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## DOMESTIC AND FOREIGN INCOMES AND TRADE BALANCE - A CASE OF SOUTH ASIAN ECONOMIES



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### ABSTRACT

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The persistent trade deficit is one of the common issues of South Asia specifically, Bangladesh, India and Pakistan. While an increase in domestic income can help in the movement from import based economy to the economy with export capacity (quadratic effect), but quadratic effect of the world income must also be evaluated as it creates demand for exports. This study has adapted Kuznets curve hypothesis to propose U shaped and inverted U shaped relationship of domestic income and world income respectively on the trade balance. By estimating Panel ARDL model using the data for three selected economies, this study has confirmed the U shaped and inverted U shaped relationship with respect to domestic income and world income respectively. Further policymakers can moderate domestic income effect to minimize trade deficit by boosting terms of trade and FDI.

**Contribution/ Originality:** This study is one of very few studies which have employed quadratic function for domestic and foreign in investigating its effect on trade balance of countries in South Asia, which enables to optimize policy based on the incidence of incomes.

### 1. INTRODUCTION

One of the common characteristics of developing countries is the persistent deficit in the trade balance. Developing countries are usually characterized by exports based on agricultural goods and imports of finished industrial goods. It is a well-known fact that industrial goods are valuable as compared to agricultural goods. Because of such reason, the import bills of these countries are higher than export revenue leading to the trade deficit. Being part of developing economies, the same is the problem also exists in Bangladesh, India and Pakistan. Following Figure 1 shows the historical pattern of the trade balance, where only India experienced a trade surplus once. These prolonged periods of trade deficit could be because of high dependency on imports of consumer and capital goods, and this translates to high inflation (Rich and Rissmiller, 2000; Ball, 2006) dependency on debt (Pattillo *et al.*, 2002) and vulnerability to exchange rate fluctuations. While study like (Gould and Ruffin, 1996) failed to find any association between the trade deficit and economic growth.

## Trade balance

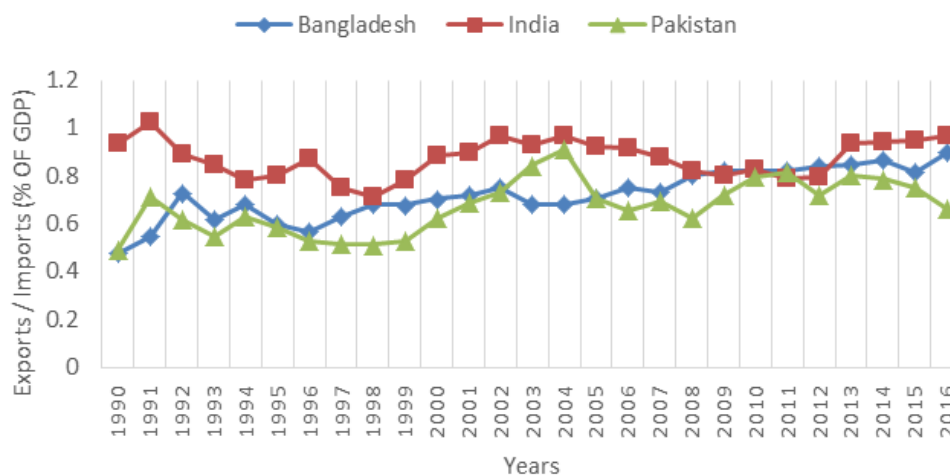


Figure-1. Historical pattern of trade balance.

There are many reasons behind the deficit in trade balance, but one of the main reasons is an increase in national income (Jhingan, 2006). Increase in national income leads to increase in purchasing power of the consumers, and it leads to increase in the volume of imports, thus resulting in a deficit in trade balance (Majeed and Shah, 2014). The same case is also happening in many of the developed countries (Kim, 1996; Christensen, 2012; Bardakas, 2013). However, some countries become able enough to channel the national income into improving their trade balance (Duasa, 2007; Ng *et al.*, 2008; Hailu, 2010; Kipkosgei, 2011; Christensen, 2012; Gzaw, 2015). These countries are those who have used the national income to increase exports, and it is because higher income incentivizes domestic production to catch up.

While studying the trade balance, one must not ignore the other side of the coin where a country can only export its goods if there is demand for their products abroad. Here foreign income also has an impact because if the income is increasing in the rest of the world, it means demand for domestic goods may rise (Ray, 2012). The positive effect may not last forever if the domestic goods are substitutable, there are instances where countries face trade deficit because of changes in world demand for domestic goods (Ng *et al.*, 2008).

