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THE IMPACT OF ENERGY CRISIS ON PAKISTAN'S TRADE: AN ECONOMETRIC ANALYSIS

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ABSTRACT*-The objective of this research paper is to analyze the impact of Energy crisis on Pakistan's economy. For this purpose, time series annual data was collected from World Development Indicators, Economic Survey of Pakistan, and handbook of Statistics on Pakistan Economy 2015 for the period 1972-2017. Natural log was applied to all variables to estimate their elasticity. Different analytical techniques such as descriptive statistic, correlation analysis and ARDL Bound Test, ADF test were used to analyze data. The results show that two-way causality exists between selected variables. ADF's Unit Root Test reveals that variables of the model are stationer at different orders so we can apply ARDL approach. The ARDL Model results show the existence of long run relationship between variables.*

Keywords: Trade Openness, Energy Crisis, Inflation, Sectoral output.

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1.INTRODUCTION:

1.1 Background of study:

Pakistan is a developing country. Pakistan's national income is based on trade, saving and investment. In trade, export is an important to find out economic condition of the economy. When exports increase, it means economic growth of Pakistan is increasing year by year. Energy Crisis influences exports in multi-dimensional ways. Oil as source of energy may have positive or negative effect on trade due to lack of unavailability of oil. Pakistan is developing country which is dependent on agriculture. But nowadays agricultural output decreases. Pakistan's dependency on agricultural sector output shifts agriculture sector to services sector. The costs of agricultural supplies have declined; the price of manufacture in Pakistan has greater than before due to increased energy and additional input expenses. The energy shortfall and the bias in energy supply policy in support of household consumers and industrial clients are critically affecting the capacity of exporting firms. Research and development have conventionally been a less priority both in the private and public sectors in Pakistan

Imports are very important for industrial sector output and economic growth. New tools and equipment expand the industrial sector output and also other social and economic variables. Energy used in industrial sector is very important and energy crisis or load shading is very harmful for production as well for exports. Now a day's China is investing in different sectors of Pakistan like industrial sector to expand the exports and run the closed textile industry of Pakistan. It is expected that in future Pakistan will face less energy crisis and high industrial output.

1.2 Main Research problem:

The main research problem of this study is to measure the impact of energy crisis on Pakistan's international through econometric analysis.

1.3 Objectives of study:

The objectives of study are outlined as under: -

- To study the causes of energy crisis in Pakistan.
- To study the impact of energy crisis on Pakistan's exports.
- To study nature of relationship between energy crisis and trade.
- To suggest the ways how to control energy crisis and increase trade.

1.4. Research Questions:

The main research questions of this study are stated in the following: -

1. What is the causes of energy crisis in Pakistan
2. What is the impact of energy crisis on Pakistan's international trade?
3. What is relationship between trade and energy crisis in Pakistan?
4. How energy crisis can be controlled and Pakistan's international trade be enhanced?

1.5. Scope of study:

The Scope of this study is large because Pakistan is a developing country and has been facing energy crisis for a long time and this crisis affecting its industry badly. Pakistan's exports are falling while imports are increasing year after year. The results of this study will be helpful for the policy makers to frame such policies that control energy crisis and emission and accelerate industrial output to enhance foreign exchange earnings. This study will also beneficial for new researchers who can conduct further research on this critical issue.

2. LITERATURE REVIEW:

2.1 Review of international studies:

Aissa et al. (2014) analyzed the impact of renewable energy utilization on trade. The research gathered data for the economy of Africa from 1980 to 2008. The econometrics result estimated by means of panel technique and granger causality approaches. Various variables were included in research study like GDP (Gross domestic product) as dependent energy consumption

and trade as independent. So study concluded that bi-casualty exist between gross domestic product to real value of imports and GDP (Gross domestic product) to value of exports. GDP (Gross domestic product) positively influences the trade and energy utilization.

