Middle-East Journal of Scientific Research 17 (7): 965-975, 2013
ISSN 1990-9233

DOI: 10.5829/idosi.mejsr.2013.17.07.1366

Human Capital: Is it Beneficial for Trade Openness in Pakistan?

[1]Akeela Maryam and [2]Muhammad Shahid Hassan

[1]Department of Finance,
[2]Department of Economics,
University of Management and Technology, Lahore, Pakistan

Abstract: This study is an attempt to examine the impact of human capital; exchange rate and gross national income on trade openness in Pakistan for the period from 1976 – 2011. The findings of the study conclude that economic growth in the form of per capita gross national income has positive and significant impact on trade openness in both short run and long run in Pakistan indicating that growth led trade hypothesis works in Pakistan in the both periods. Moreover; it has also found that human capital in the form of per capita education expenditures have significant and positive impact on trade openness indicating that human capital in the form of per capita education expenditures led trade hypothesis also works in Pakistan in both periods. Afterwards; the study has found that exchange rate has significant but negative impact on trade openness in both short run and long run in the both models in Pakistan. Finally; the estimates of CUSUM and CUSUM square have exposed that there does not exist any structural instability over time in the both models of the study.

Key words: Pakistan; Trade Openness · Human Capital · Gross National Income · Exchange Rate · ARDL Bounds Testing Approach

INTRODUCTION

The growth of a country; success and stability of economic system can be assessed and evaluated by identifying the role of trade in that country. The classical and neo classical school of thoughts of economics believe that trade plays a central role for the growth of a country and the process of such progression is backed through financial integration and involvement with and through other countries. Globalization through trade is also a solution of financial economic crisis.

The theory of comparative advantage suggests that, in order to accomplish efficient use of available resources, a country should produce only those goods in which it has specialization and a competitive edge. The twofold advantage of trade includes the efficient use of resources and easy access of products at a cheap price to a majority of consumers. For example, a country where labour is in abundance, the efficient use of such great resource is possible; through diverting all the resources into labour intensive products. Thus trade as an economic instrument not only helps to uphold the proper distribution of income and prices but also act as a powerful tool to increase the overall economic, financial and social efficiency of the world by improving economic welfare.

Trade remove constraints in order to get an optimal level of production and thus enhance the production ability of a country. From the theoretical perspective it is observed that the balance of trade therefore can be affected through different economic factors, some of which are used in this study as major influencing factors, such as exchange rate, net exports, personal remittances, health, education and per capita gross national income. These factors can have different impression on "trade" in different parts of the world according to the environment and characteristics of the people of that country. In order to specify the results the emphasis of this study is Pakistan. The relevant data for the period 1976-2011 is taken from the World Bank, economic survey of Pakistan & state bank of Pakistan. In past the trade policies of developing countries were very tight, but with the passage of time countries move toward globalization and integration. Exchange rate, interest rate, inflation and government controls are important mechanism of trade.

Corresponding Author: Muhammad Shahid Hassan, Department of Economics, University of Management and Technology, Lahore, Pakistan.

Fig. 1.1: Growth Rate of Value of Trade
Source: World Development Indicators [1]

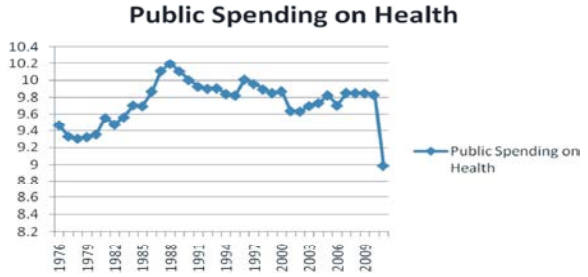

Fig. 1.2: Growth Rate of Per Capita Public Spending on Health:
Source: Handbook of Statistics on Pakistan Economy [2]

Pakistan came across a lot of trade restriction and berries after 9/11, which badly disturbs the growth and development process for many years.

The above diagram shows the trends of the growth rate of the value of trade as share of GDP from fiscal year 1976 – 2011 for a case of Pakistan. The growth rate of trade as share of GDP was 3.4 percent in the year 1976 and reached to 3.6 percent in the year 1980. Afterwards; it reached to 3.5 percent in the year 1985 and then it went to 3.66 percent in the year 1990. Moreover; the growth rate of the value of trade as share of GDP came down 3.59 percent in the year 1995 and it further declined to 3.34 percent in the year 2000. Besides this; the growth rate of the value of trade as share of GDP became 3.56 percent in the year 2005 and it reached to 3.51 percent in the year 2011.

After discussing the trends of value of trade; we are now going to demonstrate the trends of human capital. In fact we have used two proxies for human capital: the first proxy for human capital is the growth rate of per capita public spending on health and the second proxy for human capital is taken as the growth rate of per capita public spending on education. We have treated both proxies separately to capture their effects on trade openness for a case of Pakistan. The trends of human capital in the form of its proxies are presented in the following Figures number 2 and 3 respectively:

The Figure Number 1.2 presents the trends of the growth rate of per capita public spending on health for the period from 1976 – 2011 for a case of Pakistan. It has observed that the per capita public spending on health was 9.47 percent in the year 1976, which came down to 9.36 percent in the year 1980 and then it raised to 9.7 percent in the year 1985. Moreover; per person public spending on health further rose to 10 percent in the year 1990, but, it declined to 9.82 percent in the year 1995 and with a slight increase it became 9.87 percent in the year 2000. The growth rate of trade as share of GDP was 3.4 percent in the year 1976 and reached to 3.6 percent in the year 1980. Afterwards; it again declined to 9.82 percent in the year 2005 and by following declining trend it turned to be 8.99 percent in the year 2011.

