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Causal Relationship between Foreign Direct Investment, Trade and Economic Growth: A Cross Country Analysis

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Abstract
The study empirically investigated the casual link between foreign direct investment, trade and economic growth in case of Pakistan, India and Bangladesh. For empirical purpose we used annual time series data for the years 1980-2010. In this study it is tried to find out that is there casual link between FDI trade and GDP in case of selected countries, and if causality exists then what is the direction of causality. ADF unit root test is used to check the stationarity of the data. Granger causality test has been used for estimating the casual relationship. Auto Regression Distributive Lag is used to estimate long run and short run relation among the variables. The empirical results revealed that all the variables are integrated of order one. Empirical results of Granger causality test revealed that in case of Pakistan there is bidirectional causality between FDI and economic growth and unidirectional causality from FDI to trade. In case of India there is unidirectional causality from economic growth to remittances and from remittances to trade. Furthermore, in case of Bangladesh there is unidirectional relationship between FDI to economic growth, trade to economic growth, remittances to economic growth and trade to FDI while bidirectional causality from between remittances and FDI and remittances and trade.
Keywords: Gross Domestic Product; Foreign Direct Investment; Exports; Granger Causality

1. Introduction

It is well documented in the literature that foreign direct investment (FDI) plays a positive role in the process of economic growth. Foreign affiliates of transnational corporation (TNCs) succeed in developing new products and technologies faster than local firms, thereby exerting competitive pressure and forcing local firms to imitate and innovate (Thamos, et al., 2008). This is one of the important reasons why developing countries are eager to attract FDI. Many developing countries including Pakistan faces the problem of saving-investment gap and FDI influences the process of economic growth by filling up this gap, increasing productivity, transferring advanced technology, employment creation and enhancing competition (Kobrin, 2005; Le and Ataullah, 2006). These benefits have encouraged the developing countries to liberalize their FDI policies in order to attract FDI inflows. Like many other developing countries, Pakistan has thrown its doors wide open to FDI, which is expected to bring huge benefits. However, unlike China and India, Pakistan has not been successful in obtaining substantial and consistent FDI inflows (Khan and Khan, 2011). Furthermore, the meager inflows that the country has received have not been utilized appropriately to enhance the economic performance (Le and Ataullah, 2006).
In the light of expected benefits of FDI, many studies have been carried out to examine the impacts of FDI on growth. However, theories and empirics appear to provide mixed evidence regarding the impact of FDI on economic growth in developing countries. This paper investigated empirically the direction of causality between foreign direct investment inflows (FDI), trade and economic growth (GDP) in the case of Pakistan, India and Bangladesh.

2. Review of Literature

This section is devoted to present a brief review of the earlier works on the relationship between FDI inflows, trade and economic growth at national and international level.

Khan and Leng (1997) examined the interactions among inward–FDI, exports and economic growth for Singapore, Taiwan and South Korea, at the aggregate level during the period from 1965 to 1995 by using Granger causality test. They claim that there is no evidence to support the causal relationship between FDI and Exports in Taiwan and South Korea. Furthermore, a one–way causal relationship which flows from exports to inward FDI is found in Singapore.

Liu, et al. (2001) examined the causal relationship between inward FDI and foreign trade between

China and 19 economies by using the Granger causality test during the period 1984 to 1998. The result reveals that the growth of imports in China leads to the growth of inward FDI in China.

Liu, et al. (2002) investigated the causal relationship between inward FDI, trade and economic growth in China at the aggregate level from 1981 to1997 on a quarter bases. A two–way causal relationship between inward FDI and exports is found.

Karbasi, et al. (2002) analysed the role of FDI and trade in promoting economic growth across selected developing countries and the interaction among FDI, trade and economic growth. They examined data from forty two developing countries over the last three decades. The study results suggest that FDI, trade, human capital and domestic investment are important sources of economic growth for developing countries and FDI stimulates domestic investment.

Alia and Ucal (2003) investigated the causal links among inward FDI, exports and economic growth in Turkish economy during the period of 1987 to 2002 on a quarter bases. The linkage of FDI–led export growth is not found in Turkey.

