The Causal Relationship between FDI and Trade Balance of Bangladesh

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ABSTRACT

This paper examines the relationship between net capital inflows (FDI) and the trade balance of Bangladesh, for the period of 1972 to 2011. The first question asks whether the cyclical volatility in trade balance can be explained by the volatility of capital inflows. The second question addresses the causal link between net capital inflows and international trade imbalances. The results indicate that FDI and trade balance (Exp_Imp) are cointegrated and there is a unidirectional causality from FDI to trade balance. Using the granger causality Wald test there is evidence in the data that FDI does affect the trade balance of Bangladesh in the long run. In contrast, no long run causality, in the Granger sense, was found in the opposite direction.

Keywords: FDI, trade balance, cointegrated, granger causality, Bangladesh

INTRODUCTION

The balance of payments accounts maintain the record of the payments to and receipts from other countries for a particular period. One of the three main sections of balance payment is the current account finance, which includes export and imports of goods and services, as well as income receipts (Hill, 2009). The influence of Foreign Direct Investment (FDI) on the level of economic activity has been broadly explored in various researches in recent years for different countries. These results imply that the inflow of FDI has both positive and negative impact on the economy depending on specific circumstances. Overall, FDI has a positive impact on economic growth but the enormity of the outcome depends on the availability of matching resources, like technology natural and human capital. FDI not only influences the domestic investment climate of a country, it also transforms current account balance. But the magnitude of impact of FDI on foreign trade always depends on the dependency of export and import on foreign investment (Hossain, 2011). If FDI raises the export performance, then a country will be able to reduce current account deficit and improve its growth performance. The aggregate demand of the goods and services of the economy will go up creating welfare for the people. On the other hand, if FDI encourages higher import without any value addition, that might put downward pressure on the current account finance of the economy (Sekkat and Varoudakis, 2004).

Previous researchers have found that FDI has little influence on the level of remittance received but has a significant weight on the trade balance. Thus to understand the effect of FDI on the current account balance it is important to measure the short run and long run relationship between FDI and trade balance. According to Ponomereva (2000) high intensity of FDI increases the production capability, employment and income level, economic growth of a country. It also assists in transfer of technology from a developed country to a developing country. FDI can help accumulate capital, transfer latest knowledge to produce

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new export goods, provide supports in accessing new profitable markets and offer advance training for the domestic workforce. All these factors can boost the export of an economy and subsequently acquire positive current account balance (Temiz and Gokmen, 2009).

On the other hand, FDI often puts downward pressure on the current account balance by increasing the demand of imported goods and services both at the beginning and the operational stages of the investment. Often industries created through FDI uses imported raw materials which may generate adverse effect on the trade balance and current account balance (Hailu,2010).

Researchers have conducted studies on the causal relationship between the FDI and current account balance for various countries. But most of the empirical results are based on cross sectional and cross-country analysis and the studies often focused on whether output produced from FDI, complements or substitutes exporting goods and services. Moreover, very few works have been completed to find the causal relationship between FDI, trade balance and current account balance for Bangladesh with time series date for the period of 1972 to 2011. The current study chooses to fill the gap by analysing the issue with granger causality test to find both long run and short run relationship between FDI and trade balance in case of Bangladesh. Most of the empirical works have linked FDI with current account balance to measure the overall effect on balance of payment of a country.

The calculation of current account balance (CAB) is comprised of four variables, export and import of goods and services, net income abroad and net current transfer. According the Bangladesh Bank data statistics from 1996-2012 it is evident that the net income abroad, doesn't not play a significant role in determining the surplus or deficit of current account balance in Bangladesh. The amount of net income abroad has remained less than 5% of the total CAB, consistently, during that period. Again, the other key variable net current transfer which mainly includes worker's remittances, donations, aids, grants and official assistance are considered as real resources that can affect countries productivity. According to our understanding, no researchers have concluded that FDI has a direct relationship with any of these variables of net current transfer. Moreover, the contributions of net current transfer to the current account balance of Bangladesh are significant only due to workers' remittances.

According to World Bank data 2013, the ratio of total GDP to official and non official aid of Bangladesh, have declined continuously for the last 20 years. Only high growth rate of remittance income has helped Bangladesh to attain positive current account balance and increase it reserve to $20 billion by early 2014 (Bangladesh Bank data). The data shows a continuous growth in remittance for the last decade. FDI directly or indirectly influences the export and import of a country. But how much foreign development and non-development aid Bangladesh will get or the inflows of remittance have no direct relation with the inflow of FDI. Thus or study solely focuses on the association between FDI and current account balance of Bangladesh through FDI's influence on trade balance. The existing literature vastly accepts that in the long-run FDI has some influence on the current account balance. However, the complex relationship between FDI and trade balance is comparatively unexplored, especially in case of Bangladesh. Thus or study solely focuses on studying the association between FDI and current account balance of Bangladesh through FDI's influence on trade balance.

