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Impact of Foreign Direct Investment, Rising Oil Prices, and Industry Value Added on Economic Growth of Pakistan

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ABSTRACT

Rising oil prices, foreign direct investment, and industrial value-added are the key component that affects the economic stature of a country. This study locates the relationship between FDI, rising oil prices, and industry value added on the economic growth of Pakistan. To do the analyses, data length ranging from 1980 to 2020 was used. For the regression results, the analytical technique of Autoregressive Distributed Lag (ARDL) is incorporated. The empirical results show that FDI encourages economic growth. Nevertheless, industry value added is also located for positive affectation on economic growth. However, rising oil prices are found to have negative effects on economic growth. Similarly, the combined effect of oil prices and FDI are found discouraging for economic growth. As a policy option, the government of Pakistan must need to encourage FDI inflows and should step up toward industrialization. On the other side, rising oil prices be controlled at the maximum extent as it is damaging to economic prosperity.

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1. Introduction

The nature of determinants that are essential for bringing economic prosperity must be identified with care (Mehmood & Hassan, 2015a, 2015b). Among the widely known causes of ingredients that facilitate economic growth is foreign inflows in the category of FDI. It is believed that FDI brings positive impacts on economic growth (Thomas, Li, & Liu, 2009; Yang & Shafiq, 2020). It is due to the embedded capacity to enhance productivity and the bringing up of technological advancement and employment creation in the recipient country (M. A. Khan, 2007; Kobrin, 2005). FDI, industrialization, and oil prices are widely known factor that proliferates the base of economic growth of its recipient (Chien, Hsu, Zhang, Vu, & Nawaz, 2022; Hye, Shahbaz, & Hye, 2010; I. Khan, Xue, Zaman, & Mehmood, 2022; Sreenu, 2022; Zhang, 2001).

Statistics of The World Bank together with that of the International Monetary Fund mark FDI as a reason for over 7 percent of world GDP growth in past years. In the case of Pakistan, FDI is found to post a positive impact on the economy (Hye et al., 2010; M. A. Khan & Khan, 2011; Mehmood & Hassan, 2015b). FDI engages industrialization thus altogether flow of capital entertains economic prosperity. Foreign inflows, however, travel under different heads such as foreign aid, foreign debt, workers' remittances, and FDI (Ahmad, Shafiq, & Gillani, 2019; Azam, Nawaz, & Riaz, 2019; Mehmood & Hassan, 2017). The policymakers and analytics argue that administrations of the developing and developed countries are found busy in locating the ways to be a better host for FDI due to its unneglectable effects on economic wellbeing (Shafiq, Hua, Bhatti, & Gillani, 2021).

Pakistan tries its utmost in attracting foreign investors. But due to internal factors, it is hard for Pakistan to retain the pace of persistent FDI inflows (Mehmood, Batool, & Ishaq, 2021). In South Asian economies, doors for FDI are always open. However, insubstantial growth is recorded in these inflows toward South Asian region. Even though FDI is splendid in its macroeconomic after effects, still such flows are inconsistent in Pakistan. Therefore, Pakistan has jumped to 136th position from earlier 147th amongst 190 world economies. From 2016 onward to 2018, FDI flows have been $2305Million to $ 3471Million which is about 51 percent growth. However, by 2019, FDI flows to Pakistan dropped to $2199Million. Researchers like Siddique, Ansar, Naeem, and Yaqoob (2017), and Ali and Hussain (2017) found positive effects of FDI on economic growth. Whereas, varied analytical methodologies of ARDL and auto relationship and multiple relapse examination were incorporated. Similarly, Rahman (2014) and Mehmood and Hassan (2015a) arranged the time series data of varying lengths but identified positive feedback of FDI on economic growth.

FDI is a name of business doing but here the business analytics state that the rising cost of oil is a reason affecting the ease of doing business. This single variable significantly affects the business globally by pushing down the economic expansion (Ftiti, Guesmi, Teulon, & Chouachi, 2016; Ghalayini, 2011; Hussain, Nawaz, & Ibraheem, 2021). Nevertheless, the rising oil prices are a reason for the depletion of foreign exchange reserves. Growing demand for oil is foresighted to cause the expansion of oil by 118.0 million barrels per day by 2030. The reliance on economic growth is settled on the use of oil (Nawaz, Ahmadk, Hussain, & Bhatti, 2020). The increasing cost of oil leads to inflation which later makes exports incompatible in the world market and on the other side causes the people to move to cheap imports. Adejumob and Julius (2017) investigated that the effects of oil prices are significant on economic growth.