Similarly in the Figure Number 1.3, we have tried to portrait the behaviour of the growth rate of the public spending on education for each individual in a country. The Figure Number 3 reveals that the public spending on education for each individual was 10.45 percent in the year 1976, it went up to 10.53 percent in the year 1980, it further increased to 10.82 percent in the year 1985, it reached to 10.97 percent in the year 1990 and then it increased to 11.19 percent in the year 1995. After 1995, the

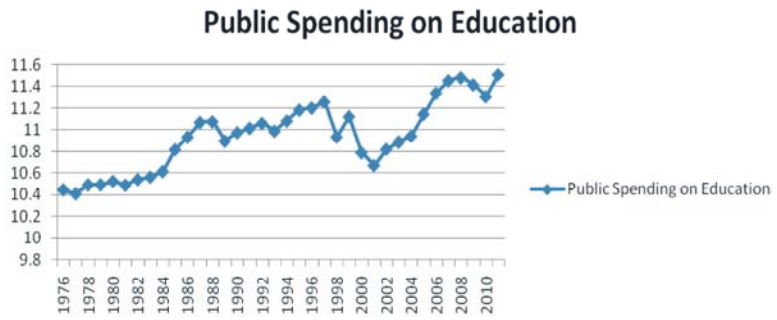

Fig. 1.3: Growth Rate of Per Capita Public Spending on Education:
Source: Handbook of Statistics on Pakistan Economy [2]

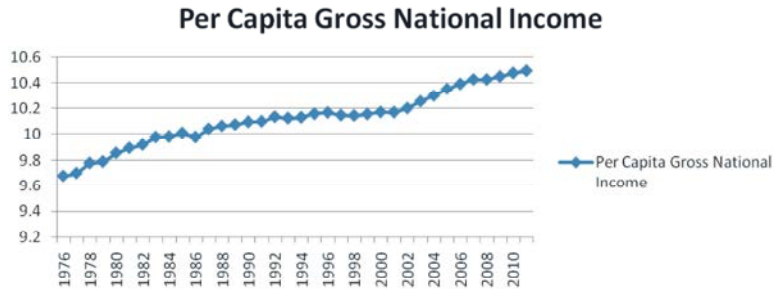

Fig. 1.4: Growth Rate of Per Capita Gross National Income:
Source: World Development Indicators [1]

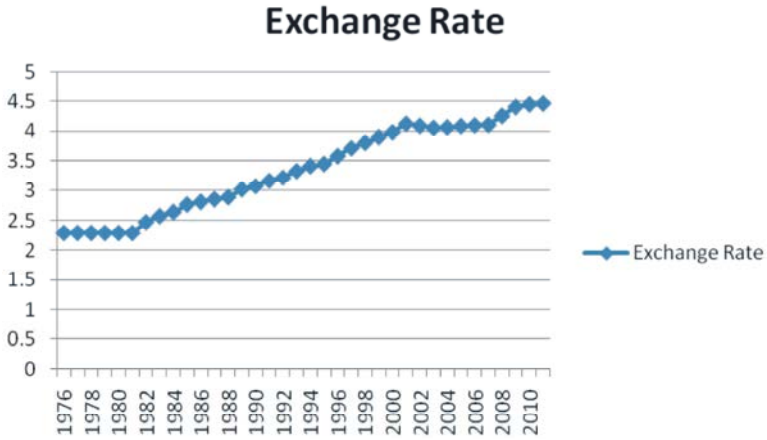

Fig. 1.5: Growth Rate of Exchange Rate:
Source: World Development Indicators [1]

growth rate of the public spending on education for each individual declined to 10.79 percent in the year 2000 and besides year 2000, it followed an increasing trend, it became 11.15 percent in the year 2005 and it finally became 11.51 percent in the year 2011.

After the brief discussion on the trends of value of trade and human capital; now we reveal our discussion towards the trends of the growth rate of per capita gross national income and exchange rate. We will demonstrate the trends of the growth rate of both per capita gross national product and exchange rate for the period from 1976 – 2011 for the country like Pakistan. The growth rate of per capita gross national income was 9.68 percent in the year 1976 and the growth rate of exchange rate was 2.29 percent in the same year. The growth rate of per capita gross national income became 9.86 percent in the year 1980 but the growth rate of exchange rate remained 2.29 percent in the same year. Afterwards; we experienced a slight increase in the growth rates of both per capita gross national income and exchange rate in the year 1985 and they became 10 percent and 2.77 percent respectively. In the year 1990 the growth rate of per capita gross national income turned to be 10.1 percent, whereas the growth rate of exchange rate was increased to 3.08 percent. Besides this; the growth rate of both variables like per capita gross national income and exchange rate increased to 10.16 percent and 3.46 percent in the year 1995 respectively. Moreover; these growth rates further increased to 10.17 percent for per capita gross national income and 3.98 percent for exchange rate for the year 2000. Afterwards; per capita gross national experienced 10.48 percent growth rate in the year 2005 whereas in the same year the growth rate of exchange rate was experienced to be 4.09 percent. The trends of both variables were consistently increasing; therefore, the growth rate of per capita gross national income became 10.50 percent in the year 2011 and during the same year the growth rate of exchange rate became 4.46 percent. The trends of both factors of trade openness are shown in the following Figures Number 1.4 and 1.5 respectively:

After discussing the trends of all the variables of the model which is conceptualised in the part 3 of this study; this study is designed to investigate the impact of human capital on trade openness by considering exchange rate

and economic growth as control variables in Pakistan using period from 1976 – 2011. This paper is comprised of five parts; part 1 describe the introduction of the study, part 2 will review the previous literature, part 3 will demonstrate data sources and methodology framework, in the part 4 empirical results will be found by using suitable econometric techniques and last and final part 5 we present conclusion and policy implications.

Literature Review: In this part of the study we review the empirical literature that examines the impact of net exports, health, education, personal remittances and exchange rates and per capita gross national income on trade, placing a comparison of special emphasis on net exports and exchange rate, by doing a comparative analysis of health and education on trade of Pakistan. In particular, we start by revising studies that focus on the association between trade and health expenditure, exchange rate, personal remittances, net exports and education and gross national income.