Metwally (2004) investigated the relationship between FDI, exports and economic growth in three European Union (EU) countries, Viz., Egypt, Jordan and Omen, during the period from 1981 to 2000 by using a simultaneous equation model. The result suggests that the export of goods and services is strongly influenced by the inward FDI in these three countries.

Dritsaki, et al. (2004) investigated the relationship between trade, Foreign Direct Investment (FDI) and economic growth for Greece over the period 1960-2002. The co-integration analysis suggested that there is a long–run equilibrium relationship among the above variables. The results of Granger causality test showed that there is a causal relationship between the economic growth, trade and FDI.

Baliamoune–Lutz (2004) examines the causal relationship between FDI, Exports and economic growth in Morocco from 1973 to 1999 by using the Granger causality test. The result shows that there is a two – way causal relationship between FDI and exports at a national level.

Zhang (2005) examines the role of FDI on Chinese export performance. The investigation is not only the estimates of full sample of industries. The result indicates that FDI has a superior influence on export performance in China at the industrial level.

Pacheco–Lopez (2005) demonstrated the causal relationship between inward FDI and Export performance on Mexico by using the Granger causality test. The result indicates that there is a bi – directional causality between inward FDI and export performance.

Hsiao and Hsiao (2006) examined the Granger causality relations between GDP, Exports and FDI among East and Southeast Asia. They estimated the VAR and VECM of the three variables to find various Granger Causal relations for each of the eight economies and they used the fixed effects and random effects approaches to estimate the panel data VAR equations for Granger Causality tests.

Wong and Tang (2007) investigated that Foreign Direct Investment (FDI) has contributed significantly to Malaysia's electronics exports as well as the growth and development of the electronics industry.

Pramadhani, et al. (2007) examined the causal relationships between inward direct investment, growth and trade in Indonesia for the period 1990 – 2004. They seek to establish whether there were strong, weak positive or negative associations between the presences of multinational enterprises and Indonesian exports and imports determent the causal links between the variables.

3. Data and Methodology

Time series data is used in the present study for the period of 1980-2010 that is obtained from World Development Indicators. Economic growth is measured by GDP (current US$), FDI measured by Foreign Direct Investment net inflows, and trade is measure by exports plus imports. If these variables share a common stochastic trend and their first difference is stationary, then they can be co-integrated.

To check stationarity of time series we used ADF unit root test. Auto Regression Distributive Lag is used to estimate long run and short run relation among the variables, furthermore Granger Causality test used in time series analysis to examine the direction of causality between three economic series. We estimate the causal relationship between foreign direct investment, trade and economic growth in case of Pakistan, Bangladesh and India. The Granger-type test states that, if a variables x and z Granger Causes variable y, the mean square error (MSE) of forecast of y based on the past values of three variables are lower than that of a forecast that uses only past values of y. This Granger test is implemented by running the following regression.

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{n} \beta \Delta y_{t-i} + \sum_{i=1}^{n} \gamma \Delta x_{t-i} + \sum_{i=1}^{n} \lambda \Delta z_{t-i} + \varepsilon_t$$

and testing the joint hypothesis H0: $\gamma 1 = \gamma 2 = \ldots\ldots \gamma p = 0$ and H0: $\lambda 1 = \lambda 2 = \ldots\ldots \lambda p = 0$ against H1: $\gamma 1 \neq \gamma 2 \neq \ldots\ldots \gamma p = 0$ and H0: $\lambda 1 \neq \lambda 2 \neq \ldots\ldots \lambda p \neq 0$. Granger Causality from the variable y to the coincident variables x and z is established if the null hypothesis of the asymptotic Chi–Square ($\chi 2$) test is rejected.

4. Results and Discussion

In the first step stationarity of the data is checked by applying unit root test. Results for unit root test applied on the economic series for Pakistan, India and Bangladesh are reported in table 1 to 3 respectively. Results indicate that all the selected series are not stationary at level when ADF unit root is applied with constant type equation. All the selected economic series are stationary at 1st difference or integrated of order one. Results are reported below:

Table 1: Unit Root Test of the Growth rate of variables for Pakistan

ADF Statistics			
Variables		**Intercept**	
		Level	**First Difference**
Y		3.625282	-3.349718
FDI		1.666138	-2.640373
TRADE		1.495462	-4.541736
REMI		-1.767744	-5.350138
Critical values	1%	-3.752946	-3.670170
	5%	-2.998064	-2.963972
	10%	-2.638752	-2.621007