Olufemi (2015) find out the association between electricity and economic growth in Nigeria. The study used the Johansen co – integration method to find out the result. The study used time series data from 1980-2012 of Nigeria. The variables were included electricity generation, employed labor, electricity consumption and foreign exchange rate as predictor and industrial growth as controlled variable. The results show that capital input negatively influences the industrial development but electricity utilization, labor employment electricity generation and foreign remittance have positive effect on industrial growth.

Sama and tah et al. (2016) observed the consequence of energy utilization on economic growth. The research collected time series result for the economy of Cameroon from 1980 to 2014. The econometric result was estimated by using generalized method of moment technique. Various variables were included in research like gross domestic product, petroleum consumption and electricity consumption, inflation, gross domestic investment and population growth.The study concluded that all the independent variables were positively related to the dependent variable.

2.2. Review of relevant studies from Pakistan

Nojmi et al. (2014) investigated the effect of electricity generation on price level in Pakistan by using time series data from (1981-2013). Different techniques like ARDL, OLS and ADF unit root were used. Various variables like exports, electricity generation, money growth, external debt and GDP

(Gross domestic product) were used as explanatory variables and inflation rate as dependent variables. The research concluded that exports, money growth, external debt and gross domestic product had positive effect on the inflation while exchange rate had negative influenced on the inflation.

Bashir et al. (2016) analyzed the impact of electricity generation on actual gross domestic product and actual exports. They took time series data from (1972-2014). The econometric results were estimated through the Johansen – co-integration method. The variables included in the study were GDP (Gross domestic product) as dependent variables while Exchange rate, employed work force, exchange rate, gross capital formation, external trade, electricity generation and inflation rate as independent variables. The study concluded that gross fixed capital formation, electricity generation, terms of trade and employed labor force had positive impact on real GDP while Exchange rate had negative influence on the real GDP. Employed work force, electricity generation, gross fixed capital formation, and inflation rate were positively related to the real exports.

2.3. Distinction of this study:

This study examines the effect of energy crisis on Pakistan's international trade. The distinguished feature of this study is trade openness which is used as dependent variable and energy utilization as independent variable during the period 1972-2017. Trade and energy consumption were used in previous studies by Bashir et al. (2016) in which they took real exports as dependent and energy generation as independent variables from developing countries over the time period from 1990-2014. Previous research used supporting variables like government expenses, broad money supply, labor force and GDP deflator. But our study use supporting variables like carbon dioxide emission

(CO2), industrial sector output actual (ISOA), services sector output actual (SSOA), Gross domestic product deflator (GDPDEF). It will make this study a unique and different from other studies.

3. RESEARCH METHODOLOGY:

Research methodology is a systematic way of conducting research through a given research methods and sampling techniques. The methodology enables the researcher to explore their research objective through step by step advancing their research.

3.1 Type of data and sources:

In this study, time series data is used and it has been collected from various sources such as Pakistan Economic Survey, 2017-18 published by Federal Bureau of Statistics Pakistan, World Development Indicators, 2018 published by World Bank, Manual of Statistics on Pakistan Economy 2015 published by State Bank of Pakistan, International Monetary Fund, Asian Development Bank.

3.2. Sample of study:

The study covers the sampling period from 1972 to 2017 taking annual time series data on Pakistan.

3.3 Selected variables:

The variables used in this study are; Trade, Energy Crisis, Investment, Money Supply, CO_2, Inflation, Exchange rate, Services sector and Industrial Sector. Natural log forms are used in this study relating to all variables so that their elasticity's may be estimated.