Altogether, FDI and rising oil prices are focused to have significant effects on the economic growth of the recipient country. The objective of this study is to locate how much FDI is influential in its affectation on economic growth? Moreover, this study has a motivation to identify the nature of the effects of rising oil prices on economic growth. As a new initiative, the objective of this study also rests to point out whether the combined effects of FDI and rising oil prices are different from that of their results or not? Similarly, as the cost of doing business is affected due to the rise in oil prices, an industry value addition is viable to possess a positive feedback effect on economic growth?

This study is organized into four sections. The Section I is of Introduction. This section is allocated to explain the significance of the opted variables of study on economic growth together with the salient empirical research and current facts and figures related to Pakistan. Section II is on Methodological Issues that are extended to Results and Discussion elaborated in Section III. Finally, the last section which is Section IV is dedicated to Conclusion and Policy Implication.

2. Methodology

The objective of this study is to locate the effects of industry value-added, FDI, and rising oil prices on the economic growth of Pakistan. For analyses, the time series data ranging from 1980 to 2020 is taken from The World Bank Development Indicators. A summary of the variables is given in Table 1.

Table 1
Summary of the variables

Variables	Abbreviation	Formula of Variables
Gross Domestic Product	GDP	Gross domestic product in $ Million
Foreign Direct Investment	FDI	FDI in current US$
Oil Prices	OLP	Crude oil price per barrel
Industry Value Added	IND	Industry value-added, annual percentage growth
Exchange Rate	EXR	Exchange rate in terms of US $
Population	PLA	Population in total
Trade Openness	TRD	Ratio of total trade to GDP
Infrastructure	IFA	Machinery and transport equipment (% of value added in manufacturing)
Interest Rate	INR	Interest rate in percentage annual

2.1 Test of Stationarity

Foremost, the variables are checked for their status of stationarity. In this regard, the Augmented Dickey-Fuller (ADF), (Dickey & Fuller, 1979) test is used which is given in the following Eq. (1)

$$\Delta R_t = c + \Gamma v_{t-1} + \sum_{j=1}^{k-1} \rho R_{t-j} + \beta T + \varepsilon_t \quad (1)$$

Where explanatory variables are expressed by *R,* time-period and stochastic term are shown by *t* and *ϵ,* respectively.

2.2 Autoregressive Distributed Lag Model

If the diagnostics of stationarity are found in mixed orders of integration, the technique of ARDL is incorporated. To Narayan (2005) and Odhiambo (2009), the results of ARDL provide appropriately the regression estimates of either time horizon (Bentzen & Engsted, 2001).

Specification of the Models: The variables taken in log form, demonstrated in the following equation, are specified to fulfill the objectives of the study.

GDP = f (FDI, IND, TRD, PLA) (2)

GDP = f (OLP, IND, EXR, INR) (3)

GDP = f (FDI × OLP, IND) (4)

The unrestricted versions of vector error correction can be read as follows;

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 \Delta GDP_{t-i} + \sum_{i=0}^{b} \delta_2 \Delta FDI_{t-i} + \sum_{i=0}^{b_1} \delta_3 \Delta IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 \Delta TRD_{t-i} + \sum_{i=0}^{b_3} \delta_5 \Delta PLA_{t-i} + \sigma_1 GDP_{t-1} + \sigma_2 FDI_{t-1} + \sigma_3 IND_{t-1} + \sigma_4 TRD_{t-1} + \sigma_5 PLA_{t-1} + \varepsilon_t \quad (5)$$

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 \Delta GDP_{t-i} + \sum_{i=0}^{b} \delta_2 \Delta OLP_{t-i} + \sum_{i=0}^{b_1} \delta_3 \Delta IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 \Delta EXR_{t-i} + \sum_{i=0}^{b_3} \delta_5 \Delta INR_{t-i} + \sigma_1 GDP_{t-1} + \sigma_2 OLP_{t-1} + \sigma_3 IND_{t-1} + \sigma_4 EXR_{t-1} + \sigma_5 INR_{t-1} + \varepsilon_t \quad (6)$$

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 \Delta GDP_{t-i} + \sum_{i=0}^{b} \delta_2 \Delta FDI \times OLP_{t-i} + \sum_{i=0}^{b_1} \delta_3 \Delta IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 \Delta IFA_{t-i} + \sigma_1 GDP_{t-1} + \sigma_2 FDI \times OLP_{t-1} + \sigma_3 IND_{t-1} + \sigma_4 IFA + \varepsilon_t \quad (7)$$