Table 2: Unit Root Test of the Growth rate of variables for India

ADF Statistics			
Variables		**Intercept**	
		Level	**First Difference**
Y		3.261649	-8.035520
FDI		2.310343	-7.128750
TRADE		5.116465	--5.691648
REMI		-0.572667	-4.892204
Critical values	1%	-3.737853	-3.699871
	5%	-2.991878	-2.976263
	10%	-2.635542	-2.627420

Table 3: Unit Root Test of the Growth rate of variables for Bangladesh

ADF Statistics			
Variables		**Intercept**	
		Level	**First Difference**
Y		2.802483	-6.140083
FDI		4.575779	-4.911323
TRADE		6.144294	-14.73228
REMI		0.993402	-4.088737
Critical values	1%	-3.670170	-3.689194
	5%	-2.963972	-2.971853
	10%	-2.621007	-2.625121

Auto Regression Distributive Lag is used to estimate long run and short run relation among the variables. Results are given in the following tables for Pakistan, Bangladesh and India. Table 4 to 6 shows the estimates for ARDL bound testing approach to co integration. The calculated F-statistics in case of Pakistan, India and Bangladesh are 8.9098, 6.4658 and 6.3027 respectively when economic growth, foreign direct investment and trade are included in the model. According to the table F-statistic is higher than upper bond value both at 5 percent and 10 percent level of significance. This implies that co integration exists among economic growth, FDI and trade over the period of 1980-2010.

Table 4: Results of ARDL Co-integration Test in case of Pakistan

F-Statistic= 8.9098		
Level of Significance	**Lower Bound**	**Upper Bound**
5 %	2.8013	4.0815
10 %	2.2013	3.3688

Table 5: Results of ARDL Co-integration Test in case of India

F-Statistic= 6.4658		
Level of Significance	**Lower Bound**	**Upper Bound**
5 %	2.8013	4.0815
10 %	2.2013	3.3688

Table 6: Results of ARDL Co-integration Test in case of Bangladesh

F-Statistic= 6.3027		
Level of Significance	**Lower Bound**	**Upper Bound**
5 %	2.8013	4.0815
10 %	2.2013	3.3688

The following tables show the estimates of ARDL model in case of Pakistan, India and Bangladesh. Schwartz Criteria (SC) is used to select the number of lags required in the co-integration test. Results of the following tables' show that lagged period economic growth is positively and significantly affected the current period's economic growth in case of Pakistan, India and Bangladesh respectively. FDI is positively (but statistically insignificant) affected in case of Pakistan, while negatively (significantly) affected in case of Indian economy. In case of Bangladesh coefficient of current period's FDI shows insignificant estimates while lagged period's FDI is negatively affected the economic growth. Similarly trade is positively and significantly affected the economic growth in case of selected countries. Current period's remittances negatively affect the economic growth of Pakistan and Bangladesh while positively (but insignificant) in India. Lagged period's remittances affected positively the economic growth of Pakistan and Bangladesh.

Table 7: Autoregressive Distributed Lag Estimates ARDL (1,0,1,1) in case of Pakistan

Dependent Variable: Y			
Variable	**Coefficient**	**t - Statistic**	**[Prob.]**
Y (-1)	.92653 *	8.6977	[.000]
FDI	.76672	.78000	[.443]
TRADE	.83421*	4.6546	[.000]
TRADE (-1)	-.53296 *	-2.7759	[.010]
REMI	-1.2209 **	-2.0315	[.053]
REMI (-1)	1.1609 **	2.0519	[.051]
R-Squared .9501	R-Bar-Squared	.9462	
F-Statistic 38.348	Probe(F-statistic)	[.000]	
Durbin-Watson 2.299			

Note: where * and ** represents level of significance at 5 % and 10% level respectively.