3.4 Model Specification:

The purpose of this study is to analyze the effect of energy crisis on Pakistan's trade during 1972-2017. For this purpose, following functional form of model is specified;

$$Trade = f\begin{Bmatrix} Energy\ Crisis, Investment, Money\ Supply, Co2\ Emission, Inflation, \\ Exchange\ rate, Services \quad Industrial\ sector \end{Bmatrix}$$

The above model may be re-written in expression form as shown below;

$$\boldsymbol{TRADE_t = \alpha + \beta_1 ENCR_t + \beta_2 INV_t + \beta_3 COE_t + \beta_4 MS_t + \beta_5 INF_t + \beta_6 EXR_t + \beta_7 SERV_t + \beta_8 INDS_t + u_t}$$

In the above expression, TRADE is log of trade openness of Pakistan, ENCR is log of Energy utilization which is used as proxy of Energy Crisis, INV is used as proxy of investment which is actually log of gross set capital formation, COE is log of Carbon dioxide Emission, MS is log of Broad Money supply, INF shows log of Inflation rate which is GDP Deflator of Pakistan, EXR represents log of Exchange rate of Pakistan, SERV is log of services value added and it shows services sector output of Pakistan, INDS is log of industrial value added which represents Industrial sector output, u_t is error term, α in intercept of trade model, $\beta_{,s}$ are coefficients of trade equation, subscript 't' shows time periods.

3.6. Analytical techniques:

The following techniques were used to analyze data and draw the results.

- Descriptive Analysis
- Causality Analysis
- ARDL Bound Test
- ARDL Short Run
- ARDL Long Run
- Unit Root Test.

3.6.1. Causality Analysis:

Causality analysis presents the cause and effect relationships between variables which shows that whether the variables are having zero causality, 1st method causality or 2nd method causality among variables.

3.6.2. ARDL's Bound Test:

For check long run co-integrating relationship between variables, the present study is intended to utilize the following equation considered at a suitable lag length (

$$\Delta TRADE = \Big[\delta_{\circ} + \sum_{j=0}^{u} \delta_{2j}\,\Delta ENCR_{t-j} + \sum_{j=0}^{u} \delta_{3j}\,\Delta INV_{t-j} + \sum_{j=0}^{u} \delta_{4j}\,\Delta COE_{t-j} + \sum_{j=0}^{u} \delta_{5j}\,\Delta MS_{t-j} + \sum_{j=0}^{u} \delta_{6j}\,\Delta INF_{t-j} + \sum_{j=0}^{u} \delta_{7j}\,\Delta EXR_{t-j} + \sum_{j=0}^{u} \delta_{8j}\,\Delta SERV_{t-j} + \sum_{j=0}^{u} \delta_{9j}\,\Delta INDS_{t-j} + \alpha_0 TRADE_{t-1} + \alpha_1 ENCR_{t-1} + \alpha_2 INV_{t-1} + \alpha_3 COE_{t-1} + \alpha_4 MS_{t-1} + \alpha_5 INF_{t-1} + \alpha_6 EXR_{t-1} + \alpha_7 SERV_{t-1} + \alpha_8 INDS_{t-1} + \omega_{1t}\Big]$$

[H_0:$\alpha_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = 0$]

[H_1:$\alpha_0 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq \alpha_8 \neq 0$]

3.6.3 ARDL's short run relationship:

ARDL short run relationship between variables will be determined by using following expression:

$$\Delta TRADE = \Big[g_{\circ} + \sum_{j=1}^{m} g_{0j}\,\Delta TRADE_{t-j} + \sum_{j=0}^{m} g_{1j}\,\Delta ENCR_{t-j} + \sum_{j=0}^{n} g_{2j}\,\Delta INV_{t-j} + \sum_{j=0}^{o} g_{3j}\,\Delta COE_{t-j} + \sum_{j=0}^{p} g_{4j}\,\Delta MS_{t-j} + \sum_{j=0}^{q} g_{5j}\,\Delta INF_{t-j} +$$

$\sum_{j=0}^{r} g_{6j}\,\Delta EXR_{t-j} + \sum_{j=0}^{s} g_{7j}\Delta SERV_{t-j} + \sum_{j=0}^{t} g8\mathrm{j}\Delta INDS_{t-j} + \psi_1 ECM_{t-1} + \epsilon_{1_t}\Big]$

