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THE EXPORTS OF MARINE RESOURCES AND ITS IMPACT ON ECONOMIC DEVELOPMENT IN PAKISTAN: AN ECONOMETRIC ANALYSIS USING VECTOR ERROR CORRECTION MODEL (VECM)

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ABSTRACT

This study examines the link between marine resources exports and their impact on economic development in Pakistan by using Vector **E**rror-Correction Models (VECM). The data of 57 years from 1960 to 2017 were used to analyse the impact among variables. The findings of this research were obtained as there is no long-run association discovered between the fisheries exports and economic development. However, we discovered that there is a short-run relationship sustained between them. In addition, the results from the Ordinary Least Squares (OLS) regression also validates that there is a robust relationship between GDP and exports of fisheries products. The findings indicated that the sub-sector (Fisheries) of the agriculture sector is playing an extensive role in the economic growth of Pakistan.

Keywords: Marine resources, Fishery sector, GDP, VECM and Pakistan.

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INTRODUCTION

As marine resources can play an important role in economic development. These resources are found in the oceans and are valued, which can be intrinsic or financial value. There are many things that include marine resources such as fisheries and seafood supply, oil and gas, minerals, tourism potential, renewable energy resources and others (Oad *et al*., 2021; Wood, 2020). Among them, the fishery sector is playing an important role in economic development, mainly in developing countries. Besides export revenues and employment, its production and commercialization make a significant source of good protein (Jaunky, 2011; Thorpe *et al.* 2005). Alike other countries, the fisheries sector in Pakistan is the major source of livelihood for the coastal population. Moreover, the most-traded foods in the country are fisheries products. In addition to marine fisheries, inland fisheries found in lakes, ponds, rivers and dams are also significant activity in the country. In Pakistan, the fishery sector is among four subsectors of the agriculture sector (i.e. fisheries, live stocks, forestry and crops) (Anonymous, 2020a; Jawaid *et al.* 2019).

According to Pakistan Economic Survey 2019-2020, the agriculture sector and its subsectors witnessed growth. The agriculture sector grew by 2.67% and the livestock sector by 2.58%. Similarly, the fisheries sector recorded a growth of 0.60%, while the forestry sector achieved a growth of 2.29% (Anonymous, 2020a). Pakistan's coastline is bordering with Arabian Sea. Following the announcement of the Exclusive Economic Zone (EEZ) in 1976, Pakistan added approximately 250,000 square kilometers of coastline to its territory to exploit fisheries (Anonymous, 2014; Jawaid *et al*., 2019). In Pakistan, marine fisheries are practiced under two separate grounds, namely the coast stretching along the coast of the capital city of Sindh province (Karachi), spreading south-east from Karachi to the border of India and alongside the coastline of Baluchistan province to the border of Iran. China, Thailand, Malaysia, Middle East, Sri Lanka and Japan are Pakistan's major buyers of fisheries (Anonymous, 2014, 2020a). Though the share of the fisheries sector in agricultural exports and GDP (0.4%), is very small but it has significantly increased the national income through export earnings (Anonymous, 2020a). In the financial year 2017-18, the country's fish (seafood) exports registered an increase of 27.94% to 198,420 metric tons from total fisheries production. The contribution of the fisheries sector by exports was USD 451.026 million to the national economy. Pakistan's export value witnessed an increase of 14.57% from USD 393.662 million of 155,091 tons in 2016-17 (Shah, 2018). Despite its importance and potential, the contribution of the fishery sector to economic development is not visible, identified, and noticed in the literature. Figure 1 demonstrates the growth trend of Fisheries Exports and

GDP in Pakistan. It further shows a mixed trend of negative and positive growth in Fisheries Exports over the last 57 years.