The role of domestic and foreign incomes on the trade balance is traced with the help of the popular theory of development economics known as Kuznets curve (Kuznets, 1956;1955). Adapting from this theory, it is proposed income-trade Kuznets curve which specifies that increase in domestic income initially fulfils the deficient necessities or luxuries from abroad, because of this, demand for imports expands (Melo and Vogt, 1984; Kale, 2001). However, a persistent rise in demand increases opportunities for local producers and entrepreneurs to innovate and substitute the imports which eventually lead to an increase in export base (Majeed *et al.*, 2006). All in all, domestic income traces a U shaped relationship with trade balance. Such a relationship of domestic income and trade balance can also be channelled by another theory known as J curve phenomenon whereby exchange rate devaluation initially increased trade deficit but in long run exports boost leads to trade surplus (Rose and Yellen, 1989; Arora *et al.*, 2003; Rehman and Afzal, 2003; Aftab and Khan, 2008; Hameed and Kanwal, 2009).

Further, to export, world demand is necessary. An initial increase in the world income, increases demand for domestic goods in the form of exports (Goldstein and Khan, 1978; Kale, 2001; Santos-Paulino and Thirlwall, 2004; Mann and Plück, 2005; Jongwanich, 2010; Gupta *et al.*, 2015; Thomas, 2016) but, if there is a persistent rise in this demand, producers in the rest of the world will imitate or innovate the substitutes leading to reduce exports and trade balance (Jongwanich, 2010). Consequently, foreign income traces an inverted U shaped relationship with the trade balance.

This process of non-linear relationship effect domestic and foreign income on trade balance depends on the terms of trade (offer curve approach, Islam *et al.* (2013). Here improvement regarding trade leads to improve the

trade balance (Lopes and Sequeira, 2014). There are a few cases where terms of trade do not affect the trade balance (Hamori, 2008). Similarly, resources and innovation from abroad can moderate income – trade balance relationship, fundamentally, FDI has positively related to trade balance (Hailu, 2010; Jayakumar *et al.*, 2014). However, if FDI only boosts taste for foreign goods or it boosts services sector income, it can increase the deficit in trade balance (Dinh and Tran, 2014; Marinela, 2015).

### 1.1. Objectives of the Study

The objectives of this study are to examine the non-linear effect of domestic and foreign income per capita on the trade balance of the country based on trade Kuznets curve. Further, this study will use policy options relevant to domestic income, terms of trade and FDI to investigate whether it can moderate the non-linear effect.

## 2. LITERATURE REVIEW

The empirical studies which play a complementary role in the fulfilment of research objectives are discussed below. According to a theoretical explanation of determinants of trade by Bahmani-Oskooee (1992) an increase in the income leads to trade deficit, which can only be controlled using contractionary fiscal policy. While, Kim (1996) discussing the effect of income on trade balance for the case of countries like United States, Japan, Germany and United Kingdom, concluded that the negative and positive effect of income depends on the business cycle. However, eventually, domestic income improves the trade balance (Hailu, 2010; Kipkosgei, 2011; Christensen, 2012; Gzaw, 2015).

Also, Singh (2002) used domestic income, foreign income and exchange rate as an indicator for trade balance. Here domestic income has a significant positive effect on trade balance which is also confirmed by Duasa (2007) for the case of India, while Singh (2002) iterated that foreign income has an insignificant adverse effect on the trade balance. Ng *et al.* (2008) for the case of Malaysia, Kipkosgei (2011) and Majeed and Shah (2014) confirmed the same results which were provided by Singh (2002). Previous outcomes are opposed by Ray (2012) and Thomas (2016) and concluded that world income has a positive and significant impact on the trade balance.

While exploring the dynamics of the trade balance in detail, according to Cushman (1987) increase in domestic (exporter country) nominal income, increases exports for UK (by 2.92%), Italy (by 2.23%), France (by 2.43%), and Netherlands (by 1.28%). Similarly, the increase in domestic income decreases imports for Japan (by 2.03%), and Italy (by 5%). This confirms that domestic income improves the trade balance. For the case of foreign (importer country) income, it reduces exports of Netherland (by 1.99%) and while it increases imports of Japan (by 4.88%), Germany (by 3.59%), UK (by 1.88%), Italy (by 5.56%) and France (by 4.02%). This concludes that increase in foreign income reduced trade balance.