Table 8: Autoregressive Distributed Lag Estimates ARDL (1,0,1,0) in case of India

Dependent Variable: Y			
Variable	**Coefficient**	**t - Statistic**	**[Prob.]**
Y (-1)	.77632*	6.5283	[.000]
FDI	-12.575 *	-5.3521	[.000]
TRADE	.8114*	4.1518	[.000]
TRADE (-1)	.5373*	2.3440	[.027]
REMI	7.189	.48232	[.634]
R-Squared .9601	R-Bar-Squared	.9506	
F-Statistic 68.348	Probe(F-statistic)	[.000]	
Durbin-Watson 2.274			

Note: where * represents level of significance at 5 % level

Table 9: Autoregressive Distributed Lag Estimates ARDL (1,1,0,1) in case of Bangladesh

Dependent Variable: Y			
Variable	**Coefficient**	**t - Statistic**	**[Prob.]**
Y (-1)	.87010 *	22.6299	[.000]
FDI	.50019	.19278	[.849]
FDI (-1)	-4.7559 *	-2.1836	[.039]
TRADE	.28055 *	2.6828	[.013]
REMI	-8.3508 *	-1.9862	[.059]
REMI (-1)	1.8709 *	4.1282	[.000]
R-Squared .9504	R-Bar-Squared	.9465	
F-Statistic 71.16	Probe(F-statistic)	[.000]	
Durbin-Watson 2.171			

Note: where * represents level of significance at 5 % level

Result of the following tables show the short run relationship among the variables. The results indicate that in short run FDI is positively (but insignificantly) affected the economic growth of Pakistan and Bangladesh; trade is positively related to economic growth of selected countries. Remittances affect negatively the economy of Pakistan and Bangladesh in the short run.

Table 10: Error Correction Representation for the Selected ARDL Model in case of Pakistan

Dependent Variable: Y			
Variable	**Coefficient**	**t - Statistic**	**[Prob.]**
FDI	.7667	.78000	[.442]
TRADE	.8342	4.6546	[.000]
REMI	-1.122	-2.0315	[.053]
ECM(-1)	-.0734	-.68970	[.496]
R-Squared .8554	R-Bar-Squared	.8253	
F-Statistic 47.331	Probe(F-statistic)	[.000]	
Durbin-Watson 2.299			

Table 11: Error Correction Representation for the Selected ARDL Model in case of India

Dependent Variable: Y			
Variable	**Coefficient**	**t - Statistic**	**[Prob.]**
FDI	12.575	-5.3521	[.000]
TRADE	.81144	4.1518	[.000]
REMI	7.189	.48232	[.634]
ECM(-1)	-.22368	-1.8810	[.071]
R-Squared .7932	R-Bar-Squared	.7601	
F-Statistic 31.962	Probe(F-statistic)	[.000]	
Durbin-Watson 2.274			

Table 12: Error Correction Representation for the Selected ARDL Model in case of Bangladesh

Dependent Variable: Y			
Variable	**Coefficient**	**t - Statistic**	**[Prob.]**
FDI	.50019	.19278	[.849]
TRADE	.28055	2.6828	[.013]
REMI	-8.3508	-1.9862	[.058]
ECM(-1)	-.12990	-3.3785	[.002]
R-Squared .8705	R-Bar-Squared	.8435	
F-Statistic 53.787	Probe(F-statistic)	[.000]	
Durbin-Watson 2.171			

In the above tables the coefficient on the lagged error-correction term is significant in case of India and Bangladesh, which confirms the result of the bounds test for cointegration. Its value is estimated to -0.22 and -0.12 for India and Bangladesh respectively, which implies the speed of adjustment to equilibrium after a shock. Approximately 22% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year in case of India while 12% in case of Bangladesh. In case of Pakistan the coefficient on the lagged error-correction term is insignificant.

In the following tables results of Granger Causality test are presented for Pakistan, India and

Bangladesh. Results of 13 indicate that there is bidirectional causality between FDI and economic growth and unidirectional causality from FDI to trade in case of Pakistan. Results of table 14 indicate that there is unidirectional causality from economic growth to remittances and from remittances to trade in case of India. Furthermore, In case of Bangladesh our empirical results in table 15 indicate that there is unidirectional relationship between FDI to economic growth, trade to economic growth, remittances to economic growth and trade to FDI while bidirectional causality from between remittances and FDI and remittances and trade.