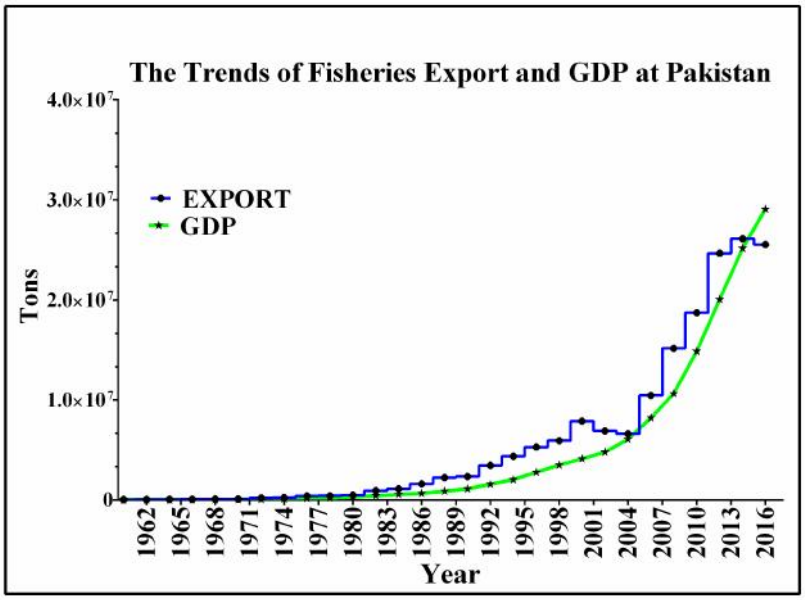

Figure 1. Trends of Fisheries Export and GDP in Pakistan (Anonymous, 2020b).

The trade of fisheries can serve as a catalyst for economic development for developing countries with huge fisheries resources (CEMARE, 2000; EU, 2006; FAO, 2003b, 2006). The worldwide fisheries trade in developing countries could add to their economies by giving a significant source of hard cash income (Bostock, 2004; FAO, 2003 a, c). This trade could be important for the economies of developing countries, which often face revenue shortages so that the foreign exchange generation from this trade can fund international debt repayments, import bills and the expenses of domestic governments (FAO, 2005; Thorpe *et al.,* 2004). Apart from this, foreign exchanges earned from fisheries exports could be utilized to import a large quantity of low-cost food for supplying the local markets, consequently contributing to national food security (FAO, 2004, 2006; Valdimarsson and James, 2001). In addition, the fisheries trade ultimately contributes to economic development by supplying employments, increasing incomes within this sector. The effects of the secondary flow also include remittances from migrant workers to families and dependents (FAO, 2005).

In connection with researches on the impact of fisheries exports on economic development, literature is very limited that discussed the exports of marine resources like fisheries and their contribution to economies. The study by Jaunky (2011) attempted to explore the underlying association between Fisheries exports growth and economic development for the 23 small Island developing states (SIDS) during 1989-2002. Various panel unit root and co-integration tests were performed and findings supplied robust proof of the long-term link between Fisheries exports growth and economic development (Jaunky, 2011). Another study by OECD (2008) investigates the link between Fisheries exports and economic development by using panel data of 47 sub-Saharan countries over the period of 1990–2005. Ordinary least squares (OLS) and analysis of variance (ANOVA) are employed and findings show that there is no relation between Fisheries exports and economic growth (OECD, 2008). The study by Jawaid *et al*. (2019) explored the relation between fisheries exports and Pakistan's economic development by using annual time-series data over the period of 1974–2013. The findings from Autoregressive distributed lag and Johansen and Juselius co-integration confirmed the presence of a positive and long-run relation between them. Furthermore, the error correction model discloses that no direct or short-run relation prevails between fishery exports and economic development (Jawaid *et al*., 2019). However, some studies were carried out by some scholars on exports and their trends. The research by Kartika (2014) is carried out to evaluate exports of fisheries products and their importance in the ground of Pakistan's economy. The findings indicate that fisheries products' exports increased in most years, but witnessed a fluctuation over the previous years (Kartika, 2014). It validates those exports of fisheries products have increased over the years, but have fluctuated over the past few years. By performing an in-depth analysis, the study by Ali *et al*. (2020) explains a comparative analysis of fisheries exports exported from Pakistan to China and around the world (Ali *et al*., 2020).

There is extensive literature on different variables (other than fisheries exports) contributing to economic growth to the economies in developing countries including Pakistan. Some scholars attempted to explore the relationship among the growth of GDP, growth of export, growth of Labour force, investment and other variables (Abbas, 2012; Amirkhalkhali and Dar, 1995; Bakari, 2017; Bodman, 1996; Darrat, 1987; Ghartey, 1993; Henneberry and Khan, 2000; Jawaid, 2014; Kavoussi, 1984; Khan and Lodhi, 2014; Kunst and Marin, 1989; Moschos, 1989; Ram, 1985; Salvatore and Hatcher, 1991; Sengupta and Espana, 1994; Shahbaz and Rahman, 2014; Tahir *et al.,* 2015; Tyler, 1981; Ullah *et al*., 2009).