3.6.4 ARDL: Long-run relationship:

Long run relationship will be determined through ARDL approach and equation is given below: -

$$TRADE = \Bigg[d_{\circ} + \sum_{j=1}^{m} d_{1j}\,TRADE_{t-j} + \sum_{j=0}^{n} d_{2j}\,ENCR_{t-j} + \sum_{j=0}^{o} d_{3j}\,INV_{t-j} + \sum_{j=0}^{p} d_{4j}\,COE_{t-j} + \sum_{j=0}^{q} d_{5j}\,MS_{t-j} + \sum_{j=0}^{r} d_{6j}\,INF_{t-j} + \sum_{j=0}^{s} d_{7j} EXR_{t-j} + \sum_{j=0}^{t} d_{8j} SERV_{t-j} + \sum_{j=0}^{U} d_{9j} INDS_{t-j} + v_1 \Bigg]$$

3.6.5 Unit Root Test:

To check the problem of stationarity, the present study is intended to follow Dickey Fuller test (ADF). A number of test are used to check whether all the variables are stationary at L (0) and I (1) difference. If error term is correlated, then ADF test is relevant. To check this problem, the following equations of unit root would be utilized.

Without Drift and Trend:

$$\Delta \mathrm{Y_t} = \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta \mathrm{Y_{t-i}} + \mu_\mathrm{i}$$

With Drift and no Trend:

$$\Delta \mathrm{Y_t} = \beta_1 + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta \mathrm{Y_{t-i}} + \mu_\mathrm{i}$$

With Drift and Trend:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-1} + \mu_i$$

4. EMPERICAL ANALYSIS:

In this section, we will discuss descriptive analysis which includes (Mean, Standard Deviation, Minimum, Maximum, Kurtosis, and Skewness). We shall also interpret the data of variables from 1972 to 2017. After explaining the data, we will check cause and effect relationship among variables by using causality test. In order to check the association among variables, we will examine correlations among variables.

4.1 Descriptive analysis:

Table 1: Results of Descriptive Analysis

Descriptive Statistics	DE	ENCR	COE	INF	EXR	SERV	INDS	MS	INV
Mean	.32	409.85	85418.5	61.89	39.82	2720	960	247000	932
Median	.33	425.53	81246.1	29.90	29.33	2410	855	221000	1020
Maximum	.44	523.26	163061	243.85	102.76	6260	2160	600000	1560
Minimum	.24	285.16	11210	3.76	8.68	615	196	55900	333
Std. Dev.	.04	75.63	51024.9	69.37	30.18	1650	617	162000	369
Skewness	.62	-0.23	0.19	1.40	0.70	0.56	0.53	0.66	-0.09
Kurtosis	.44	1.60	1.68	3.78	2.23	2.16	1.99	2.16	1.89
Jarque-Bera	.22	3.99	3.44	15.50	4.72	3.63	3.93	4.56	2.31
Probability	.19	0.13	0.17	0.00	0.09	0.16	0.14	0.10	0.31

In Table 1 descriptive statistics are shown which indicate average trade openness in Pakistan is 0.32 units. Median value of trade openness is 0.33. Maximum trade openness is 0.44 and its minimum value has been 0.24 during 1972

– 2017 in Pakistan. Standard deviation shows deviation from mean value its value is 0.04 which shows that significance of trade openness lies near to mean value. The table also shows that average energy consumption in Pakistan has been 409.85 kg. Median value of energy consumption is 425.53 kg. Maximum energy consumption remained 523.26 kg in Pakistan and its minimum value has been 285.16 kg during 1972 – 2017 in Pakistan. The data in table 1 shows that average services sector output in Pakistan has been 2720 million rupees. Median value of Services Sector Output is 2410 million rupees. Maximum Services Sector Output remained 6260 million rupees in Pakistan and its minimum value has been 615 million rupees during 1972 – 2017. Standard deviation shows deviation from mean value its value is 1650 which shows that value of Services Sector Output lies less near to mean value. On the other side, the price of kurtosis is 2.16 which show that Services Sector Output is having Platy Kurtic distribution. Null hypothesis of Jarque – Bera statistics shows that residuals of Services Sector Output are normally distributed. Its probability value 0.16 which concludes that we may not be able to reject Null hypotheses and may conclude that the residuals of Services Sector Output are usually dispersed. Platy Kurtic distribution. Null hypothesis of Jarque – Bera statistics shows that the residuals of Investment are usually dispersed. Its probability value 0.31 which concludes that we may not be able to reject Null hypotheses and may wind up those residuals of Investment is usually dispersed.