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LITERATURE REVIEW

Many researchers have analysed the association between FDI, export, GDP growth and balance of payments. Sahoo and Mathiyazhagan (2002) suggested a long-run relationship between GDP growth, FDI export and Industrial production. Both Ersoy (2011) and Mastroyiannis (2011) found that financial inflows induced changes the current account of Turkish and Greek economy respectively. Again, Mastroyiannis (2012) examined the Granger causality among current account and FDI for the Portuguese economy for the period of 1980 to 2009. The findings show unidirectional causal relation in the long-run from FDI to current account and a bidirectional relationship in the short-run between the two variables. Researchers like Turner (1991), Chuhan et al (1996), Bosworth & Collins (1999), Sarno & Taylor (1999) came to similar conclusion that FDI is an important element of capital inflow for the developing countries. They also advocated the long-term relationship between FDI and balance of payments. Along with influencing the balance of payments, FDI also changes the other key factors related to international trade. Sekkat and Varoudakis (2004) found that FDI inflow increases a country's productivity and technological capability. Thus FDI can influence the host country's trade balance and balance of payments. Similar view was presented by Temiz and Goken (2009). According to them FDI inspires higher export by accumulating physical capital, transferring technology and developing new products.

Phang (1998) in his study concluded that FDI helped Malaysia to increase its foreign trade and export. Similar results have been echoed in the research of Samsu, Derus & Ooi (2008). Their study demonstrated that FDI and export have long run relationship in case of Malaysia. Athukorala and Menon(1996) also commented that export oriented FDI in Malaysia enhanced the countries capability to produce global standard products.

Pacheco- Lopez (2005) conducted Granger causality test between FDI and export with the data of Mexico. The bidirectional relationship among the variables also shows that FDI promoted export in Mexico and higher export also increased the demand for foreign goods thus stimulating imports. Hailu (2010) also commented that if FDI uses foreign factors of productions and other assets, it will increase the import of the host country. Liu et al (2001) used data from China and nineteen other countries to analyze the correlation between FDI, export and import. Their study concluded that China's export and import are positively related with inflow of FDI. Iqbal et al (2010) also found similar results for Pakistan. Their co-integration analysis showed that FDI has a long-run positive impact on the foreign trade of the country.

Akbas et al (2013) analyzed data of G7 countries from 1990-2011 to establish causal relationship among current account deficit, foreign direct investment and total credits. Their result shows a unidirectional relationship among foreign direct investment and current account deficit. Kaur, Yadav & Gautam (2012) evaluated the correlation between FDI and current account balance from the context of India and there was evidence of unidirectional relationship from FDI to current account. Jayachandran & Seilan (2010) used the data from 1970-2007 for India to study the relationship between trade, FDI and economic growth. The Granger causality test showed no causality relationship from /FDI to trade. On the other hand, Sarode (2012) found that FDI has a negative impact on current a/ccount and a positive impact on the capital account in case of India.

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Erosy (2011) analyzed the interrelationship between the financial account and its components with the current account in case of Turkey. His analysis illustrates that there is uni-directional causality among FDI and current account balance. Likewise, Morande (1988) found unidirectional causality between capital account and current account for Chile and Faroque and Veloce (1990) proved bidirectional causality amongst financial and current account in case of Canada. Fry et al (1995) conducted a research with 46 developing countries and found contradictory results. According to his analysis some countries have bi directional, some have unidirectional and others have no causality between the financial and current account.

But unregulated FDI inflows can cause considerable negative pressure on the balance of payment of an economy. According to a the UNCTAD report (2002) developing countries current account might decrease considerably because of high volume of profit repatriation by the multinational companies and increase in import cost of FDI. Jansen (1995) on the other hand, used Thailand as an example to argue that though private investment grows with export oriented FDI but it has contradictory consequences for balance of payment for the host country. Again, Ahmad & Mohsin (2004) concluded in their paper that FDI inflows in Pakistan created domestic output but it did not contribute to higher export. The main reason behind the result was that most of the foreign investment in the country was focused on producing non-tradable goods and in the service sector rather than value adding export sectors. While analyzing the effects of FDI on domestic investment of the host country Agosin and Mayer (2000) found that FDI crowd outs the domestic investment both in Asia and Latin America. They concluded that FDI does not always bring positive results for a country.