After reviewing the above literature, it was concluded that the relation between exports and their impact on economic developments is considered broadly, but the connection between Fisheries exports and economic development is not much discussed widely and additionally, the connection between Fisheries exports and its impact on economic development is not yet much identified especially in case of Pakistan. Therefore, this study is designed to explore the connection between fisheries exports and GDP (economic development) in Pakistan. This research can help the policymakers and government to pay more attention to expediting the growth of the fisheries sector, if the association between the fisheries sector and GDP was found. The main objective of this research is to answer of following questions:

- Is there any relationship between Marine Resources' Export and Economic Growth in Pakistan?
- If yes, whether this relation is long-run or short-run?

MATERIALS AND METHODS

Secondary data was used to evaluate the exports of Marine Resources (fisheries) and their impacts on Economic Growth (GDP) in Pakistan. The data was collected from the official websites of Pakistan, PBS (Pakistan Bureau of Statistics), Marine Fisheries Department Hand Book's Various Volumes (Anonymous, 2020b) and World Bank. Time series data from 1960 to 2017 (57 years) was employed. The variable "Fisheries exports" was in metric tons, whereas the value of GDP in '000' PKR for the period of 1960-2017. After the collection of data, the various reports relating to the subject matter were reviewed. Finally, different econometric techniques were applied to analyse the Long-Run and Short-run Relationships. E-Views8 software was used for the analysis of the data.

Data Analysis: Two types of tests VECM and OLS were utilized to investigate the relationship between GDP and Exports of fisheries variables.

RESULTS

Regression model: Ordinary Least Squares regression (OLS) is usually called linear regression i.e. simple or multiple that depends on the number of explanatory variables.

$$GDP = \beta 0 + \beta_1 EXP + \varepsilon$$

Whereas GDP is the dependent variable, β0 is an intercept of the model, EXP Independent variables and e is random error.

EXP =Export

GDP = Gross Domestic Product

Null Hypothesis: There relationship is no between GDP and EXP

Alternative Hypothesis: There is a relationship between GDP and EXP

If Probability is lesser than 5%, we will accept an alternative hypothesis and if the probability is greater than 5%, we reject the alternative hypothesis.

After running the OLS regression model (on equation 1), its results are represented in table 1.

Table 1. Results of OLS regression model.

Dependent Variable: GDP
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-748646.2	367956.9	-2.034603	0.0466
EXPORT	0.922563	0.034606	26.65895	0
R-squared	0.92696	Mean dependent var	5062604	
Adjusted R-squared	0.925655	S.D. dependent var	8279832	
S.E. of regression	2257596	Akaike info criterion	32.13137	
Sum squared resid	2.85E+14	Schwarz criterion	32.20242	
Log-likelihood	-929.8098	Hannan-Quinn criter.	32.15905	
F-statistic	710.6998	Durbin-Watson stat	0.68269	
Prob(F-statistic)	0			

"*", "**" and "***" indicate that variables are stationary at 1%, 5% and 10% respectively. The level of significance is 5%. We can accept the model because our data is fitted well as the probability is less than 5%. R-squared is more than 60%, and the probability of the F-statistic is less than 5%.

Results from table 1, it can be concluded that the alternative hypothesis is accepted because the probability is less than 5%, also R-square is greater than 60%, and the probability of F-statistic is lesser than 5%. So, this indicates that there is a robust relationship between GDP and EXP.

VECM Model: For developing the VECM Model, three steps are involved. These steps include 1st Lag selection, 2nd Johnsen Test for Co-integration and 3rd VECM.

1. Lag selection

The lag value is required in developing the VECM model. Weuse Vector Auto-regression Estimates and after this, we employ VAR Lag Order Selection Criteria to take lag.

a. In the first step, Vector Auto-regression Estimates is used to select lag

b. Findings from table 3: optimum lag would be 4 from the VAR Lag Order Selection Criteria table because the fourth row of this table has the lowest value of LR, FPE, A/C and HQ except SC and these values are also with a star. So, we shall use lag 4 in Johnsen Test for Co-integration and VECM.

c. Johnsen Test for Co-integration

After choosing the lag value, we will move to another step Johnsen Test for Co-integration in developing the VECM model. But there is a precondition for employing this test and that is, all variables must be stationary. If they are non-stationary at level, then we have to convert all the variables into first difference and 2nd difference to make them stationary. Once they will become stationary, then we can employ the Johnsen Test for Co-integration. The stationary status of variables shows that all variables are integrated of the same order. So, we use the Augmented Dicky Filler (ADF) test to make the variable stationary.