Where a, b_i is the long run and short run representations between the regressors and dependent variable. Moreover, Δ is the first difference and the σ_i and δ_i are the coefficient of a short-run and long-run. After the regress of ARDL on each model, the Wald Test (*F*-Statistic*)* is viewed to confirm the existence of a long-run relationship. The *H0* of no long-run relationship is given as *H0*; $\sigma_1 = \sigma_2 = \sigma_3 = \sigma_4 = \sigma_5 = \sigma_6 = \sigma_7 = \sigma_8 = 0$ alternatively *H1*; $\sigma_1 \neq \sigma_2 \neq \sigma_3 \neq \sigma_4 \neq \sigma_5 \neq \sigma_6 \neq \sigma_7 \neq \sigma_8 \neq 0$ confirms a long-run relationship.

2.3 The Time Horizons

For the sake of long-run coefficient analyses, the following equations are regressed.

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 GDP_{t-i} + \sum_{i=0}^{b} \delta_2 FDI_{t-i} + \sum_{i=0}^{b_1} \delta_3 IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 TRD_{t-i} + \sum_{i=0}^{b_3} \delta_5 PLA_{t-i} + \varepsilon_t \quad (8)$$

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 GDP_{t-i} + \sum_{i=0}^{b} \delta_2 OLP_{t-i} + \sum_{i=0}^{b_1} \delta_3 IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 EXR_{t-i} + \sum_{i=0}^{b_3} \delta_5 INR_{t-i} + \varepsilon_t \quad (9)$$

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 GDP_{t-i} + \sum_{i=0}^{b} \delta_2 FDI \times OLP_{t-i} + \sum_{i=0}^{b_1} \delta_3 IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 IFR_{t-i} + \varepsilon_t \quad (10)$$

Similarly, for computation of short run coefficients, Eq. (11), (12), and (13) are regressed.

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 \Delta GDP_{t-i} + \sum_{i=0}^{b} \delta_2 \Delta FDI_{t-i} + \sum_{i=0}^{b_1} \delta_3 \Delta IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 \Delta TRD_{t-i} + \sum_{i=0}^{b_3} \delta_5 \Delta PLA_{t-i} + \sigma_1 GDP_{t-1} + \sigma_2 FDI_{t-1} + \sigma_3 IND_{t-1} + \sigma_4 TRD_{t-1} + \sigma_5 PLA_{t-1} + \lambda \mathrm{ECM}_{t-1} + \varepsilon_t \quad (11)$$

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 \Delta GDP_{t-i} + \sum_{i=0}^{b} \delta_2 \Delta OLP_{t-i} + \sum_{i=0}^{b_1} \delta_3 \Delta IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 \Delta EXR_{t-i} + \sum_{i=0}^{b_3} \delta_5 \Delta INR_{t-i} + \sigma_1 GDP_{t-1} + \sigma_2 OLP_{t-1} + \sigma_3 IND_{t-1} + \sigma_4 EXR_{t-1} + \sigma_5 INR_{t-1} + \lambda \mathrm{ECM}_{t-1} + \varepsilon_t \quad (12)$$

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{a} \delta_1 \Delta GDP_{t-i} + \sum_{i=0}^{b} \delta_2 \Delta FDI \times OLP_{t-i} + \sum_{i=0}^{b_1} \delta_3 \Delta IND_{t-i} + \sum_{i=0}^{b_2} \delta_4 \Delta IFA_{t-i} + \sigma_1 GDP_{t-1} + \sigma_2 FDI \times OLP_{t-1} + \sigma_3 IND_{t-1} + \sigma_4 IFA + \lambda \mathrm{ECM}_{t-1} + \varepsilon_t \quad (13)$$

Where λ (ECM_{t-1}) represents the speed of adjustment of disequilibrium.

3. Discussion of Results

This section provides the results of the study and the necessary discussion.

3.1 Descriptive Statistical Analyses

To begin with, the descriptive statistical analyses are presented in Table 2. It is to describe the characteristics of data. Attributes of mean, median, standard deviation, skewness, kurtosis, and Jarque Bera are viewed on each variable. In precise, expect FDI all the variables show the highest deviation from their respective mean value. EXR, FDI, and IND are positively skewed. In the case of TRD, the distribution is mesokurtic. Whereas, the distribution series of FDI, OLP, IFA, and EXR are leptokurtic and IND, IFA, and PLA are platykurtic. Series having normally distributed residuals are GDP, IND, TRD, PLA, and INR.