Liuyong and Yanping (2007) conducted research on the relationship between FDI and current account. Their study shows that FDI is negatively related to current account and positively related to the financial account. Kiran (2010) also found no causal relation between FDI and foreign trade for Turkey using Granger causality and Dolado & Luthkepohl (1996) causality test based on the vector auto regressive model. Campbell (2001) commented in his paper regarding the negative effects of unregulated foreign capital inflow in Barbados. According to his research the yields of FDI gets grind down if the FDI encourages imports of goods and services and high investment income payments to the investing countries.

The rest of the paper is organised as follows. The next section gives a brief discussion on the type of data set used and the methodology of the study. In the third segment presents the empirical results and main findings and concluding notes are summarized in last section of the paper.

DATA AND METHODOLOGY

Data

The annual data from 1972 to 2011 is taken from International Monetary Fund, International Financial Statistics and Balance of Payments databases. Unfortunately the FDI data of 2012 was still not available when the analysis was conducted on the date 14th May, 2014. The study has also used World Bank, International Debt Statistics, and World Bank and OECD GDP estimates. Data of export and import have been collected from UNCTAD data which is presented as US Dollars at current prices and current exchange rates in millions and for FDI data World Bank National Accounts data is used which was presented as net inflow in current

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US Dollars. The analysis is based on time series data at the national level on foreign direct investment, export and import for Bangladesh. The trade balance has been calculated by subtracting yearly export data from the import data.

To analyse the relationship between FDI and trade balance, granger causality test have been used. The test is a well recognised method of examining the direction of causality between the time series data. Here, FDI refers to net inflow of foreign direct investment to Bangladesh at current US dollar and Exp_Imp represents the trade balance of Bangladesh during that period, which is the difference between export value and import value at current US dollar.

Test for Stationary

The times series econometrics studies requires the unit root test, to check if the data is stationary or non-stationary at various levels. I have used the augmented Dickey- Fuller (ADF) unit root test and the Phillips- Perron (PP) test to analyse the unit root in the time series. The regression equation for FDI (FDI) and trade balance (Exp _ Imp) for unit root is given by[1],

$$\Delta FDI_t = \alpha FDI_{t-1} + \beta_1 \Delta FDI_{t-1} + \beta_2 \Delta FDI_{t-2} + \ldots\ldots\ldots + \beta_p \Delta FDI_{t-p} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$\Delta Exp\_Imp_t = \alpha Exp\_Imp_{t-1} + \beta_1 \Delta\ Exp\_Imp_{t-1} + \beta_2 \Delta Exp\_Imp_{t-2} + \ldots\ldots + \beta_p \Delta Exp\_Imp_{t-p} \ldots \quad (2)$$

here ΔFDI is the first difference of FDI and ΔExp_Imp is first difference term of export minus import in other words trade balance. The test of unit root is conducted on the coefficient of FDI_{t-1}. If the beta values are significantly different from zero, then we reject the null hypothesis that FDI contains unit root. PP test is an alternative method to correct serial correlation in unit root testing. It is similar to ADF but modifies t-ratio such that asymptotic distribution of test statistic is unaffected by serial correlation. ADF test uses parametric autoregressive structure to identify serial correlation as compared to PP test which uses non-parametric corrections. The result shows that the null hypothesis of a unit root in the time series cannot be rejected for both FDI and Exp_Imp at level. But both the variables are stationary in their first differences. So it is evident that the time series data of foreign direct investment and trade balance of Bangladesh are integrated of order one, I(I).

Test of Cointrgration:

After finding the data stationary at first difference, the next step is to analyze the long term relationship between the examined variables. To measure the level of cointegration I have used Johansen and Juselius method which is based on the maximum likelihood estimation of the vector autoregressive (VAR) model to establish the number of cointegrating vectors. The Johansen test shows multiple cointegrating relationships. The test shows two test statistics (the Trace Test and the Maximum eigenvalues test) for finding the number of cointegrating vectors. The analysis is based on the following techniques[2]:

$$Y_1 = A_1 Y_{t-1} + A_2 Y_{t-1} + \ldots\ldots\ldots\ldots\ldots + A_p Y_{t-p} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

[1] Dickey, D., Fuller, W.A. (1981)- Likelihood Ratio statistics for Auto regressive Time Series with Unit Root, Econometrica,49:1057-1072

[2]. Dimitrios, A., & Stephen, G. H. (2007) - Applied Econometrics: A modern approach. Published Palgrave Macmillan, New York, Revised Ed, Pg-319