4.2 Correlation Analysis:

The results of correlation analysis are given in Table 2:

Table 2: Results of Correlation analysis

Variables	TRADE	ENCR	INV	COE	MS	INF	EXR	INDS	SERV
TRADE	1								

ENCR	-0.70	1							
	0.00	-----							
INV	-0.67	0.97	1						
	0.00	0.00	-----						
COE	-0.53	0.61	0.63	1					
	0.00	0.00	0.00	-----					
MS	-0.67	0.97	0.96	0.55	1				
	0.00	0.00	0.00	0.00	-----				
INF	-0.72	0.95	0.93	0.60	0.97	1			
	0.00	0.00	0.00	0.00	0.00	-----			
EXR	-0.74	0.96	0.93	0.55	0.97	0.98	1		
	0.00	0.00	0.00	0.00	0.00	0.00	-----		
INDS	-0.71	0.98	0.97	0.61	0.99	0.98	0.97	1	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----	
SERV	-0.72	0.97	0.97	0.62	0.98	0.98	0.97	0.99	1
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----

The results of correlation analysis are shown in Table .2 in which 1st column and first row is regarding names of variables. Besides each variable, in first

row, values of correlation are given while its probability values are given in second row. The results of the Analysis show that there is moderate negative correlation among Energy Crisis and Trade; Investment and Trade; Carbon Dioxide Emission and Trade; Money supply and Trade while strong negative correlation exists between Inflation and Trade; Exchange rate and Trade; Services Sector Output (SSO) and Trade; Industrial Sector Output(ISO) and Trade. Strong positive correlation exists between Investment and Energy Crisis; Money Supply and Energy Crisis; Inflation rate and Energy Crisis; Exchange rate and Energy Crisis. It might be seen that there is moderate positive association between Carbon Dioxide (CO_2) Emission and Energy Crisis; CO_2 Emission and Investment; Money Supply and CO_2 Emission; Inflation and CO_2 Emission; Exchange rate and CO_2 Emission; Industrial Sector Output and CO_2 Emission; Services Sector Output and CO_2 Emission.

4.3. Unit Root Test:

Augmented Dickey Fuller (ADF)'s Unit Root test is applied on all variables to check the stationary and their results are given in table 3.

Table 3: Results of Unit Root

Variable	Test in	Including	t-static	Probability	conclusion
Trade	LEVEL	INTERCEPT	-2.2358	0.1971	I(0)
		ND & INTERCEPT	-3.3476	0.0723	
Services Sector Output	LEVEL	INTERCEPT	-2.1183	0.2388	I(1)
		ND & INTERCEPT	-1.8178	0.6782	
	1ST	INTERCEPT	-4.3046	0.0014	
Industrial		INTERCEPT	-2.5475	0.1118	