Goldstein and Khan (1985) summarized several empirical studies (like (Houthakker and Magee, 1969; Basevi, 1973; Samuelson, 1973; Taplin, 1973; Deppler and Ripley, 1978; Goldstein and Khan, 1978; Balassa, 1979; Wilson and Takacs, 1979; Geraci and Prewo, 1982)) and provided the income elasticity of exports and imports. While it was evident that for both cases of exports and imports, an increase in income has a positive effect. But whether domestic income will lead increase or decrease in the trade balance is inconclusive as there were mixed outcomes of import elasticity greater and export elasticity and vice versa.

Bardakas (2013) presented the relationship between income and imports in his working paper. According to his findings, imports tend to increase in response to income. Similarly, Bernasconi and Wuergler (2012) tried to capture the impact of income on imports. For this purpose, they have selected 123 cross-section countries from different regions of the world. The main finding of this study is that there is a positive relationship between income and imports. Hailu (2010) and Dinh and Tran (2014) also indicated that FDI is an essential determinant, which improves the trade balance of the host country. However, a study by, Marinela (2015) tried to find out the impact of

FDI on the trade balance of the Romanian economy. Basically, in this study, he has checked the impact of FDI on exports and imports one by one. The findings indicate that FDI is causing an increase in the trade deficit.

Backus *et al.* (1994) explored the effects of the terms of trade on the trade balance of economies like Finland, France, Italy, Japan, Switzerland, United Kingdom and United States. Where other than US all countries showed a negative relationship between terms of trade and trade balance. While a study by Hamori (2008) tested the effect of terms of trade as a critical factor which affects the trade balance for the G7 countries. According to his findings trade balance is not affected by terms of trade, because there is no co-integration between them. Similarly, Islam *et al.* (2013) have captured the impact of terms of trade on trade balance for Bangladesh. The findings of this study are indicating that improvement regarding trade leads to improve the trade balance. While the debate is discussed by Backus *et al.* (1992) that the present terms of trade negatively influences the trade balance while positively has an effect past terms of trade. Previous studies have overlooked to explore the quadratic effect of the domestic income and foreign income on the trade balance. Based on the prevalent trade deficit in Bangladesh, India and Pakistan, studying the non-linear pattern of income may help in devising a strategy for managing trade balance.

### 3. METHODOLOGY

#### 3.1. Theoretical Model

Figure 2 provides the theoretical model which this study intends to test. Here it is hypothesized that increase in the domestic income initially motivates imports of consumers and capital goods hence leads to decrease in the trade balance while later on, in the long run, it leads to increase in production of exportable goods, leading to increase in the trade balance. On the other hand, increase in world income will initially increase the demand for domestic goods leading to increase in the domestic trade balance, while in the long run, they become net exporter leading to decrease in the domestic trade balance.

Hence domestic income is expected to form U shaped while foreign income is expected to form an inverted U shaped relationship with the trade balance. Upon testing of this hypothesis, this study will calculate the threshold value beyond which domestic income increases trade balance, and foreign income decreases trade balance and exploring the position of Bangladesh, India and Pakistan concerning these thresholds.

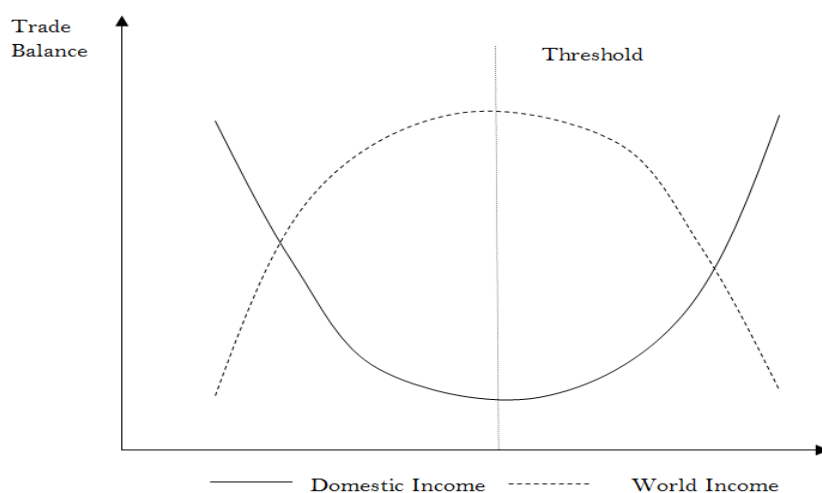


Figure-2. Theoretical model.