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Here Y_1 is a k-vector of non-stationary variables(n x 1) and A_i is the matrix of the parameters (n x n), þ is a lag operator and ε_t = the white noise residual of constant variance and zero mean. If $\varepsilon_t \sim I(0)$ then the variables Y_t and X_t are said to be cointegrated. Again, the Johansen's test can be explained with VAR model of order of k which is mentioned below:

$$y_t = \gamma + \sum_{i=1}^{k} A_i\, y_{t-i} + u_t \quad \text{.....(4)}$$

the equation can be written in another form;

$$\Delta y_t = \gamma + \Pi y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i\, \Delta y_{t-i} + u_t \quad \text{.....(5)}$$

Here y_t is an (n x1) vector of variables that are I(I), $\Pi = \sum_{i=1}^{k-1} Ai - I$ and $\Gamma_i = -\sum_{j=i+1}^{k-1} A_j$. If Π is a zero (0) matrix, we say the variables do not have long run relationship, that means they are not cointegrated.

In this paper the lag order (*l*) is determined using Hannan and Quinn Information Criteria (HQIC), Akaike Information Criterion (AIC) and Schwarz Bayesian Information Criterion (SBIC) which are used popularly in other literatures.

Granger Causality Test

The last step is testing for Granger causality test between the variables based on the unit root and cointegration test. The VAR model in the bivariate framework for FDI and trade balance is given by X_t is said not to Granger-cause Y_t if for all h > 0

$$F(Y_{t+h} | \Omega_t) = F(y_{t+h} | \Omega_t - X_t) \quad \text{.....(6)}$$

where F denotes the conditional distribution and $\Omega_t - X_t$ is all the information in the universe except series X_t. In basic words, X_t is said to not Granger-cause Y_t if X cannot help predict future Y.

Bivariate Granger causality tests involve using regression analysis to provide an indication of whether Lagged values of one variable x can help predict current values of another variable y. The approach involves seeing how much of the current value of y can be explained by past va lues of y and then to see whether adding lagged values of x can improve the explanation of y. Hence variable y is said tobe Granger-caused by x if x helps in the prediction of y, or equival ently if the coefficients on the lagged X's are statistically significant.

Again, the Granger causality tests for the case of two stationary variables (in this paper FDI and trade balance) involve estimating the following time series regressions[3]:

$$FDI_t = \alpha_0 + \alpha_1 FDI_{t-1} + \ldots + \alpha_l FDI_{t-l} + \beta_1 Exp\_Imp_{t-1} + \ldots + \beta_l Exp\_Imp_{t-l} + \epsilon_t \quad \text{.....(7)}$$

$$Exp\_Imp_t = \alpha_0 + \alpha_1 Exp\_Imp_{t-1} + \ldots + \alpha_l Exp\_Imp_{t-l} + \beta_1 FDI_{t-1} + \ldots + \beta_l FDI_{t-l} + u_t \quad \text{.....(8)}$$

where ϵ_t and u_t are uncorrelated error terms and involves testing $\beta_1 = \beta_2 = \ldots = \beta_l = 0$ in each regression equation (i.e. testing the null hypothesis that Exp_Imp does not Granger c ause FDI in the first regression and that FDI does not Granger cause Exp_Imp in the second r egression).

[3]. Granger, C.W. (1980).Testing for Causality, Journal of Economic Dynamics and Control, 2, 329 - 352.

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RESULTS AND DISCUSSIONS

This segment of the paper discusses the various results tested. The result presented in the table 1 and table 2 shows the unit root test. From the results it is evident that both FDI and Exp_Imp (trade balance) have unit root at levels and stationary in their first differences. Again, similar results have been established in case of ADF and PP test.

Table 1: Results of ADF and PP Test for Unit Roots at levels

Variables	*Test statistic ADF*	*Test statistics PP test*	*5% critical value*	*1% critical value*
FDI	-1.880	-1.752	-3.544	-4.251
Exp_Imp	-2.271	-2.201	-3.544	-4.251

Table 2: Results of ADF and PP Test for Unit Roots at First Difference

Variables	*Test statistic ADF*	*Test statistics PP test*	*5% critical value*	*1% critical value*
FDI	-8.304	-8.496	3.544	-4.251
Exp_Imp	-6.452	-6.549	3.544	-4.251

After conducting the stationary test, the optimum lag is selected by using Akaike information criteria (AIC), Schwartz Bayesian (SBIC) and Hannan and Quinn (HQIC). Next table shows that all the criteria have given 3 as the optimum lag. Thus, for further analysis lag order of 3(*three*) have been used to examine long run relationship between the variables.