Sector Output	LEVEL	ND & INTER-CEPT	-0.8253	0.9551	I(1)
	1ST	INTERCEPT	-4.8468	0.0003	
Carbon Dioxide Emission	LEVEL	INTERCEPT	-6.3187	0.0000	I(0)
Money Supply	LEVEL	INTERCEPT	0.01238	0.9545	I(0)
		ND & INTER-CEPT	-4.2144	0.0094	
Inflation	LEVEL	INTERCEPT	-1.0264	0.7354	I(1)
		ND & INTER-CEP	-2.3575	0.3956	
	1ST	INTERCEP	-4.6707	0.005	
Exchange rate	LEVEL	INTERCEPT	0.02375	0.9555	I(1)
		ND & INTER-CEP	-1.7639	0.7047	
	1ST	INTERCEPT	-4.7956	0.0003	
Energy Crisis	LEVEL	INTERCEP	-1.9204	0.3201	I(1)
		ND & INTER-CEPT	-0.4955	0.98	
	1ST	INTERCEP	-5.3486	0.0001	
Investment	LEVEL	INTERCEPT	-0.1198	0.94	I(1)
		D & INTER-CEPT	9		
		CEPT	9		

The ADF's unit root test shows that all variables are stationary at different orders and we can apply ARDL model to draw the results.

4.4. Bound Test:

Bound test is use to check long run relationship between variables of the model. The result of Bound Test is given in table 4

Table 4: Results of Bound Test

Test Statistic	Value	K
F-Statistic	4.823497	8
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	1.95	3.06
5%	2.22	3.39
2.50%	2.48	3.7
1%	2.79	4.1

4.5. ARDL long run results:

The results of ARDL model long run are shown in Table 5 in which 1st column is shown names of variables, coefficient values are given in 2nd column, standard errors are given in column three, t – statistics are reported in column fourth, probability of each variable is given in column fifth.

Table 5: Long Run Results

Variables	Coefficients	Standard Errors	t-statistics	Probability
Energy Consumption	-1.296776	0.605453	-2.141830	0.0426
Investment	0.979113	0.289436	3.382829	0.0025
Carbon Dioxide Emission	0.181534	0.266869	0.680236	0.5029
Money Supply	0.623906	0.158762	3.929810	0.0006
Inflation	0.254212	0.103337	2.460030	0.0215
Exchange Rate	0.278575	0.146330	1.903747	0.0690
Industrial Sector Output	1.117164	0.366378	3.049211	0.0055
Services Sector Output	-3.271738	0.510409	-6.410030	0.0000
Constant	17.756720	5.119230	3.468631	0.0020
		Lag length		(2,0,0,0,2,2,1,2,0)

When industrial sector output increases, it means productivity of industries are increasing and hence exports of Pakistan as well. There is positive association between industrial sector trade and output in long run. Value of t – statistics is 3.04 and probability value is 0.00 attached with this variable which signifies that industrial sector output variable is 1 percent of significance level in the long run.

5.4 ARDL short run Relationship:

The results of ARDL short run coefficients are shown in table 6.

Table 6: Short Run Analysis

Variables	Coefficients	Std. Error	t-Statistic	Prob.
D(LTOR(-1))	0.297472	0.15975	1.862104	0.0749
D(LECOM)	-1.504529	0.651693	-2.308647	0.0299
D(LGFCFR)	0.693434	0.255593	2.713043	0.0121
D(LGFCFR(-1))	-0.651264	0.222332	-2.929236	0.0073
D(LCO2)	0.210617	0.308954	0.681711	0.5019
D(LBMOR)	0.72386	0.205783	3.517596	0.0018
D(LGDPDEF)	0.294938	0.133685	2.206224	0.0372
D(LEXR)	-0.430048	0.239518	-1.795472	0.0852
D(LEXR(-1))	-0.418043	0.23202	-1.801752	0.0842
D(LISOR)	0.692061	0.490198	1.411798	0.1708
D(LSSOR)	-1.966213	0.712072	-2.761254	0.0109
D(LSSOR(-1))	2.398757	0.597721	4.013172	0.0005
CointEq(-1)	-1.160207	0.201433	-5.759773	0.0000

In this table, ARDL short run co integrating equation shows the convergence of short run analysis towards long run equilibrium as –ve sign is fond of with co-integration (-1) variable with statistically significant probability value. The study shows that there would be 11 percent annual adjustment. One-year previous trade openness has + ve effect on current trade openness with statistically significant coefficient value. There is negative association among trade openness and energy utilization with significant coefficient. Current year investment has positive relation with trade openness with significant coefficient. Last year investment has negative impact on trade openness. One

year previous services sector output is positively significantly related with trade openness.