Table 2. Vector Auto-regression Estimates.

Vector Auto-regression Estimates		
Sample (adjusted): 1962 2017		
Included observations: 56 after adjustments		
Standard errors in ( ) & t-statistics in [ ]		
	GDP	EXPORT
GDP(-1)	1.051373	0.648604
	(0.19913)	(1.15106)
	[5.27991]	[0.56349]
GDP(-2)	0.008170	-0.432089
	(0.19936)	(1.15240)
	[0.04098]	[-0.37495]
EXPORT(-1)	0.070141	0.611154
	(0.03444)	(0.19905)
	[2.03689]	[3.07028]
EXPORT(-2)	-0.027284	0.192222
	(0.03025)	(0.17486)
	[-0.90197]	[1.09932]
C	25382.40	528227.8
	(65066.4)	(376117.)
	[0.39010]	[1.40443]
R-squared	0.998200	0.944445
Adj. R-squared	0.998059	0.940088
Sum sq. resids	6.94E+12	2.32E+14
S.E. equation	368893.7	2132393.
F-statistic	7069.462	216.7514
Log likelihood	-794.6646	-892.9161
Akaike AIC	28.55945	32.06843
Schwarz SC	28.74029	32.24927
Mean dependent	5242587.	6523170.
S.D. dependent	8372099.	8711815.
Determinant resid covariance (dof adj.)		2.81E+23
Determinant resid covariance		2.33E+23
Log-likelihood		-1665.479
Akaike information criterion		59.83854
Schwarz criterion		60.20021

d. In the 2nd step, we use VAR Lag Order Selection Criteria to lag value.

Table 3. VAR Lag Order Selection Criteria.

VAR Lag Order Selection Criteria
Endogenous variables: GDP EXPORT
Exogenous variables: C
Sample: 1960 2017
Included observations: 54

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-1806.855	NA	4.27e+26	66.99463	67.06830	67.02304
1	-1611.635	368.7495	3.59e+23	59.91240	60.13339	59.99763

2	-1607.864	6.842382	3.62e+23	59.92090	60.28923	60.06295
3	-1586.022	38.02180	1.87e+23	59.26008	59.77574*	59.45895
4	-1579.810	10.35312*	1.73e+23*	59.17816*	59.84115	59.43385*

* 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
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

1. Augmented Dicky Filler (ADF) test

Augmented Dickey-Fuller (ADF) test includes three tests for Unit root.

a.At Level
b.At first difference
c.At second difference

ADF Test's Hypothesis:
Null Hypothesis: **H0:** Variable is not stationary
Alternative Hypothesis: **H1:** Variable is stationary

According to the unit root test, If the probability is less than 5% (if prob< 5%; Result = stationary) we accept alternate hypothesis and reject the null hypothesis, but the probability is more than 5% (if prob> 5%; Result= non-stationary) we reject the alternate hypothesis and accept the null hypothesis. By employing ADF test, we obtain the following results as reported in the table.

Table 4. Results of ADF Test.

Variables	*On level*	*Prob*	*1stDifference*	*Prob*	*2ndDifference*	*Prob*	*Conclusion*
GDP	5.869332	1	1.312651	0.9984***	-5.417202	0*	I(2)
EXP	1.212818	0.9979***	-9.43883	0*	-	-	I(1)

"*", "**" and "***" indicate that variables are stationary at 1%, 5% and 10% respectively. The level of significance is 5%.

Results: Table 4 demonstrates that variable Export is stationary at the first difference, while variable GDP stationary is at the second difference. Now, two variables are stationary. It indicates that all these variables are integrated of the same order, so we can move to another step in developing the VECM model. Now we easily employ Johnsen Test as its precondition has been fulfilled.

2. Use of Johnsen Test for Co-integration

After using the unit root test (ADF) and converting variables into stationary, we employ the Johnsen Test for Co-integration to find the long-run relations between variables GDP and EXPORT.

There are two hypotheses for Johnsen Test for Co-integration

a. First Null Hypothesis = None = There is no co-integration among two variables.

