IMPACT OF TRADE OPENNESS, OIL AND GAS CONSUMPTION ON GDP

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ABSTRACT: *The core purpose of the study is to investigate the association and impact of trade openness, oil and gas consumption with GDP. For this aim, the co-integration relation of trade openness, oil and gas consumption with GDP of Pakistan has examined with considering the stationarity of data. The co-integration of the trade openness, oil and gas consumption with GDP is investigated by the Johnson co-integration. The Error correction model is used to check the relation in short term behavior of a variable with its long term behavior that was developed by the* Johansen-Juselius (1990). *Moreover, the post estimation tests are used to check the stability of the variables and perfection of the model. Empirical results show that the trade openness, oil and gas consumption has significant causal relationship on GDP of Pakistan. Results also indicate that there is long term association between trade openness, oil and gas consumption with GDP. This study observed the unidirectional causality between independent and dependent variables. This study provides the first attempt in investigating the impact of trade openness, oil and gas consumption on GDP in the context of Pakistan. This study highlights the different ways in which the GDP of Pakistan is impacted by the trade openness, oil and gas consumption. Research method that is employed provides an applicable framework for investigating the relationship between economic variables. This study elaborates a better co-integration relationship among the given economic variables. Based upon the empirical evidences it adds new information in the literature in terms of identifying a relationship of GDP with trade openness, oil and gas consumption in the Pakistan.*

Keywords: Trade Openness, Oil and Gas Consumption, GDP

INTRODUCTION

The correlation between trade openness and economic development has been examined in Asian developing countries, on the contrary; insignificant correlation has been explored in between democratic system and economic development. It also signifies the fragile nature of democratic governments in the progressive countries [1]. The openness to trade international has positive impact on economic growth and development. Furthermore, openness to international trade enhances the conviction. It can favorably contribute to the development of both native and global relationship subsequently; the extent of indigenous market can also be improved through domestic and global relationship [2]. A call for policy implementation which could be inferred that since the openness to trade has no impact on native financial institute development and output development. There is need to deploy their sources that ultimately creating a constant native demand instead of focusing extensively on the peripheral in front and openness to trade specifically. For instance; It also bring incredible lesson to china and Germany in particular that now a days are more focused on elevating their export development and growth through preserving comparative exchange rate by invention costly policies[3].

The correlation between economic development and openness to trade is explored for 17 emerging countries. The co-integration inter-relation between the determinants is explored by Bound testing technique designed by pesaran, Toda and Yamamoto explored the causality inter-relation. As per Bound test, co-integration has been derived that explored to be favorable and significant statistically. As per result depicted the vice versa approach of the causality assessment for four countries, the dimension of causality is from openness to trade for economic development and rest for the other four [4].

The correlation, regression framework model is being employed to investigate the sensitive relationship of a natural gas in terms of its use on future climate alter in GDP. It also seems the natural gas utilization is being declined in the

future as compared to the present scenario due to the climate changes [5].

Long term equilibrium association is exist between Real GDP, real gross fixed capital formation, natural gas consumption and the labor force. Elasticity in the long term is statistically significant positive for the natural gas consumption, labor force and the real gross fixed capital formation. Natural gas consumption and the economic growth have both long term and short term bidirectional causality [6].

Elasticity between economic growth and the consumption of oil is less than one for china, South Africa and Turkey. The income elasticity of natural gas for Turkey was 2.578 so; the natural gas comes in the luxury goods in the Turkey. In Russia the income elasticity of the natural gas was 0.81203. In Brazil, Turkey and Russia the income elasticity and natural gas consumption has long-term bidirectional causal relationship [7].

Natural gas consumption, GDP and capital nexus has a unidirectional causality relationship in Italy and United Kingdom. However, Bidirectional causality is found in the Germany, United States and France [8].

In china natural gas consumption is rapidly growing. Government is taking measures in this regard to fulfill this growing consumption of natural gas. Obvious decision is the exploration and development of new gas reserves that are mainly found in the North West and south west region of china that is about 22 trillion cubic meters. Secondly formation of proper gas pipe lines and infra-structure construction [9]. Economic growth of Pakistan is positive effected by the exports, labor, capital and natural gas consumption. Natural gas consumption has a positive and significant impact on the economic growth. Increase in the capital investment has positive significant impact on the real GDP at a 1% level of significance. Economic growth is strongly explained by the natural gas consumption and the capital. A unidirectional causality is found in economic growth and the natural gas consumption [10]. Economic growth and the oil consumption have bi-directional causality which shows that Philippines should try to overcome the oil

consumption for achieving   economic growth. Oil consumption and the emission of CO2 has bi-directional causality shows an improvement required in the efficiency of Oil consumption to reduce CO2 emission. Uni-directional causality between economic growth and the CO2 emission indicates that increase in the growth can continue without increasing the co2 emission [11]. [12] explains that Oil consumption and the CO2 emission has long run association with GDP. Economic growth has long and short term bidirectional relationship with the oil consumption and Co2 emission based on the VECM test by granger causality. GDP and oil consumption has long term equilibrium relationship. GDP is Granger caused by the oil consumption in the short run not in the long run. Economic growth is highly elastic by the use of oil both in long and short term. Mutual effect between the economic growth and oil consumption can be used in long term to predict the oil consumption but not in short run [13].