#### 3.2. Model

In this study, three models are used, where the first one (Equation 1) is the base model having quadratic functions of domestic income and foreign income. While the other two models Equations 2 and 3 use FDI and Terms of Trade as controlling variables to check the robustness of the thresholds.

$$TB_{it} = \beta_0 + \beta_1 GNID_{it} + \beta_2 GNID_{it}^2 + \beta_3 GNIW_{it} + \beta_4 GNIW_{it}^2 + e_{it} \quad (1)$$

$$\delta TB / \delta GNID = \beta_1 + 2\beta_2 GNID, \quad \delta TB / \delta GNIW = \beta_3 + 2\beta_4 GNIW$$

for optimal GNID and GNIW

$$\beta_1 + 2\beta_2 GNID^* = 0$$

$$GNID^* = -\beta_1 / 2\beta_2$$

Similarly,

$$GNIW^* = -\beta_3 / 2\beta_4$$

$$TB_{it} = \beta_0 + \beta_1 GNID_{it} + \beta_2 GNID_{it}^2 + \beta_3 GNIW_{it} + \beta_4 GNIW_{it}^2 + \beta_5 FDI_{it} + e_{it} \quad (2)$$

$$TB_{it} = \beta_0 + \beta_1 GNID_{it} + \beta_2 GNID_{it}^2 + \beta_3 GNIW_{it} + \beta_4 GNIW_{it}^2 + \beta_5 TOT_{it} + e_{it} \quad (3)$$

### 3.3. Data Sources

This study focuses on time series data collected from the World Development Indicator (WDI) for the period 1990 to 2016. All the variables are in natural log form firstly to convert the variable to relative form to generate elasticities rather than slopes and secondly to smooth and scale any abrupt changes in the data which might lead to non-normal kurtosis or heteroscedasticity (Gujarati, 2009; Benoit, 2011). The countries under consideration in this study are Bangladesh, India and Pakistan. The variables used in the study are mentioned in Table 1 with definitions and sources.

**Table-1.** Variables used in this study.

Variable (symbol)	Definition	Source
Trade Balance (TB)	Exports / Imports as % of GDP	WDI
Domestic income (GNID)	GNI per capita (constant US\$)	WDI
World income (GNIW)	World GNI – Domestic GNI (Constant US\$)	WDI
Foreign Direct Investment (FDI)	Foreign Direct Investment (Net inflow % of GDP)	WDI
Terms of trade (TOT)	Net Barter Terms of Trade Index (2000 = 100)	WDI

### 3.4. Descriptive Statistics

Following Table 2 shows the descriptive statistics and the normality statistics for the variables used in this study. Here we can see the average value of the trade balance is negative, indicating that the selected countries are experiencing a trade deficit most of the time. While average world income is higher than the average domestic income of Bangladesh, India and Pakistan. While based on Jarque and Bera (1987) test, only trade balance and domestic income are normally distributed at 5% level.

**Table-2.** Descriptive statistics.

Variables	Obs	Mean	Std. Dev.	Skewness	Kurtosis	Jarque Bera	Prob.
TB	81	-0.29	0.18	-0.54	2.62	4.57	0.10
FDI	81	-0.58	1.44	-1.68	5.58	24.54	0.00
TOT	81	4.47	0.18	-0.75	2.78	6.79	0.03
GNIW	81	9.08	0.09	-0.15	1.52	73.47	0.00
GNID	81	10.63	0.35	-0.01	2.31	2.67	0.26

Figure 3 illustrates that selected economies are experiencing a fall in the trade deficit over time, while only one instance for the case of India in 1991, where she enjoyed a trade surplus.

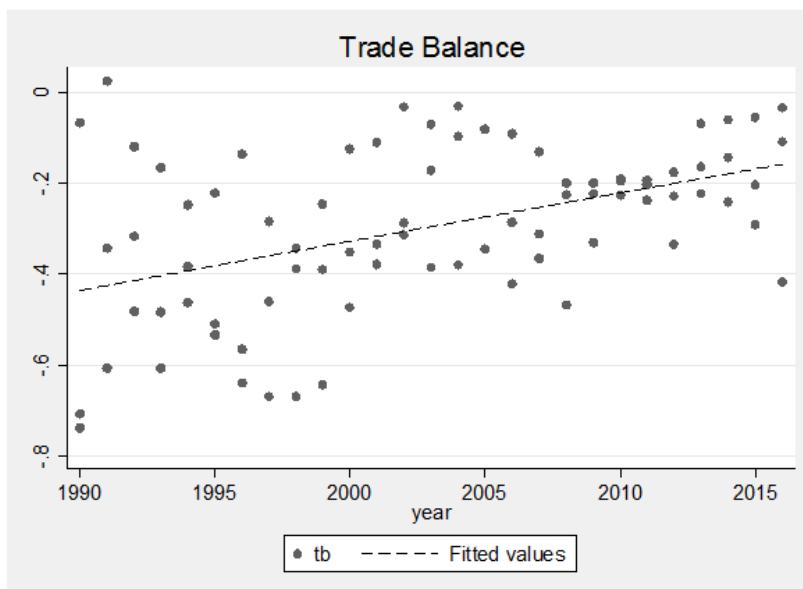


Figure-3. Time averages of trade balance.