In the upper part of the Table, if Trace Statistic value (TSV) is more than Critical Value (CV) and Prob value is less than 5%. So, the null hypothesis would be rejected. In the lower part of a table, if the Max-Eigen Statistic value (MESV) is more than CV and the P-value is less than 5%. So, the null hypothesis would be rejected.

b. Second Null Hypothesis = At most 1= There is at most 1 co-integrated model

In the upper part of a table, if TSV is lesser than CV and P-value is more than 5%. So, the null hypothesis can be rejected. In the lower part of a table, if MESV is more than CV and Prob-value is more than 5%. So, the null hypothesis can be rejected.

Table 5. Unrestricted Co-integration Rank Test (Trace).

Sample (adjusted): 1965 2017				
Included observations: 53 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: GDP EXPORT				
Lags interval (in first differences): 1 to 4				
Unrestricted Co-integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.535256	45.73204	25.87211	0.0001

At most 1	0.092080	5.119765	12.51798	0.5793
Trace test indicates 1 co-integrating eqn (s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized		***Max-Eigen***	***0.05***	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.535256	40.61227	19.38704	0.0000
At most 1	0.092080	5.119765	12.51798	0.5793
Max-eigenvalue test indicates 1 co-integrating eqn (s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Co-integrating Coefficients (normalized by b'*S11*b=I):				
GDP	EXPORT	@TREND(61)		
1.87E-06	-1.30E-06	0.111977		
1.23E-06	6.66E-07	-0.054562		
Unrestricted Adjustment Coefficients (alpha):				
D(GDP)	176696.8	27100.67		
D(EXPORT)	780920.3	-241990.0		
1 Co-integrating Equation(s):		***Log likelihood***	***-1528.559***	
Normalized co-integrating coefficients (standard error in parentheses)				
GDP	EXPORT	@TREND(61)		
1.000000	-0.694043	59747.49		
	(0.09847)	(12997.2)		
Adjustment coefficients (standard error in parentheses)				
D(GDP)	0.331161			
	(0.05353)			
D(EXPORT)	1.463584			
	(0.30855)			

Results of Table 5:

First Null Hypothesis: TSV is more than CV and Prob value is less than 5%. So, we can reject the null hypothesis. MESV is more than CV and Prob value is less than 5%. So, the null hypothesis can be rejected.

Second Null Hypothesis = TSV is lesser than CV and Prob value is more than 5%. So, the null hypothesis can be rejected. MESV is smaller than CV and. Prob value is more than 5%. So, the null hypothesis can be rejected.

The results show that there is a relationship and there is at most 1 co-integrated model.

However, the Unrestricted Co-integration Rank Test (Trace) and Unrestricted Co-integration Rank Test (Maximum Eigenvalue) are telling the same thing.

So, these variables are co-integrated and have long-run associationship. In other words, it can be said that in the long-run, they moved together.

If variables are co-integrated and have a long-run associationship, then restricted VAR i.e. VECM Model can be employed. But if variables are not co-integrated, then unrestricted VAR can be used rather than the VECM model.

2. Vector Error Correction Estimates (VECM)

VECM supplies facts about the long and short-run relationship among variables. This model will help to find two things. 1. Long-run causality 2. Short-run causality.

Table 6. Vector Error Correction Estimates.

Vector Error Correction Estimates	
Sample (adjusted): 1965 2017	
Included observations: 53 after adjustments	
Standard errors in ( ) & t-statistics in [ ]	
Co-integratingEq:	***CointEq1***
GDP(-1)	1.000000
EXPORT(-1)	-0.311630
	(0.06747)