GDP per capita and per capita consumption in oil has significant inverted-U shape relationship. At peak point of per capita oil consumption the level of GDP per capita were estimated 65072 in year 2005 international constant dollar that was so much greater than the economies of scale. As GDP per increases the per capita oil consumption is predicted to increase [14]. Economic growth and crude oil consumption has bi-directional relationship in the oil importing countries. But the uni-directional causality exists in the oil exporting countries. However, in long term the bidirectional causality relation exists in both regions [15]. [16,17] Explains that a short run unidirectional causality from the economic growth to oil consumption of the country. But bidirectional causality exists in long run from oil consumption to economic growth. However, a strong causality is unidirectional that is from economic growth to the oil consumption. Over causality is found from the oil consumption to economic growth.

DATA AND METHODOLOGY

In this section data and methods are used to analyze the co-integration and causal relationship of trade openness, oil and gas consumption with GDP and it also examine the various economic indicators that are used in present study to access the development in the financial sector.

DATA AND EMPIRICAL RESULTS

To construct the summary of trade openness, oil and gas consumption with GDP for Pakistan different financial indicators are used such total trade as a % age of GDP used in the representation of trade openness and GDP per capita used as dependent variable. The data of GDP per capita and Trade openness is collected from the data portal available at WDI in the context of Pakistan. The data of Oil and gas consumption is collected from economic survey of Pakistan. The data is in time series form for the years 1985-2015.

Results and empirical analysis are consists of mainly four parts.

(1) Construction of stationarity in the variables by Augmented Dickey-Fuller test.

(2) Estimation of Johansen's co-integration test to check the long term association of trade openness, oil and gas consumption with GDP.

(3) We precede Granger causality test to check the cause and effect relationship.

(4) Diagnostic tests are used to check the validity of model and data in variables.

Unit root test

For a financial time series data it is necessary to check the stationarity of every variable before model estimating. This thing indicates that both regressand and regressors used in the model are consistent and unbiased over the estimated time periods. So the Augmented Dickey-Fuller (ADF) test is used for this purpose.

Table I. Unit root test

Variables	I(0) (Prob.)	I(1) (Prob.)
Trade Openness	0.0066	.00000
Oil Consumption	0.2674	.00000
Gas Consumption	0.1268	0.0872
GDP	0.8644	0.0160

At the first glance it is showing that the data of GDP, Oil and gas consumption is none-stationary at level but after getting first difference it becomes stationary. But trade openness is already stationary at level. See Table I. Unit root test results.

Co-integration test

If the data is unit root then in the analysis of data the results are spurious but in the long run relationship method gives sufficient results. For this purpose the co-integration test based on the method of [18] or can be obtained by the Johansen-Juselius (1990) test. This method requires that regressors and the regressand should be I (0) and I (1). Additionally error correction method used for Co-integration. This thing is only applicable there at least one co-integration equation is achieved then in this case Johansen's (1988) approach is applicable. The co-integration method developed by the Johnson checked a number of co-integration equation between concern variables by using vector auto-regression model considering all variables are endogenous.

Second step is the application of co-integration model to determine degree of co-integration among variables in the model. As per unit root all variables are I (1) so the all variables integrated at first order. So the Johnson co-integration test is applied between the variables such as GDP, trade openness, oil and gas consumption to detect any long term association between concern variables. Then long term association among the variables is estimated after the confirmation of degree of integration. To analyze this association among variables study determines the optimum lag that is based on the lag length criteria given by sequential modified LR test statistic, final prediction error, Akaike information criterion, Schwarz information criterion, Hannan–Quinn information criterion. The results are presented in table II. So, the lag 2 will be followed. From table III it is conclude that null hypotheses of no co-integration is rejected at 5% level of significance. Even the null hypotheses of 1, 2 and at most 3 'no co-integration equations' are reject because the value of trace statistics is not less than critical value. Therefore the trace statistics shows four co- integration equations.

Table II. VAR optimal lag selection

Lag	LR	FPE	AIC	SC	HQ
0	NA	4.83	84.307	84.492	84.367
1	215.7	3.42	77.041	77.966	77.343
2	43.85*	1.38*	76.080*	77.745*	76.623*

Note: Indicates lag order selected; LR: sequential modified LR test statistic (each test at 5 %), FPE: final prediction error, AIC: Akaike information criterion; SC: Schwarz information criterion, HQ: Hannan–Quinn information criterion.