While comparing the trade balance with the world income in Figure 4 it can be seen that the increase in the world income is associated with an increase in the trade balance. Trade balance may be because an increase in world income increases the demand for domestic goods.

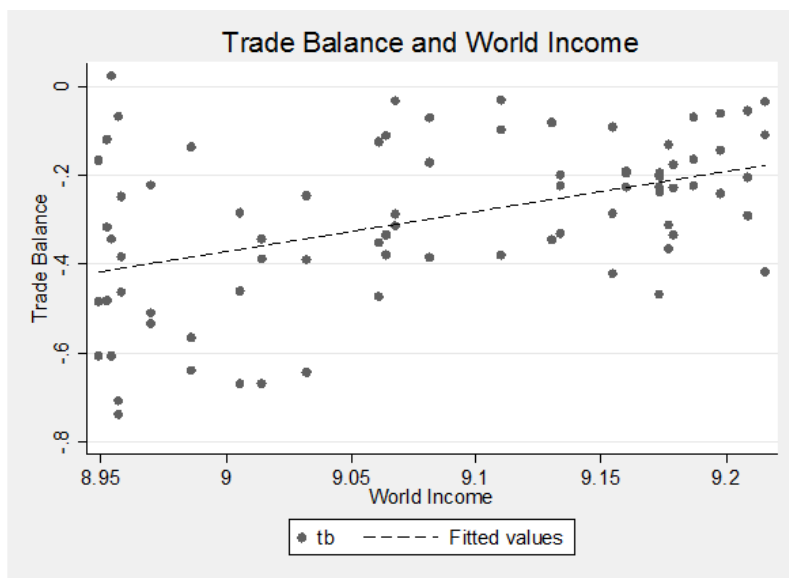


Figure-4. Scatter plot of trade balance and world income.

Similar is the case of domestic income and trade balance shown in Figure 5 both of them are positively associated. Here the increase in income is expected to increase the country’s capacity to produce exportable goods.

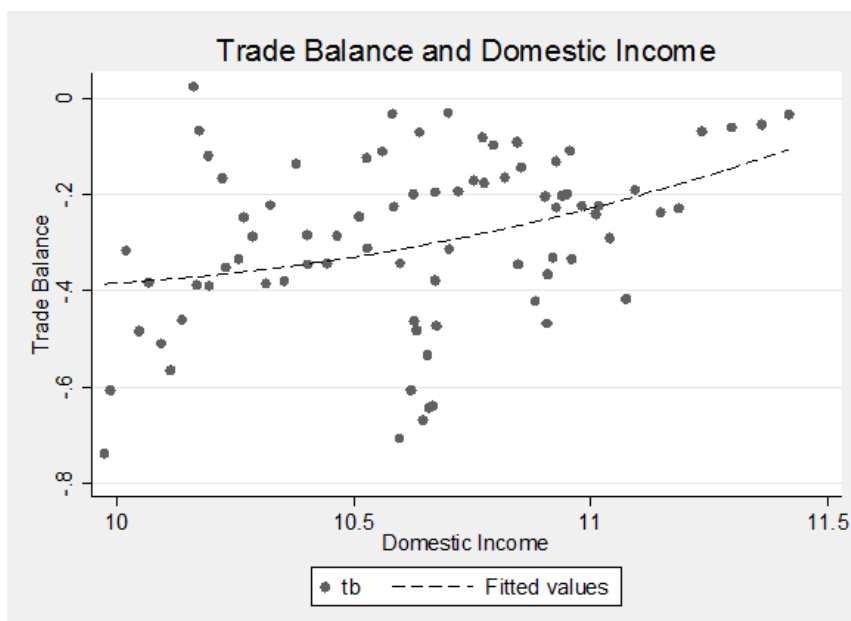


Figure-5. Scatter plot of trade balance and domestic income.

Here in Figure 6 higher FDI brings technology and knowledge, making domestic goods more competitive and exportable. Hence it is expected to be positively associated with trade balance.