Trade and balance of trade is one of the major factor that decide that whether a country is developed or in developing stage. A country's balance of trade can be affected through net exports and national income of exporting and importing countries. A high rate of per capita gross national income will increase the demand for goods and services. In the standing of countries receiving high remittances Pakistan is in the list of top ten countries. From the last few decades the figure of remittances sent by Pakistani migrants has boost up quickly. These positive flows have provided not only the serious support to the balance of payment but also provide help to improve the situation of external debt. In the study of Mughal and Anwar [3] the fact is discovered that remittances could alleviate poverty and can reduce inequality.

Furthermore the upsurge in remittances also helped to offset the negative effects of the current oil crises, can improve the living standards of households who are recipient of such remittances and also can reduce unemployment [Pakistan Economic Survey, (4)] for the economic development the country is increasing relying on the remittances [Mughal, (5)]. Such similar studies has been conducted by Behuria and Khullar [6] and Gordon and Gupta [7], that shows that trade facilitated activities such as export financing, communication and insurance can enhanced economic growth in the economy. GNI is a major component that influences trade. The higher level of per capita gross national income can enhance the trade and similarly higher volume of trade can increase the per capita gross national income. In order to know the stage of economic success, development objectives and the national welfare of people lived in the country, the primary measure that has been considered is GNP per capita, according to the observation of Robinson [8].

Moreover the study of Hoogvelt [9] reveals the fact that GNP per capita has been largely used as a measure to determine the status of economic success of a country and its rank in all over the world as the global hierarchy of national development. Traditionally the societies were ranked as whether civilized or barbarian, traditional or modern and advanced or backward based on the cultural and religious perspectives but now in the current age of globalization the GNP is considered as a measure of ranking such as "developing society or economy, "least developed, or developed. The GNP measure can be superficial, parochial and misleading but still it has been used effectively by economists and development experts to identify inappropriate development policies and strategies and to make best policies for the future. Time series data of twenty trade development countries has been used by Love [10], to test the hypothesis that export instability brings short run macroeconomic instability. In this study they employed the Granger [11] causality test and Sims [12] reduced form approach which brings the positive results about the significance of model.

The first time-series econometric study that observed the relationship among economic growth, export instability and investment is conducted by Sinha [13] by considering nine Asian countries. The results of study show negative relationship among export instability and economic growth for Malaysia, Japan, Sri Lanka and Philippines and positive relationship for the countries as Myanmar, Thailand and Pakistan. However India shows mix results as an identification problem arose due to two co-integrated vectors. In case of Pakistan some studies have been carried out in past like Khan and Saqib [14] use a simultaneous equation model and as a result, they find a strong connection between export performance and economic growth in Pakistan. In the period of 1959-1991, no support were found in the study of Mutairi [15], whereas Khan *et al*. [16] find strong indication of bi-directional causality between growth of exports and economic growth of Pakistan.

Another research in favour of the argument that exports has a positive contribution in economic growth and level of national income, has been conducted by Rana [17]. Investment in these factors will reveal progressive results in future. A positive and significant effect of

health on income is found by Rivera & Currais [18]. Housemen test was applied in this study to test the variables like GDP and health expenditure, time line, Life expectancy and health investment and the existence of relationship between health and income was found. Additionally Temple [19] exposes the productive benefits of education for OECD countries. In 2002 Halvorson study the backdrop of economic crises in Pakistan and developing linkage among changing livelihood system. This study reveals the fact that people faces health related risks in some areas of Pakistan, such risk includes insufficient sanitation facilities, unhealthy water, poor draining system and poor hygiene practices. One of the most important determinants, contributing to the balance of trade is exchange rate. Many empirical studies have shown the association between real exchange rate and balance of trade. The study of Bhattarai & Armah [20] reveals that, exchange rate is helpful to regulate the flow of trade and capital in developing countries who are confronting with a deficit in balance of payment due to a structural gap between volume of exports and imports.

The study of Bautista [21] stated that exchange rate is the means of foreign trade and foreign exchange. The study argued that exchange rate is an important determinant of economic performance. The study of Gomes and Paz [22] and Tsen [23] conducted for Brazil and Malaysia for the period ranges 1965-2002 reveal that a long run relationship exists between balance of trade, exchange rate and income from domestic and foreign resources. Additionally the study of Sigh [24] discover that real exchange rate and domestic income has a significant influence on trade however income from abroad shows an insignificant impact on balance of trade in case of India. Besides this; Hassan *et al*. [25] examined the impact of urbanization on trade openness in case of Pakistan. They used ARDL Bounds Testing approach to find out long term relationship between trade openness and its factors. They found that urbanization elevates trade openness in the short run but not in the long run in Pakistan. Moreover; they also found bidirectional causality between urbanization and trade openness in the short run but, they found unidirectional causality running from urbanization to trade openness in the long run. Furthermore; Hassan and Kalim [26] explored the relationship between human capital and economic growth for a case of Pakistan using VECM technique and found that human capital in the form of education has a bidirectional causal relationship with economic growth and health in the short and in the long run, whereas, human capital in the form of health does not have any causal relationship with economic growth in the short run, but, it does has bidirectional causal relationship with economic growth in the long run in Pakistan. After reviewing the previous literature; now we will some of the sources from where we will obtain data and econometric methodology by which will estimate empirical results in the next part of the study and it is given as below:

Model and Methodological Framework

Model: In this study we have conceptualised two models in the form log linear transformation. The reason to convert our data series in the form of log linear form is that the estimated results of log linear transformation are more superior to the estimated results of simple form model [Ehrlich (27) and Layson (28); Bowers and Pierce (29), Cameron (30) and Ehrlich (31)]. The models are given as below:

$$LTR_t = \alpha_0 + \alpha_1 LHE_t + \alpha_2 LER_t + \alpha_3 LGNI_t + \varepsilon_{1t} \quad (1)$$

$$LTR_t = \beta_0 + \beta_1 LEDU_t + \beta_2 LER_t + \beta_3 LGNI_t + \varepsilon_{1t} \quad (2)$$

whereas;

Variables	*Description*	*Data Source*
LTR_t	*Value of Trade as Percentage of GDP*	*WDI* [1]
LHE_t	*Per capita health expenditure*	*Handbook of Statistics on Pakistan Economy* [2]
$LEDU_t$	*Education expenditure (as % of population)*	*WDI* [1]
LER_t	*Official Exchange Rate ($ US in terms of Pak Rs.)*	*WDI* [1]
$LGNI_t$	*Gross national income per capita*	*WDI* [1]

Estimation Technique: In the process of estimation; we will initiate from estimating unit root problem. In order to find out unit root problem we will use two unit root tests, for instance: Augmented Dickey Fuller [32] unit root test and Phillip Perron [33] unit root test. The equations of ADF [32] test and Phillip Perron [33] are given respectively as below:

$$\Delta Y_t = \gamma + \beta Y_{t-1} - \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \varepsilon_{3t} \quad (3)$$

$$\Delta Y_t = \tau + \psi_t Y_{t-1} + \varepsilon_{4t} \quad (4)$$

Afterwards; we will apply ARDL Bounds Testing Approach developed by Pesaran *et al*. [34] in order to find out the Co – Integration among the variables of the both models proposed in equations **(1)** and **(2)** in the long run. The matrix to estimate results for ARDL for both models are respectively given as below:

$$\begin{bmatrix} \Delta LTR_t \\ \Delta LHE_t \\ \Delta LER_t \\ \Delta LGNI_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \\ a_{30} \\ a_{40} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix} X \begin{bmatrix} LTR_{t-1} \\ LHE_{t-1} \\ LER_{t-1} \\ LGNI_{t-1} \end{bmatrix}$$
$$+ \begin{bmatrix} b_{11} & b_{12} & b_{13} & b_{14} \\ b_{21} & b_{22} & b_{23} & b_{24} \\ b_{31} & b_{32} & b_{33} & b_{34} \\ b_{41} & b_{42} & b_{43} & b_{44} \end{bmatrix} X \sum_{i=a}^{p} \begin{bmatrix} \Delta LTR_{t-i} \\ \Delta LHE_{t-i} \\ \Delta LER_{t-i} \\ \Delta LGNI_{t-i} \end{bmatrix} + \begin{bmatrix} \mu_{10} \\ \mu_{20} \\ \mu_{30} \\ \mu_{40} \end{bmatrix} \quad (A)$$

Matrix A will be used for estimating long run relationship among the variables of the model number 1 proposed in equation 1. In the both matrices such as (A) and (B); the lagged term of the dependant variable when it will be entertained as an independent variable then its lag order will start from one [for instance: a = 1 and b = 1] in the both matrices. Also; the lag order of the remaining lagged independent variables will start from zero [for instance a = 0 and b = 0] in the both matrices.

$$\begin{bmatrix} \Delta LTR_t \\ \Delta LEDU_t \\ \Delta LER_t \\ \Delta LGNI_t \end{bmatrix} = \begin{bmatrix} c_{10} \\ c_{20} \\ c_{30} \\ c_{40} \end{bmatrix} + \begin{bmatrix} c_{11} & c_{12} & c_{13} & c_{14} \\ c_{21} & c_{22} & c_{23} & c_{24} \\ c_{31} & c_{32} & c_{33} & c_{34} \\ c_{41} & c_{42} & c_{43} & c_{44} \end{bmatrix} X \begin{bmatrix} LTR_{t-1} \\ LEDU_{t-1} \\ LER_{t-1} \\ LGNI_{t-1} \end{bmatrix}$$
$$+ \begin{bmatrix} d_{11} & d_{12} & d_{13} & d_{14} \\ d_{21} & d_{22} & d_{23} & d_{24} \\ d_{31} & d_{32} & d_{33} & d_{34} \\ d_{41} & d_{42} & d_{43} & d_{44} \end{bmatrix} X \sum_{i=b}^{p} \begin{bmatrix} \Delta LTR_{t-i} \\ \Delta LEDU_{t-i} \\ \Delta LER_{t-i} \\ \Delta LGNI_{t-i} \end{bmatrix} + \begin{bmatrix} \eta_{10} \\ \eta_{20} \\ \eta_{30} \\ \eta_{40} \end{bmatrix} \quad (B)$$

Matrix B will be used for estimating long run relationship among the variables of the model number 1 proposed in equation 2. Besides this; the estimated results of VAR are not efficient unless we inculcate first period lag term of error term in the Matrix of ARDL. Therefore; after inculcating first period lag term of error term in the Matrices of ARDL proposed above will help us to develop matrices for error correction mechanism.

$$\begin{bmatrix} \Delta LTR_t \\ \Delta LHE_t \\ \Delta LER_t \\ \Delta LGNI_t \end{bmatrix} = \begin{bmatrix} e_{10} \\ e_{20} \\ e_{30} \\ e_{40} \end{bmatrix} + \begin{bmatrix} e_{11} & e_{12} & e_{13} & e_{14} \\ e_{21} & e_{22} & e_{23} & e_{24} \\ e_{31} & e_{32} & e_{33} & e_{34} \\ e_{41} & e_{42} & e_{43} & e_{44} \end{bmatrix} X \sum_{i=c}^{p} \begin{bmatrix} \Delta LTR_{t-i} \\ \Delta LHE_{t-i} \\ \Delta LER_{t-i} \\ \Delta LGNI_{t-i} \end{bmatrix} + \begin{bmatrix} \omega_{11} ECM_{t-1} \\ \omega_{21} ECM_{t-1} \\ \omega_{31} ECM_{t-1} \\ \omega_{41} ECM_{t-1} \end{bmatrix} + \begin{bmatrix} \delta_{10} \\ \delta_{20} \\ \delta_{30} \\ \delta_{40} \end{bmatrix} \quad (C)$$