	[-4.61896]	
C	-2949342.	
Error Correction:	***D(GDP)***	***D(EXPORT)***
CointEq1	0.392438	1.383551
	(0.08933)	(0.51479)
	[4.39336]	[2.68761]
D(GDP(-1))	-0.112307	0.397497
	(0.15046)	(0.86712)
	[-0.74642]	[0.45841]
D(GDP(-2))	0.304646	3.428441
	(0.27123)	(1.56314)
	[1.12319]	[2.19331]
D(GDP(-3))	-1.673472	-9.059342
	(0.37507)	(2.16153)
	[-4.46180]	[-4.19117]
D(GDP(-4))	-0.753153	-5.903302
	(0.35802)	(2.06327)
	[-2.10369]	[-2.86114]
D(EXPORT(-1))	0.201273	0.225012
	(0.04376)	(0.25222)
	[4.59898]	[0.89213]
D(EXPORT(-2))	0.127851	0.107580
	(0.05082)	(0.29288)
	[2.51575]	[0.36732]
D(EXPORT(-3))	0.291565	1.010892
	(0.05867)	(0.33810)
	[4.96991]	[2.98995]
D(EXPORT(-4))	0.198000	0.656913
	(0.04778)	(0.27537)
	[4.14387]	[2.38558]
C	1222979.	4340487.
	(269651.)	(1554019)
	[4.53541]	[2.79307]
R-squared	0.941893	0.692492
Adj. R-squared	0.929732	0.628129
Sum sq. resids	2.43E+12	8.06E+13
S.E. equation	237501.7	1368738.
F-statistic	77.44654	10.75928
Log likelihood	-725.6931	-818.5210
Akaike AIC	27.76200	31.26494
Schwarz SC	28.13376	31.63670
Mean dependent	602496.6	517468.2
S.D. dependent	895955.4	2244525.
Determinant resid covariance (dof adj.)		8.59E+22
Determinant resid covariance		5.65E+22
Log-likelihood		-1538.717
Akaike information criterion		58.89500
Schwarz criterion		59.71285

Results: According to table 6, we don't have sufficient information to predict the short run as well as the long-run relationship of variables because table 5 lacks the p-value which is the core heart of the interpretation, therefore to get the p-value we run the following test and to find short and long-run associations between variables.

1. Long-Run Analysis or causality

The long-term and short-term associations' interpretation is depending on the criteria of C1 to C10.C1 represents the associationship of long-run between the dependent variable (GDP) and independent variable (Export). So, the criteria of long-run causality

are that C1's coefficient should be significant and negative. (Probability should also be less than 5%).

Table 7. Results of Least Square by Dependent Variable: D(GDP).

Dependent Variable: D(GDP)
Method: Least Squares
Sample (adjusted): 1965 2017
Included observations: 53 after adjustments
D(GDP) = C(1)*(GDP(-1) - 0.311630249078*EXPORT(-1) - 2949342.49225) + C(2)*D(GDP(-1)) + C(3)*D(GDP(-2)) + C(4)*D(GDP(-3)) + C(5)*D(GDP(-4)) + C(6)*D(EXPORT(-1)) + C(7)*D(EXPORT(-2)) + C(8)*D(EXPORT(-3)) + C(9)*D(EXPORT(-4)) + C(10)

	Coefficient	***Std. Error***	***t-Statistic***	***Prob.***
C(1)	0.392438	0.089325	4.393361	0.0001
C(2)	-0.112307	0.150461	-0.746416	0.4595
C(3)	0.304646	0.271234	1.123188	0.2676
C(4)	-1.673472	0.375066	-4.461805	0.0001
C(5)	-0.753153	0.358016	-2.103687	0.0413
C(6)	0.201273	0.043765	4.598983	0.0000
C(7)	0.127851	0.050820	2.515753	0.0157
C(8)	0.291565	0.058666	4.969910	0.0000
C(9)	0.198000	0.047781	4.143874	0.0002
C(10)	1222979.	269651.3	4.535411	0.0000
R-squared	0.941893	Mean dependent var		602496.6
Adjusted R-squared	0.929732	S.D. dependent var		895955.4
S.E. of regression	237501.7	Akaike info criterion		27.76200
Sum squared resid	2.43E+12	Schwarz criterion		28.13376
Log likelihood	-725.6931	Hannan-Quinn criter.		27.90496
F-statistic	77.44654	Durbin-Watson stat		1.693747
Prob(F-statistic)	0.000000			

In Table 7, we can accept the model because our data is fitted well as the probability is less than 5%, R-squared is more than 60%, and the probability of F-statistic is less than 5%.

Results: In table 7, the coefficient of C (1) is not negative but significant. It shows that there is no long-term relationship.

2. Short-Run Analysis

To find a short-run associationship between GDP and Export, the Wald test can be used.

Null Hypothesis: C (6) = C(7) = C(8)= C(9)= 0

Where C (6) , C(7), C(8) and C(9)represents Export.

Table 8. Results of Wald Test.

Wald Test:
Equation: Untitled

Test Statistic	***Value***	***Df***	***Probability***
F-statistic	14.69401	(4, 43)	0.0000
Chi-square	58.77605	4	0.0000

Null Hypothesis: C(6)=C(7)=C(8)=C(9)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	***Value***	***Std. Err.***
C(6)	0.201273	0.043765
C(7)	0.127851	0.050820
C(8)	0.291565	0.058666
C(9)	0.198000	0.047781

Restrictions are linear in coefficients.