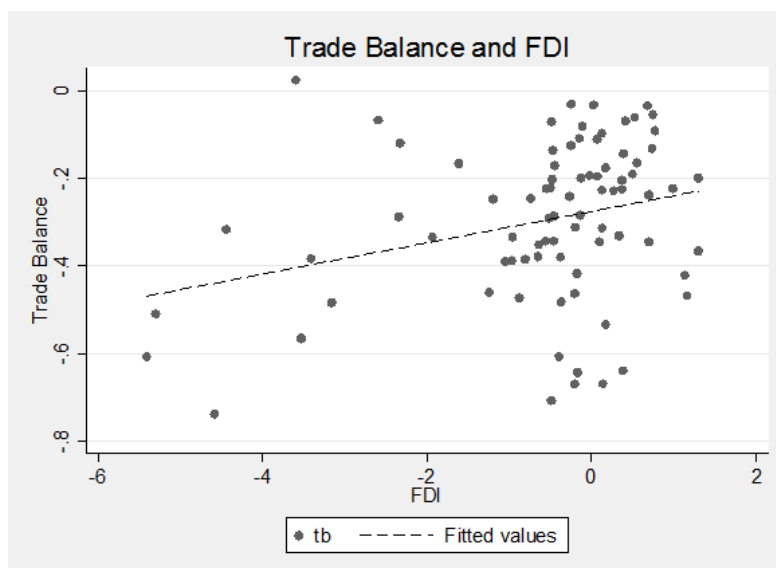


Figure-6. Scatter plot of trade balance and FDI.

Lastly as expected, increase regarding trade leads to an increase in the trade balance as depicted in Figure 7.

#### 4. ESTIMATION RESULTS

##### 4.1. Unit Root Tests

Ordinary Least Squares approach assumes that each observation of the variable must have same data generation process (distribution) (Gujarati, 2009) but in reality, it is difficult to find the exact distribution let alone the determination that distribution has changed or not. For this, statisticians have claimed that if the mean and variance of the data is constant in time (i.e. variable is randomly changing in time), then it is assumed that its distribution has not been changed (i.e. it is stationary) (Johnston and DiNardo, 1972; Greene, 2003; Enders, 2008).

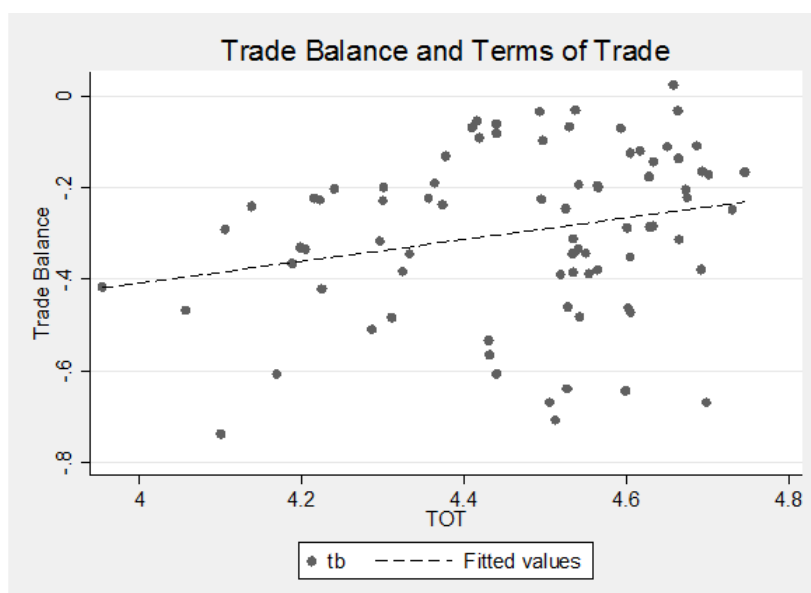


Figure-7. Scatter plot of trade balance and terms of trade.

However, it is human error learning behavior or inertia effect that causes variable to be a function its past values (Gujarati, 2009) which become prominent in panel data which have long time periods (Eberhardt, 2011; Arshed *et al.*, 2018). To test this non-stationary nature of the variables tests like LLC (Levin *et al.*, 2002) IPS (Im *et al.*, 1997) and ADF (Maddala and Wu, 1999) under the assumption that variables are cross-sectional independent from other variables. While observing the selected sample, this assumption of cross-section independent seems far-fetched because of globalization, integration and rivalry among these economies. This study has used Pesaran (2007) CIPS panel unit root test, which allows for cross-sectional dependence.

Table-3. Panel unit root test.