Matrix C will be used for estimating short run relationship among the variables of the model number 1 proposed in equation 1.

$$\begin{bmatrix} \Delta LTR_t \\ \Delta LEDU_t \\ \Delta LER_t \\ \Delta LGNI_t \end{bmatrix} = \begin{bmatrix} f_{10} \\ f_{20} \\ f_{30} \\ f_{40} \end{bmatrix} + \begin{bmatrix} f_{11} & f_{12} & f_{13} & f_{14} \\ f_{21} & f_{22} & f_{23} & f_{24} \\ f_{31} & f_{32} & f_{33} & f_{34} \\ f_{41} & f_{42} & f_{43} & f_{44} \end{bmatrix} X \sum_{i=d}^{p} \begin{bmatrix} \Delta LTR_{t-i} \\ \Delta LEDU_{t-i} \\ \Delta LER_{t-i} \\ \Delta LGNI_{t-i} \end{bmatrix} + \begin{bmatrix} \lambda_{11} ECM_{t-1} \\ \lambda_{21} ECM_{t-1} \\ \lambda_{31} ECM_{t-1} \\ \lambda_{41} ECM_{t-1} \end{bmatrix} + \begin{bmatrix} \psi_{10} \\ \psi_{20} \\ \psi_{30} \\ \psi_{40} \end{bmatrix} \quad (D)$$

Matrix D will be used for estimating short run relationship among the variables of the model number 2 proposed in equation 2. Moreover; the first period lagged term of the dependant variable in both matrices (C) and (D) when it will be taken as explanatory variable then its lag will start from one [for instance: c = 1 and d = 1] in the both matrices. As far as the lag order of the remaining lagged explanatory variables is concerned; it will start from zero [for instance c = 0 and d = 0] in the both matrices.

In the end; we will use Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMSQ) diagrams in order to investigate whether there prevails stable relationship among the variables of the models proposed in the equations (1) and (2) respectively. Afterwards; we will estimate the empirical results in the next part 4 of this study which is given as below:

RESULTS AND DISCUSSION

Table – 4.1 shows the descriptive statistics of all variables taken in the both models. The estimates of Kurtosis and Skewness have exposed that the data series is normally distributed. The normality of the data series is further tested by applying Jarque – Bera test and the insignificant Jarque – Bera test rejects the hypothesis that the data series not normally distributed. Besides this; the unit root test is applied in order to examine the unit root problem in a data series and the estimated results are given in the following Table – 4.2:

The estimated results of unit root tests [ADF; (32) and Phillip Perron, (33)] are given in Table – 4.2 and the estimates of both unit root tests [ADF; (32) and Phillip Perron, (33)] have exposed that trade openness has appeared as stationary at level and first difference, where as all other remaining variables are non – stationary at level but stationary at first difference. Therefore; this study has found mixed order of integration [I(0) and I(1)] through both unit root estimators. In the next step; the optimal lag length of the study is found in the Table – 4.3 for both models and estimated results of Table – 4.3 have disclosed that for model number 1 and model number 2 the optimal lag length is one. The optimal lag length is selected on the basis of the minimum value of Hannan-Quinn Information Criterion. After the lag length criteria; we have estimated long run relationship among

Table 4.1: - Descriptive Statistics

	LTR	*LHEPC*	*LEDUPC*	*LER*	*LGNIPC*
Mean	3.524595	9.739539	10.94617	3.351573	10.11738
Median	3.538130	9.826438	10.96100	3.377966	10.13194
Maximum	3.661238	10.19573	11.51251	4.458332	10.49780
Minimum	3.322148	8.986995	10.41341	2.292535	9.677380
Std. Dev.	0.090305	0.260366	0.321322	0.740739	0.215153
Skewness	-0.586832	-0.789951	-0.026928	-0.093594	-0.097760
Kurtosis	2.700192	3.485811	2.008822	1.592039	2.520175
Jarque-Bera	2.201057	4.098150	1.478003	3.026089	0.402690
Probability	0.332695	0.128854	0.477591	0.220238	0.817630
Sum	126.8854	350.6234	394.0620	120.6566	364.2256
Sum Sq. Dev.	0.285422	2.372666	3.613673	19.20429	1.620180
Observations	36	36	36	36	36

Table 4.2: Unit Root test

	At Level			*At 1st Difference*	
	ADF-Test	*PP-Test*		*ADF-Test*	*PP-Test*
Variables	*t-statistics*	*t-statistics*	*Variables*	*t-statistics*	*t-Statistics*
LTR	-2.9012*	-2.8504*	Δ*LTR*	-6.5970***	-6.7107***
LER	-0.0168	-0.0943	Δ*LER*	-4.1928***	-4.1138***
LHE	-1.1968	-1.2950	Δ*LHE*	-2.8123*	-2.8118*
LGNI	-1.1925	-1.1308	Δ*LGNI*	-5.5714***	-5.6714***
LEDU	-1.0541	-1.0754	Δ*LEDU*	-5.9002***	-5.9007***

; **, * represent significance of the test statistics at 10 percent, 5 percent and 1 percent levels of significance.*

Table 4.3: Lag Length Criteria

	Lag Length Criteria			
	Model No. 1		*Model No. 2*	
Criterias	*Lag Length*	*Value*	*Lag Length*	*Value*
LR	*1*	233.7002*	*1*	233.7002*
FPE	*1*	2.24e-10*	*1*	2.24e-10*
AIC	*4*	-11.00912*	*4*	-11.00912*
SIC	*1*	-9.960071*	*1*	-9.960071*
HQ	*1*	-10.57250*	*1*	-10.57250*