Summary of VECM model: P-value of Chi-square in Table 8 is lesser than 5% and null hypothesis would be rejected. It validates the short-run associationship between Exports and GDP. So, there is no long-term causality but a short-term associationship between Exports and GDP. We can say there is no long-run relationship or association-ship among variables but there is short-run relation between these two variables.

DISCUSSION

We can conclude from the results of the OLS model presented in Table 1 that we accept the alternative hypothesis because the probability is less than 5%, also R-square is more than 60%, and the probability of F-statistic is less than 5%. So, this indicates that there is a robust relationship between GDP and EXP.

After finding the relationship as presented in Table 1, we employed another model i.e. VECM to further investigate the relations between GDP and EXP. We need to involve steps to develop the VECM model.

First, we have to find lag value and then Johnsen Test for Co-integration and at the end; we will run VECM to find relations between variables.

In table 3, the optimum lag would be 4 from the VAR Lag Order Selection Criteria table because the fourth row of this table has the lowest value of LR, FPE, A/C and HQ except SC and these values are also with a star. So, we shall use lag 4 in Johnsen Test for Co-integration and VECM. Before employing, Johnsen Test for Co-integration and VECM, we make variables stationary. Table 4 demonstrates that variable Export is stationary at first difference and while, variable GDP is stationary at the second difference. Both variables are not stationary at the level. Now, two variables are stationary. It indicates that all these variables are integrated of the same order, so we can move to another step in developing the VECM model. Now we easily employ Johnsen Test as its precondition has been fulfilled.

Results of Table 5, show that TSV is more than CV and Prob value is less than 5%. So, we can reject the null hypothesis. MESV is more than CV and Prob value is smaller than 5%. So, the null hypothesis would be rejected. TSV is lesser than CV and Prob value is more than 5%. So, the null hypothesis cannot be rejected. MESV is lesser than CV and. Prob value is more than 5%. So, the null hypothesis cannot be rejected. The results show that there is a relationship and there is at most 1 co-integrated model.

However, the Unrestricted Co-integration Rank Test (Trace) and Unrestricted Co-integration Rank Test (Maximum Eigenvalue) are telling the same thing. So, these variables are co-integrated and have long-run associationship. In other words, it can be said that in the long-run, they moved together.

If variables are co-integrated or have a long-term associationship, then restricted VAR i.e. VECM Model can be used. But if variables are not co-integrated, then the VECM model cannot be employed. Rather unrestricted VAR would be used. So, the VECM model is employed.

Results presented in table 6 don't show enough information to forecast the short-term and long-term associationship among variables because table 5 does not have the p-value that is core-heart for interpretation of relationships among variables, so another test is employed to get the p-value.

The P-value of Chi-square in Table 8 is less than 5% which shows that the null hypothesis can be rejected. It shows there is short term connection between Exports and GDP. There is no long-term associationship but short-run relation between Exports and GDP. We can say there is no long-run relationship or association-ship among variables but there is short-run relation between these two variables.

So, there is a strong relationship between GDP and Exports of fisheries but the relation is short-term as presented by VECM's model.

Conclusion: At the end, we conclude that the marine resources (Fisheries Export) have a positive impact on GDP. The results of OLS regression show that fisheries export has a significant relationship with GDP. It confirms that if exports of marine resources (Fisheries Exports) increase and GDP also rise. In addition to this VECM model also validates that there is no long-run relation but short-run relations between GDP and Fisheries Exports. The results from the co-integrating equations or model indicate that co-integration exists between fisheries' exports and its economic growth in Pakistan. The short-run relation between GDP and Exports of fisheries shows that there is no sustainable policy in the country to maintain or increase the quantity of fisheries products. There are certain issues obstructing the growth of exports such as lack of labour skills, outdated infrastructure i.e. rusted Jattis, no fibreglass, non-implementation of HACCP, non-implementation of safety, cleanness and sanitation standards. Because of these issues, European countries banned fisheries exports from Pakistan in 2006. Moreover, Pakistan is exporting 25-30% fisheries of the total production of fisheries in the country and it has the capacity to export more to earn more foreign exchange. So, Pakistan should make a more effective policy to attract the International Markets to increase the exports of marine resources especially fisheries. Some of them include marketing skills, technology skills, managerial skills, etc. The increase in fisheries exports would contribute more to economic growth in the country.

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