Pesaran CIPS panel unit root test					
	Level	Lags	First difference	Lags	Decision
TB	-1.45 (0.07)	1	-5.75 (0.00)	1	I(1)
FDI	-1.25 (0.10)	0	-5.07 (0.00)	0	I(1)
TOT	0.25 (0.60)	1	-2.25 (0.01)	1	I(1)
GNIW	7.80 (1.00)	1	-2.00 (0.04)	1	I(1)
GNID	-2.41 (0.01)	1	-3.10 (0.00)	1	I(0)

The results in Table 3 show that other than domestic income, all variables are non-stationary while domestic income is stationary. This situation implicates that the standard OLS estimation approach will be spurious. This study will use Pesaran *et al.* (1999) based Panel ARDL model after confirmation of the presence of cointegration.

#### 4.2. Cointegration Tests

Since there is at least one non-stationary variable, so there is a need for the presence of cointegrating relationship before a valid estimation can be done. This study has used two types of panel cointegration tests, namely Pedroni (1996;1999) and Kao (1999). Here Table 4 shows the probability values of Pedroni and Kao panel cointegration tests. For all these models, we can see that out of 8 tests at least five tests come out to be significant except model 2, ensuring that majority tests indicating the presence of cointegration relation.

#### 4.3. Estimation Model

Since variables are in a mixed order of integration and the cointegration has been confirmed using the Pedroni and Kao panel cointegration tests. This study will use the Panel ARDL model (Pesaran and Smith, 1995; Pesaran *et*



al., 1999; Blackburne and Frank, 2007). This model will provide homogeneous long run estimates with pooled country-specific short run estimates.

Table-4. Panel cointegration tests

	Model 1	Model 2	Model 3
Pedroni cointegration test			
Panel v-Statistic	0.87	0.91	0.90
Panel rho-Statistic	0.43	0.74	0.44
Panel PP-Statistic	0.05*	0.23	0.00***
Panel ADF-Statistic	0.01**	0.21	0.00***
Group rho-Statistic	0.59	0.85	0.74
Group PP-Statistic	0.01**	0.04**	0.01**
Group ADF-Statistic	0.00***	0.04**	0.00***
Kao cointegration test			
ADF	0.00***	0.00***	0.00***

Note: \*\*\* 1% level \*\* 5% level \* 10% level.

Table 5 shows the long-run estimates of panel ARDL model. There are three models, the first one is the base model without any control variable, while model two uses the terms of trade (TOT) and model three uses FDI as a control variable.

In all of these models, the coefficient of domestic GNI (GNID) is negative while the coefficient of the square of domestic GNI (GNID<sup>2</sup>) is negative confirming that there is U shaped relationship between domestic GNI and the trade balance. This means that initially increase in domestic income will increase imports as mentioned by Bahmani-Oskooee (1992); Jhingan (2006); Majeed and Shah (2014). While in long run local markets will substitute imports and develop exportable commodities as mentioned by Duasa (2007); Majeed *et al.* (2006); Gzaw (2015).

Similarly, the coefficient of world GNI (GNIW) is positive while the coefficient of the square of world GNI (GNIW<sup>2</sup>) is negative confirming that there is an inverted U shaped relationship between world GNI and trade balance. This initial increase in foreign income will increase exports as proposed by Ray (2012). However, the prolonged demand for exports will incentivize the foreign markets to imitate the products to reduce the demand as proposed by Jongwanich (2010).

Here the terms of trade and FDI has an insignificant positive impact on the trade balance of Bangladesh, India and Pakistan. Since the share of FDI to the GDP is low in these countries and the export commodities are not technology-intensive, that is why both terms of trade and FDI have an insignificant effect (Hamori, 2008).

The calculation of the optimal level of domestic and world income, which identifies the turning point of the U and inverted U shaped relationship (discussed in Figure 2) using the first derivative of domestic and world income as shown in Equation 1. These optimal values indicate the level of domestic and foreign income where their effects on trade balance will reverse. Similarly, we can see how the inclusion of control variables affect the optimal value of domestic income (GNID) while it does not affect the optimal value of foreign income (GNIW).

Table-5. Panel ARDL long-run estimates.

Long run estimates (Dep.Var: TB)			
	Model 1	Model 2	Model 3
	Coefficient (Prob)	Coefficient (Prob)	Coefficient (Prob)
GNID	-10.33 (0.02)**	-9.71 (0.04)**	-11.05 (0.01)**
GNID <sup>2</sup>	0.54 (0.01)**	0.51 (0.02)**	0.58 (0.01)**
GNIW	172.82 (0.00)***	126.19 (0.00)***	124.83 (0.00)***
GNIW <sup>2</sup>	-9.59 (0.00)***	-7.01 (0.00)***	-6.93 (0.00)***
TOT		0.13 (0.21)	
FDI			0.01 (0.38)
GNID*	9.565	9.519	9.526
GNIW*	9.010	9.001	9.006

Note: \*\*\* 1% level \*\* 5% level \* 10% level.