** 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
SIC: Schwarz Information Criterion
HQ: Hannan-Quinn Information Criterion

trade openness, per capita health expenditures as proxy for human capital, exchange rate and per capita gross national income in model number 1 and among among trade openness, per capita education expenditures as proxy for human capital, exchange rate and per capita gross national income in model number 2 by using ARDL Bounds Testing Approach [34]. The estimated results of optimal lag length are presented in Table – 4.3 as below:

After finding optimal lag length of the model; now we find out the long run relationship among the variables of the study. The empirical findings reported in Table – 4.4 reveal that the calculated value of F – Statistics [following Wald Test] is greater than its Upper Critical Bound for both models proposed in equations (1) and (2); and indicating that trade openness, human capita (both proxies: per capita health expenditures and per capita education expenditures), exchange rate and gross national income have long run stable relationship with each other. Moreover; the diagnostics reveal that the data series of both models do not have problem of Serial Correlation and problem of Hetroscadasticity. The error term is also normally distributed in the both models and

Table 4.4: Autoregressive Distributed Lag Estimates

Estimated Models	*LTR = f(LHE,LER,LGNI)*	*LTR = f(LEDU,LER,LGNI)*
Optimal lags	(1,0,0,0)	(1,0,0,0)
F-statistics	4.4397*	4.3458*
W-statistics	17.7588*	17.3831*
Diagnostic Tests		
R^2	0.4953	0.5263
Adjusted- R^2	0.4257	0.4610
F-statistics	7.1158 [0.000]***	8.0562 [0.000]***
Durbin's-H	-0.2428 [0.808]	0.1298 [0.897]
Serial Correlation	0.2954 [0.587]	0.4960 [0.481]
Functional Form	0.0435 [0.835]	0.1206 [0.728]
Normality	1.3866 [0.500]	1.2150 [0.545]
Heteroscedasticity	1.5820 [0.208]	2.1544 [0.142]

	Critical Bounds For F-Statistics		*Critical Bounds For W-Statistics*	
Level of Significance	*Lower Critical Bound*	*Upper Critical Bound*	*Lower Critical Bound*	*Upper Critical Bound*
5 per cent	3.5971	4.9442	14.3886	19.7767
10 per cent	2.9393	4.0984	11.7570	16.3934

; **, * represent significance of the test statistics at 10 percent, 5 percent and 1 percent levels of significance.*

Table 4.5: Estimated Long Run Coefficients

	Dependant Variable = LTR	
	Model Number 1	*Model Number 2*
Regressors	Coefficient	Coefficient
LHE	0.0938	-
LEDU	-	0.2184**
LER	-0.1962***	-0.15118**
LGNI	0.6803**	0.2571
C	-3.6095	-0.9530

; **, * represent significance of the test statistics at 10 percent, 5 percent and 1 percent levels of significance.*

functional form is also correct in the both models. The estimated results through ARDL Bounds Testing Approach are presented in the following Table – 4.4 as below:

Besides this; we have computed long term coefficients and the estimated results are shown in the following Table – 4.5:

The estimates in Table – 4.5 for the first model proposed in equation (1) have disclosed that gross national income and human capital in the form per capita health expenditures have positive impact on trade openness in the long run in Pakistan. The coefficient of human capital in the form per capita health expenditures is quite small that is due to one percent increase in per capita health expenditures, trade openness expands by almost 0.094 percent in the long run; but, it is found as insignificant factor of trade openness in Pakistan.

Moreover; the coefficient of economic growth in the form gross national income has found to be high and significant contributor to trade openness in Pakistan and it reveals that one percent increase in economic growth tends to increase trade openness by almost 0.68 percent in the long run. It also indicates that growth led trade hypothesis does prevail in Pakistan in the long run in case when we treat human capital in the form per capita health expenditures. It has also found that exchange rate has significant but adverse impact on trade openness in the first model proposed in equation (1). It indicates that due to one percent appreciation in the exchange rate; trade will significantly deteriorate by almost 0.20 percent in the long run in Pakistan. Afterwards; the empirical findings of Table – 4.5 for the second model proposed in equation (2) have exposed that human capital in the form per capita education expenditures and gross national income have positive impact on trade openness in Pakistan. The coefficient of human capital in the form per capita education expenditures reveals that as per capita education expenditures elevate by one percent, these will significantly open trade by almost 0.22 percent in the long run in Pakistan. It indicates that human capital led trade hypothesis is also true in the long run in case of Pakistan.

Besides this; the coefficient of economic growth in the form per capita gross national income has found to be high which shows that trade opens by almost 0.26 percent as economic growth enhances by one percent. However; in the long run, the impact of economic growth on trade openness has found to be insignificant in case when we treat human capital in the form per capita education expenditures. We have also found the impact of exchange rate on trade openness in the long run in the second model proposed in the equation (2) as well and the estimated results have shown that exchange rate

Table 4.6: Error Correction Representation

	Dependant Variable = ΔLTR_t	
	Model Number 1	*Model Number 2*
	Coefficient	Coefficient
ΔLHE_t	0.0610	-
$\Delta LEDU_t$	-	0.1509**
ΔLER_t	-0.1275**	-0.1045**
$\Delta LGNI_t$	0.4420**	0.1777
ECM_{t-1}	-0.6498***	-0.6911***
Diagnostic Tests		
R^2	0.3981	0.4351
Adjusted-R^2	0.3151	0.3571
F-Statistic	4.7949 [0.004]***	5.5833 [0.002]***
Akaike Info. Criterion	42.9243	44.0022
Schwarz Bayesian Criterion	39.1084	40.1863
DW-Statistic	2.0304	1.9796

; **, * represent significance of the test statistics at 10 percent, 5 percent and 1 percent levels of significance.*

significantly declines trade in the long run in Pakistan. The estimated coefficient of exchange rate demonstrates that trade will significantly decrease by almost 0.15 percent as exchange rate appreciates by one percent in Pakistan in the long run.