Table III. Johansen's maximumLong-run relationship

No. of CE(s)	Eigen value	Trace Stat	Critical Value	Prob.*
None *	0.6410	72.625	47.856	0.0001
At most 1 *	0.5164	41.885	29.797	0.0013
At most 2 *	0.3388	20.086	15.494	0.0094
At most 3 *	0.2257	7.6742	3.8414	0.0056

Between GDP, Trade openness, Oil and gas consumption.

Trace test shows four co-integrating equations at 5 % level indicates rejection of the hypothesis.

The next step is to estimate the error correction model by using lag restriction. The error correction is 6.8 percent at lag 1. Signe of the error correction term's coefficient is negative and significant at 10% level of significance showing that disequilibrium between the long and short term values of the dependent variables is disappearing is gradually at the speed of 6.8 percent every year. By integrating the adjustment in the error term for short run equation to create desirable equilibrium, the trade openness, oil and gas consumption are acting as catalyst in long run for the growth of GDP at 6.8 percent of adjustment to gain long run equilibrium. See table IV.

Table IV. Vector error correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1592.75	1842.408	-0.86449	0.3966
D(TO(-1))	-35.53513	73.4931	-0.48352	0.6335
D(TO(-2))	174.6516	68.33075	2.555973	(0.018)
D(OC(-1))	8.23E-05	8.452305	0.973649	0.3408
D(OC(-2))	0.000522	0.000163	3.201342	(0.0041)
D(GC(-1))	0.000401	0.002388	0.167885	0.8682
D(GC(-2))	0.006347	0.003558	1.783955	(0.0882)
ETC(-1)	-0.068103	0.032939	2.067549	(0.0973)
F-stat. 4.977 (0.023)				
Adj. R-squared	0.32305			

Here TO=Trade Openness, OC= Oil consumption, GC=Gas Consumption.

Granger causality

By causality we mean that causality by concept of Granger's (1969). It means if one variable precedes other's one or there is cause and effect relationship between variables. If the GDP has long term relationship with trade openness, oil and gas consumption explained by lagged regression model then it needs to check cause and effect relationship between the variables (Gujarati 2003). From table V it is shown that the null hypothesis of no granger cause GDP by Trade openness, oil and gas consumption is rejected. See table V.

Table V. Granger causality Test

Null Hypothesis:	Prob.
DTRADE Openness does not Granger Cause DGDP	0.0310
DOIL Consumption does not Granger Cause DGDP	0.0287
DGAS Consumption does not Granger Cause DGDP	0.0802

Table VI. Diagnostic Tests

Null Hypothesis:	Diagnostic Tests	Prob.
No specification Error.	Ramsey RESET	0.9554
No Serial Correlation.	Breusch-Godfrey	0.8814
No Heteroskedasticity	Breusch-Pagan-Godfrey	0.8031

In the table VI diagnostic test Chi-square value explain the autocorrelation, specification error and the hertosecdasticity in the variables of the model. As the p-value of the Chi-square is not less than .05 so the null hypothesis of no autocorrelation, no error specification and the hetrosecdasticity is failed to reject. So in the above model the error term of current year is not regress on its previous year. More over the model is perfect and has correct functional form as there is no specification error showed by the Ramsey test. And the model is homoscedastic showing that the unequal variances of error term are not existing in the model. The variances of the observations of the variables with respect to error term remain same.

CONCLUSION

On the conclusion of this study results are obtained from the evidence of time period 1985-2015 in Pakistan. This study elaborates the significance of trade openness, oil and gas consumption in the GDP of Pakistan. Trade openness, oil and gas consumption has long term relation with GDP. Okuyan, Ozun, & Erbaykal (2012) explain the correlation between economic development and openness to trade is significant. Long term equilibrium association is exist between Real GDP and natural gas consumption (Apergis and Payne 2010). Al-Mulali (2011) explore that Oil consumption has long term relationship with GDP. GDP and oil consumption has long term equilibrium relationship (Zou and Chau 2006). Moreover, GDP is also caused by trade openness, oil and gas consumption as per Granger causality. In Turkey and Russia the income elasticity and natural gas consumption has long-term bidirectional causal relationship (Apergis and Payne 2010). Economic growth and the oil consumption have bi-directional causality (Lim, Lim and Yoo 2014). Furthermore trade openness, oil and gas consumption has significant impact on the GDP. Trade openness has positive impact on economic growth and development (Coyne & Williamson, 2012). Natural gas consumption has positive significant impact on the economic growth (Shahbaz, Lean and Farooq 2013). Mutual effect between the economic growth and oil consumption can be used in long term to predict the oil consumption but not in short run (Zou and Chau 2006). Data of the variables is normal distributed. Estimated model is free from specification error, serial correlation and hetrosecdasticity.

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