Table 13: Granger Causality test in case of Pakistan

Null Hypothesis	Observations	F-Stat	Prob.	Decision
FDI does not Granger Cause Y	29	3.32332	0.0532	Reject
Y does not Granger Cause FDI		8.07151	0.0021	Reject
TRADE does not Granger Cause Y	29	0.00936	0.9907	Fail to reject
Y does not Granger Cause TRADE		1.43091	0.2588	Fail to reject
REMITENCE does not Granger Cause Y	29	0.25435	0.7775	Fail to reject
Y does not Granger Cause REMITENCE		0.41394	0.6657	Fail to reject
TRADE does not Granger Cause FDI	29	21.2052	5.E-06	Fail to reject
FDI does not Granger Cause TRADE		6.61350	0.0052	Reject
REMITENCE does not Granger Cause FDI	29	0.09847	0.9066	Fail to reject
FDI does not Granger Cause REMITENCE		0.33850	0.7162	Fail to reject
REMITENCE does not Granger Cause TRADE	29	0.05722	0.9445	Fail to reject
TRADE does not Granger Cause REMITENCE		0.24161	0.7873	Fail to reject

Table 14: Granger Causality test in case of India

Null Hypothesis	Observations	F-Stat	Prob.	Decision
FDI does not Granger Cause GDP	29	0.88843	0.4244	Fail to reject
GDP does not Granger Cause FDI		42.9973	1.E-08	Fail to reject
TRADE does not Granger Cause GDP	29	2.23859	0.1284	Fail to reject
GDP does not Granger Cause TRADE		59.1479	5.E-10	Fail to reject
REMITENCE does not Granger Cause GDP	29	1.16424	0.3292	Fail to reject
GDP does not Granger Cause REMITENCE		2.80097	0.0807	Reject
TRADE does not Granger Cause FDI	29	15.2761	5.E-05	Fail to reject
FDI does not Granger Cause TRADE		20.5830	6.E-06	Fail to reject
REMITENCE does not Granger Cause FDI	29	0.92788	0.4091	Fail to reject
FDI does not Granger Cause REMITENCE		0.87575	0.4294	Fail to reject
REMITENCE does not Granger Cause TRADE	29	5.14183	0.0139	Reject
TRADE does not Granger Cause REMITENCE		1.55013	0.2327	Fail to reject

Table 15: Granger Causality test in case of Bangladesh

Null Hypothesis	Observations	F-Stat	Prob.	Decision
FDI does not Granger Cause GDP	29	2.60741	0.0945	Reject
GDP does not Granger Cause FDI		2.18710	0.1341	Fail to reject
TRADE does not Granger Cause GDP	29	2.99987	0.0687	Reject
GDP does not Granger Cause TRADE		0.01442	0.9857	Fail to reject
REMITENCE does not Granger Cause GDP	29	9.98701	0.0007	Reject
GDP does not Granger Cause REMITENCE		1.17829	0.3250	Fail to reject
TRADE does not Granger Cause FDI	29	2.61290	0.0940	Reject
FDI does not Granger Cause TRADE		0.066282	0.5246	Fail to reject
REMITENCE does not Granger Cause FDI	29	4.65364	0.0196	Reject
FDI does not Granger Cause REMITENCE		4.04053	0.0307	Reject
REMITENCE does not Granger Cause TRADE	29	2.69932	0.0876	Reject
TRADE does not Granger Cause REMITENCE		4.15734	0.0282	Reject

5. Conclusion

The paper examines the dynamic causal relationship among the series of economic growth, foreign direct investment and trade in case of Pakistan, India and Bangladesh for the period of 1980-2010. It implements ARDL model to cointegration to investigate the existence of a long run relation among the above noted series;

and the Granger causality to test the direction of causality between the variables. The topic merits special importance due to the possible interrelations among the series with implications for economic growth. The results show that there is cointegration among the variables specified in the model. Results indicate that in case of Pakistan there is bidirectional causality between FDI and economic growth and unidirectional causality from FDI to trade. In case of India there is unidirectional causality from economic growth to remittances and from remittances to trade. Furthermore, in case of Bangladesh there is unidirectional relationship between FDI to economic growth, trade to economic growth, remittances to economic growth and trade to FDI while bidirectional causality from between remittances and FDI and remittances and trade. This finding generates important implications and recommendations for policy makers in Pakistan, India and Bangladesh. The results suggest that for FDI to bring in the anticipated positive impacts on economic growth, government will undertake serious reforms with clear objectives and strong commitments.

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