Afterwards; we have estimated the short run dynamics which are presented in the following Table – 4.6:

The empirical results of Table – 4.6 show that in the first model proposed in equation (1); both economic growth in the form of per capita gross national income and human capital in the form of per capita health expenditures have positive impact on trade openness in the short in Pakistan. However; the impact of economic growth in the form of per capita gross national income has found to be significant but, the impact of human capital in the form of per capita health expenditures has found to be insignificant in the short run. Moreover; it has also found that exchange rate effects significantly and inversely trade openness in Pakistan in the short run in the model number 1 proposed in equation (1). Additionally; we have also investigated the empirical results for second model proposed in equation (2) for short run and these results demonstrate that human capital in the form of per capita education expenditures and economic growth in the form of per capita gross national income have positive effect on trade openness in Pakistan, but, the impact of human capital in the form of per capita education expenditures has found to be significant and the impact of economic growth in the form of per capita gross national income has found to be insignificant in the short run in Pakistan. Besides this; the impact of exchange rate has remained adverse and significant on trade openness in the short run in Pakistan for the model number 2 proposed in equation (2) as well. We have also tested the convergence hypothesis for the both models and it has found the coefficient of first period lagged term of error term is negative and highly significant indicating that error will be corrected in the both models and convergence towards long run and stable equilibrium will take place in the both models. The stable equilibrium will be attained slightly earlier in the second model proposed in equation (2) as compared with the first model proposed in equation (1).

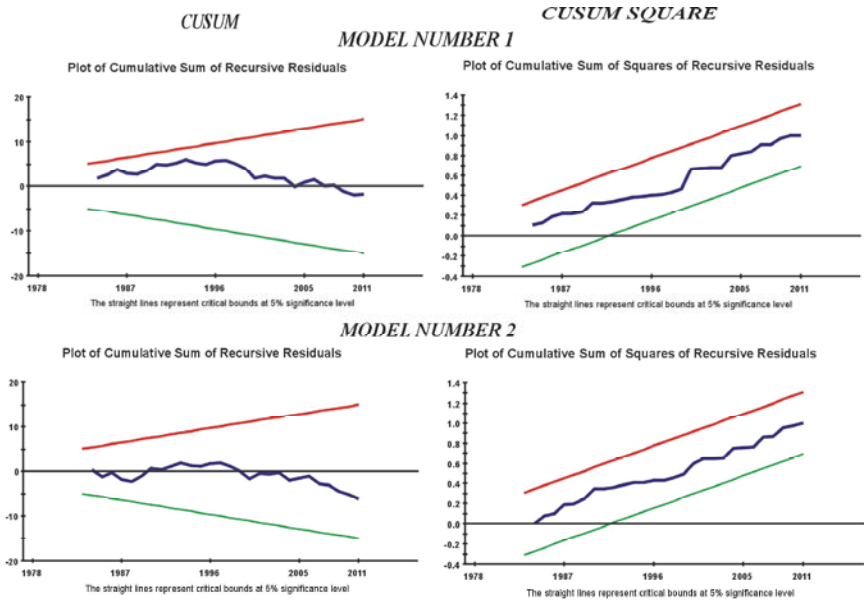

Fig. 4.1: Stability Test:

At the end; we have also attempted to test whether there prevails structural instability in the study over the data series 1976 – 2011 taken for empirical examination. The graphical representation of CUSUM and CUSUM square have shown that in the both models proposed in equation (1) and (2) we have found structural stability over time indicating that variables of both models have stable relationship with each other.

CONCLUSION

This study is an attempt to examine the impact of human capital; exchange rate and gross national income on trade openness over the period of 1976 – 2011 for a case of Pakistan. The article applies Augmented Dickey Fuller [32] and Phillip Perron [33] unit root tests to check the unit root problem; ARDL Bounds Testing [34] approach to test long term co-integration between trade and its factors for the both models, in order to examine the impact of factors of trade on trade openness in the long run, we have applied Fully Modified Ordinary Least Square Technique, then to find out short term coefficients we have applied Error Correction Mechanism and finally to examine structural instability over time in the both models, we have applied CUSUM and CUSUM square diagrams.

The empirical findings of the study have disclosed that economic growth in the form of per capita gross national income has positive and significant impact on trade openness in the both short run and long run in the first model proposed in equation (1) and hence it indicates that growth led trade hypothesis works in the short run and in the long run in Pakistan. Besides this; we have also tested the impact of human capital on trade openness in Pakistan for both short run and long run and for this purpose we have introduced two proxies for human capital: per capita health expenditures and per capita education expenditures. The empirical findings have exposed that human capital in the form of per capita health expenditures have insignificant but positive impact on trade openness in short run and in long run; whereas, human capital in the form of per capita education expenditures have significant and positive impact on trade openness and hence it indicates that human capital in the form of per capita education expenditures led trade hypothesis also works in Pakistan in the short run and in the long run.

Moreover; we have found that exchange rate has significant but negative impact on trade openness in the short run and in the long run into both models proposed in equations (1 and 2) in Pakistan. Finally; it has also found through the estimates of CUSUM and CUSUM square that there does not exist any structural instability over time in the both models of the study.