Table 6 provides the short run estimates of panel ARDL model. The convergence coefficient ( $ECM_{-1}$ ) shows whether any deviations from the equilibrium are responded with the movement back to the equilibrium. For all three models, the convergence coefficient is significant and negative, showing that it takes 1.47 years for model 1 and model 2 and 1.30 years for model 3 to converge back to an equilibrium state. This confirms that policymakers can use this model to control the trade balance.

Similarly, in the short run, only domestic income (GNID) affects the trade balance of the country, but it forms inverted U shaped pattern as compared to its U shaped effect in the long run. While, terms of trade have a negative significant effect on trade balance in short run as suggested by Backus *et al.* (1992).

Table-6. Panel ARDL short run estimates.

Short run estimates (Dep. Var: $\Delta TB$ )			
	Model 1	Model 2	Model 3
	Coefficient (Prob)	Coefficient (Prob)	Coefficient (Prob)
$ECM_{-1}$	-0.68 (0.02)	-0.68 (0.02)	-0.77 (0.02)
$\Delta GNID$	109.53 (0.05)	100.72 (0.01)	113.42 (0.02)
$\Delta GNID^2$	-5.08 (0.05)	-4.67 (0.01)	-5.29 (0.02)
$\Delta GNIW$	-225.62 (0.22)	-2.17.05 (0.19)	-267.31 (0.17)
$\Delta GNIW^2$	12.39 (0.21)	11.92 (0.19)	14.69 (0.17)
$\Delta TOT$		-356.21 (0.02)	
$\Delta FDI$			0.40 (0.94)
Cons	-500.71 (0.02)	-736.70 (0.05)	-393.61 (0.00)
Convergence speed	1.47	1.47	1.30

Table 7 shows the comparison between present scenario of GNI and optimal value of GNI based on the non-linear function. Here we can see that the income per capita of Bangladesh, India and Pakistan are higher than the optimal value, this indicates that their income is high enough to become competitive for exports. But, unfortunately, the world per capita income is also higher than the optimal value indicating that the world can substitute the imports purchase from Bangladesh, India and Pakistan. This prompts the selected countries to innovate or specialize their export base which can boost their terms of trade such that their exportable goods are not easily substitutable. This Table 7 provide the net effect of current domestic GNI and world GNI in the last row, here Pakistan's trade balance is witnessing highest net positive effect because of domestic and foreign GNI.

Table-7. Present scenario and optimal values of GNI per capita.

Variables	Bangladesh	India	Pakistan
Optimal GNID	14256.95	14256.95	14256.95
Actual GNID	32532.67	44801.64	48533.04
Optimal GNIW	8184.52	8184.52	8184.52
Actual GNIW	8777.97	8777.97	8777.97
Net effect at optimal	229.18	229.18	229.18
Effect at actual	229.51	229.85	229.95

## 5. CONCLUSION AND POLICY IMPLICATIONS

Trade is an important source of revenue income from exports or foreign commodities via imports, but if the economy becomes over-reliant on the provision of higher end finished goods from abroad and export the primary goods, it will fall into the trap of imbalance of trade receipt payments. The consequences of trade imbalance are widely studied, and many of them proposed that domestic demand and foreign demand may be one of the critical determinants of trade balance.

This study is inspired by the Kuznets curve and J Curve phenomenon and proposed income-trade Kuznets curve whereby domestic income follows U shaped, and foreign income follows an inverted U shaped relationship

with trade balance. Using the time series panel data for Bangladesh, India and Pakistan and estimation with the help of panel ARDL model, this study confirms the presence of income-trade Kuznets curve.

This study finds the optimal value of domestic income and the foreign income where their relationship with the trade balance reverses. Further, this study has also confirmed that terms of trade and FDI only moderate the relationship between domestic income and trade balance. Moreover, when the comparison of the optimal values of domestic and foreign income is done with the actual incidence of domestic income and foreign income, it is evident that these selected economies have the potential to boost their exports, but world income is high enough to substitute the exports of selected economies.

Thus, it is advisable to the policymakers to work on consistent alleviation regarding trade and attract high skill or knowledge intensive FDI, which can help in innovate the export base and consistently make domestic economies competitive.

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