6. FINDINGS AND RESULTS:

The results of empirical analysis show that in Pakistan average trade openness is 0.325543, average industrial sector output is 960, average exchange rate is 39.82808, carbon dioxide emission on average is 85418.45, industrial sector output is 2720 on average, energy consumption is 409.85, inflation on average is 61.89, broad money supply is 247000 and mean of investment is 932. In Pakistan, Trade is positively skewed and is having Lepto Kurtic distribution. Energy consumption is negative skewed and is having Platy Kurtic distribution. Carbon dioxide emission is positively skewness and is having Platy Kurtic distribution. Inflation has positive skewness and Lepto Kurtic distribution. Exchange rate has positive skewness and is having Platy Kurtic. Industrial sector output has Positive skewness and Platy Kurtic. Services sector output has Positive skewness and Platy Kurtic distribution. Broad money has positive skewness and Platy Kurtic. Investment has negative skewness and has Platy Kurtic distribution.

Long run elasticity of trade openness with reference to Energy Consumption, Investment, Carbon Dioxide Emission, Money Supply, Inflation, Exchange rate, INDS (Industrial Sector) output and Services Sector output are respectively, -1.29, 0.97, 0.18, 0.62, 0.25, 0.27, 1.11 and -3.27 respectively in the long run. The short run results suggest that speed of adjustment from short run to long run would be 11 percent per annum.

7. CONCLUSIONS:

The results of correlation analysis concludes that Strong positive correlation exists between Investment and Energy crisis; Money Supply and Energy crisis; Inflation and Energy crisis; Exchange rate and Energy crisis; INDS (Industrial Sector) output and Energy crisis; Services Sector Output and Energy crisis; Money Supply and Investment; Inflation and Investment; Exchange rate and Investment; Industrial Sector output and Investment; Services Sector output and Investment; Investment and Money Supply; Services Sector output and Carbon Dioxide Emission.

To verify long run Co-integration between variables, ARDL Bound testing approach was utilized and the results support that there exists long run co-integrating amongst variables like Trade Openness, Energy Consumption, Carbon Dioxide Emission, Inflation, Exchange rate, Service Sector Output, Industrial Sector Output, Money Supply, and Investment. To measure change in coefficients in the long run, ARDL model was applied which reveals that energy consumption and Services Sector Output are the only factors which are reducing trade openness in Pakistan while Investment, Carbon dioxide emission, money supply, inflation, EXR (exchange rate) and industrial sector output are increasing trade openness in Pakistan in long run.

The long run elasticity of trade openness with reference to Energy Consumption, Investment, Carbon Dioxide Emission, Money Supply, Inflation, Exchange rate, industrial Sector output and Services Sector Output are respectively, -1.29, 0.97, 0.18, 0.62, 0.25, 0.27, 1.11 and -3.27. Moreover, there would be 11 percent annual adjustment towards long run symmetry if any trouble occurs in the short run during the analysis period.

8. POLICY RECOMMENDATIONS:

In the light of above discussion, we would like to make the following recommendations: -

- The government should take strict policy initiative to reduce rising imports and enhance energy generation to produce goods and services domestically and for export purpose.
- The Government should focus on promotion of industrial sector in order to expand country's manufacturing capacity.
- Government should reduce carbon dioxide emission because CO_2 is harmful for human being and animals also.
- Exchange rate positively influence the trade openness so government should take action to keep exchange rate stable.
- Government must control inflation rate in order to stabilize prices of goods and services in the domestic market.
- Government should take initiative to improve services sector exports.

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CONTRIBUTION OF AUTHORS AND CONFLICT OF INTEREST

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