REFERENCES

1. World Bank. 2013. World Development Indicators [CD Rom 2012]. World Bank, Washington, D.C.
2. Handbook of Statistics on Pakistan Economy. (2013). *State Bank, Government of Pakistan.*
3. Mughal, M.Y. and A. Anwar, 2012. Remittances, inequality and poverty in Pakistan: Macro and Micro Economic Evidence. *CATT WP No. 2*. Retrieved From: http://catt.univ-pau.fr/ live/ digitalAssets/ 115/ 115579_2012_2013_2DocWcattRemittances_Inequality_Poverty_in_Pakistan_Macro_MicroEco_MMughal_AIAnwar.pdf
4. Pakistan Economic Survey. 2012. Government of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad.
5. Mughal, M.Y., 2013. Remittances as Development Strategy: Steeping Stones or Slippery Slope? Journal of International Development, 25(4): 583-595.
6. Behuria, S. and R. Khullar, 1994. Intermidiate Services and Economic Development: The Malaysia example. *EDRC Occasional papers*. Asian Development Bank. Retrieved From: http:// www.adb.org/ sites/ default/ files/ pub/1994/OP008.pdf
7. Gordon, J. and P. Gupta, 2004. Understanding India,s Services Revolution. IMF Working Paper Number WP/04/171. Retrieved From: http:// www.imf.org/ external/pubs/ft/wp/2004/wp04171.pdf
8. Robinson, J., 1979. Aspects of Development and Underdevelopment. Cambridge University Press, Cambridge.
9. Hoogvelt, A.M., 1982. The Third World in Global Development. Macmillan Publishers Limited.
10. Love, J., 1992. Export Instability and the Domestic Economy: Questions of Causality. Journal of Development Studies, 28(4): 735-742.
11. Granger, C.W.J., 1969. Investigating Causal Relationships by Econometric Models and Cross-Spectral Models. Econometrica, 37(3): 424-438.
12. Sims, C., 1972. Money, Income and Causality. American Economic Review, 62(3): 540-552.
13. Sinha, D., 1999. Export Instability, Investment and Economic Growth in Asian Countries: A Time Series Analysis. Center Discussion Paper No. 799, Economic Growth Center, Yale University. Retrieved From: http:// www.econ.yale.edu/ growth_pdf/ cdp799.pdf

14. Khan, A.H. and N. Saqib, 1993. Exports and Economic Growth: The Pakistan Experience. International Economic Journal, 7(3): 53-64.
15. Mutairi, N.A., 1993. Exports and Pakistan's Economic Development. Pakistan Economic and Social Review, 31(2): 134-146.
16. Khan, A.H., A. Malik and L. Hasan, 1995. Exports, Growth and Causality: An Application of Co-integration and Error-Correction Modelling. The Pakistan Development Review, 34(4): 1001-1012.
17. Rana, P.B., 1985. Exports and Economic Growth in the Asian Region. ADB Economic Staff Paper No.25. Manila, Asian Development Bank.
18. Rivera, B. and L. Currais, 2003. The Effect of Health Investment on Growth: A Causality Analysis. International Advances in Economic Research, 9(4): 312-324.
19. Temple, J., 2001. Growth Effects of Education and Social Capital in the OECD Countries. Organization for Economic Co-operation and Development (OECD) *Economic Studies No.33, 2001/II,* 57-101. Retrieved From: http:// www.efm.bris.ac.uk/ ecjrwt/ abstracts/ Article2ES33.pdf
20. Bhattarai, K.R. and M.K. Armah, 2005. The Effects of Exchange Rtae on the Trade Balance in Ghana: Evidence from Cointegration Analysis. Research Memorandum 52. Centre for Economic Policy, Business School, University of Hull, United Kingdom. Retrieved From: http:// www2.hull.ac.uk/ hubs/ pdf/memorandum52.pdf
21. Bautista, R.M., 1987. Production Incentives in Philippine Agriculture: Effects of Trade and Exchange Rate Policies. *Research Report Number 59*, International Food policy Research Institute. Retrieved From: http:// www.ifpri.org/ sites/ default/ files/ publications/rr59.pdf
22. Gomes, F.A.R. and L.S. Paz, 2005. Can Real Exchange Rate Devaluation Improve Trade Balance? The 1990-1998 Brazilian Case. Applied Economics Letters, 12(9): 525-528.
23. Tsen, W.H., 2006. Is There a Long Run Relationship between Trade Balance and Terms of Trade? The Case of Malaysia. Applied Economics Letters, 13(5): 307-311.
24. Singh, T., 2002. India's Trade Balance: The Role of Income and Exchange Rates. Journal of Policy Modeling, 24(5): 437-452.
25. Hassan, M.S., A. Wajid and K. Ahmed, 2012. Urbanization as a Way to Open Economy: Empirical Evidence from Pakistan. World Applied Sciences Journal, 20(7): 931-940.
26. Hassan, M.S. and R. Kalim, 2012. Sorting out the Triangular Causality among Education, Health and Economic Growth: A Time Series Analysis of Pakistan. World Applied Science Journal, 18(2): 196-2007.
27. Ehrlich, I., 1977. The Deterrent Effect of Capital Punishment Reply. American Economic Review, 67: 452-58.
28. Layson, S., 1983. Homicide and Deterrence: Another View of the Canadian Time-Series Evidence. The Canadian Journal of Economics, 16(1): 52-73.
29. Bowers, W. and G. Pierce, 1975. The Illusion of Deterrence in Isaac Ehrlich's Work on the Deterrent Effect of Capital Punishment". Yale Law Journal, 85(2): 187-208.
30. Cameron, S., 1994. A Review of the Econometric Evidence on the Effects of Capital Punishment. Journal of Socio-economics, pp: 197-214.
31. Ehrlich, I., 1996. Crime, Punishment and the Market for Offences. Journal of Economic Perspectives, 10: 43-67.
32. Dickey, D.A. and W.A. Fuller, 1981. Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. Econometrica, 49(4): 1057-1072.
33. Phillips, P.C.B and P. Perron, 1988. Testing for a Unit Root in Time Series Regression. Biometrika, 75(2): 335-346.
34. Pesaran, M.H., J. Richard and Y. Shin, 2001. Bounds Testing Approaches to the Analysis of Level Relationships. Journal of Applied Econometrics, 16: 289-326.