Table 3: Lag Order Selection Criteria

Sample 1972-2011		Number of observations = 40	
Lag order	*HQIC*	*AIC*	*SBIC*
0	58.9422	58.9762	59.0334
1	56.446	56.5382	56.71
2	56.3932	56.5467	56.833
3	55.9051*	56.1201*	56.521*
4	56.0713	56.3476	56.863

**Is the optimum lag order.*

In this analysis it is evident that the time series data is integrated of order one, thus the Johansen's test for cointegration have been selected to measure the long run relationship between the variables. Table 4 represents the Johansen's cointegration test results for cointegrating rank *r*. The null hypothesis is rejected as the trace statistic 30.18 exceeds the 1% critical value (23.46), which suggests that there is certainly at least one cointegrating, vectors in each sample to shows a stable long run relation between the variables. Moreover, the max statistic also rejects the null hypothesis of no cointegration and accepts the alternative hypothesis that there is one cointegration.

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Table 4: Johansen Test of Cointegration with Trend in VAR for FDI and Exp_Imp.

H_0	H_1	*Test Statistics*	*5% critical value*	*1% critical value*
Trace statistic				
r = 0	r > 0	30.18	18.17	23.46
r ≤ 1	r >1	0.623	3.74	6.40
Max statistic				
r=0	r=1	29.56	16.87	21.47
r=1	r=2	0.623	3.74	6.40

In last part of the analysis conducted Granger causality test was conducted using Wald test to examine the causal link between FDI and Exp_Imp (trade balance). According to the vector autoregressive model, H_0 = variable X does not granger cause Y, if in the equation for Y all the coefficients of X are equal to zero.

Table 5: Granger Causality Test for FDI and Exp_Imp

Number of observations: 37	Optimum Lags =3
Null Hypothesis	*Values*
Lagged FDI does not cause Exp_Imp	18.366 (0.00)
Lagged Exp_Imp does not cause FDI	0.669 (0.88)

The Granger causality test result is presented in Table: 5.The result shows a unidirectional relationship between the two variables. There is only one way of long run causality from FDI to Exp_Imp. Here, the null hypothesis of lagged FDI does not causes Exp_Imp (trade balance) is rejected as the value is significant (0.00). The value indicates that FDI has an effect on the trade balance of Bangladesh. However, because of the insignificant value (0.88) the null hypothesis of lagged Exp_Imp does not cause FDI cannot be rejected. So, the null hypothesis is accepted that lagged Exp_Imp does not granger cause FDI for Bangladesh.

CONCLUSION

This study analyzed whether foreign direct investment, Granger cause trade balance for Bangladesh or vice versa. This paper attempted to indicate whether there is long run relationship between foreign direct investment and trade balance of Bangladesh using yearly data for the period of 1972 to 2011. It is important to examine the relationship between the two variables for a developing country like Bangladesh because if FDI causes higher trade deficit, that will decrease the current account balance and might trigger a major macroeconomic problem. On the contrary, if FDI increases the trade balance, it will improve the current account position and strengthen the economic condition of Bangladesh.

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The results indicate that FDI and trade balance (Exp_Imp) are cointegrated and there is a unidirectional causality from FDI to trade balance which means the net capital inflow (FDI) does explain the movement in international trade balance of Bangladesh for the long run but no long run causality, in the Granger sense, was found in the opposite direction.

The trade balance is a major component of the current account balance (Hill 2010). That is why the two terms are more often used interchangeably, but they are not exactly same. Bangladesh as a low income country thus cannot afford to go on the negative side of the current account balance by having high trade deficit due to inappropriate use of foreign investment. Therefore, as a policy implication changes in FDI might cause to a change in the trade balance and subsequently current account balance in the long run. This should be taken into account when policy makers of Bangladesh make a decision to develop policies for inflow foreign investment to the country.

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APPENDIX

Data Source 1: Foreign direct investment, net inflows (BoP, current US$): Source: International Monetary Fund, International Financial Statistics and Balance of Payments databases, World Bank, International Debt Statistics, and World Bank and OECD GDP estimates.
http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=world-development-indicators#

http://www.indexmundi.com/facts/bangladesh/foreign-direct-investment.
http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sRF_ActivePath=p,5&sRF_Expanded=,p,5

Data Source 2: World Bank national accounts data, and OECD National Accounts data files. http://www.indexmundi.com/facts/bangladesh/exports-of-goods-and-services.
http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=world-development-indicators . International Monetary Fund, Balance of Payments Statistics Yearbook and data files. Source: International Monetary Fund, Balance of Payments Statistics Yearbook and data files. http://www.indexmundi.com/facts/bangladesh/imports-of-goods-and-services.
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