Table 2
Descriptive Statistical Analyses

Variable	Mean	Median	Std. Dev.	Skewness	Kurtosis	J-B	Prob.
GDP	4.98	4.80	1.92	-0.05	2.81	0.07	0.96
FDI	1.18	0.53	1.42	1.73	5.48	29.67	0.00
IND	23.55	23.36	0.78	0.17	1.68	3.09	0.21
TRD	33.39	33.70	3.34	-0.61	2.98	2.49	0.28
PLA	135000000	134000000	35336612	0.09	1.85	2.16	0.34
OLP	3.29	3.30	0.87	-0.59	4.03	5.01	0.08
EXR	1607.29	49.50	971788	6.00	37.02	2115.4	0.00
INR	10.99	9.87	2.19	-0.29	2.59	0.97	0.58
IFA	7.28	8.52	1.75	-0.46	1.35	5.97	0.05

3.2 Stationarity Analyses

Afterward, the results of stationarity are given in Table 3. The findings confirm the varied order of integration i.e. I(0) and I(1). Therefore, since mixed results are found, the regression analyses are carried out by the mean of the ARDL approach.

Table 3
Stationarity Analyses

Variables	ADF Statistic (At Level)	ADF (With 1st Difference)	Order of Integration
GDP	-3.64	-7.91	I(0)
FDI	-0.12	-2.57	I(1)
IND	-1.22	-4.53	I(1)
TRD	-2.70	-8.09	I(1)
PLA	-1.82	-2.77	I(1)
OLP	-1.48	-2.75	I(1)
EXR	-2.22	-4.43	I(1)
INR	0.76	-4.09	I(1)
IFA	-4.25	-4.16	I(0)

3.3 Bound Test

In ARDL approach, the Bound Test is used to examine the existence of a long-run relationship. For that purpose, Walt Test (*F*-Statistics) is viewed for the authentication of long-run relationships. The findings are given in Table 4.

The results of the Bound Test confirm the long-run relationship between the regressors and GDP in each model.

Table 4
Bound Test Results

Model	*F*-Statistics	Upper Bound Critical Value	Conclusion
Model I GDP = f (FDI, IND, TRD, PLA)	6.51	4.35	Co-integration exist
Model II GDP = f (OLP, IND, EXR, INR)	10.32	2.72	Co-integration exist
Model III GDP = f (FDI × OLP, IND, IFA)	7.12	3.71	Co-integration exist

3.4 Estimation of Long run Coefficients (Model I to Model III)

The long-run coefficients are estimated, and the results are given in Table 5. Having dependent variable, the economic growth, proxied by GDP, with FDI, Industry value added, trade, and, population, the independent variables.

Table 5
Estimation of Long run Coefficients

		Model-I		
Variable	**Coefficient**	**Standard Error**	***t*- Ratio**	**Prob.**
FDI	0.19	0.08	2.19	0.05
IND	5.61	1.81	3.11	0.01
TRD	-5.11	1.36	-3.76	0.00
PLA	1.30	0.24	5.33	0.00
C	2.17	1.28	1.69	0.12
		Model-II		
Variable	**Coefficient**	**Standard Error**	***t*- ratio**	**Prob.**
OLP	-4.05	2.18	-1.86	0.09
IND	5.56	4.09	1.35	0.21
EXR	-1.46	0.49	-2.98	0.01
INR	0.13	0.07	2.00	0.08
C	-13.56	11.22	-1.21	0.26
		Model-III		
Variable	**Coefficient**	**Standard Error**	***t*- ratio**	**Prob.**
FDI × OLP	-0.42	0.23	-1.84	0.09
IND	-2.31	0.93	-2.48	0.03
IFA	1.18	0.59	1.98	0.06
C	8.23	2.79	2.94	0.01

Findings of Model- I and on FDI are held significant and the coefficient sign is positive. Therefore, the results confirm that FDI is helpful to initiate economic growth so do is the conclusion on Industry value added. Any move towards industrialization is to enhance economic growth. Whereas, the trade is found significant and negative. Any trade openness is to cause GDP to a dropdown. Moreover, the variable of the population is significant and has a positive coefficient value. It means that any increase in population is not damaging to economic growth rather more population comes up with more labor which later contributes to triggering economic growth. In the case of Model-II, the Oil prices and exchange rate are found negative and significant in affectation on GDP. Thus, it is to assure that any rise in oil prices and exchange rate is to depress the economic growth. Concluding the long-run coefficient results, interest rate is found positive with GDP. Therefore, it is concluded that an increase in the rate of interest is nothing to do with the causing failure of the economy rather it facilitates favorable circumstances.

As far as Model-III is concerned, the joined effect of FDI and oil prices is affirmed to negatively affect economic growth. It is thus concluded that any favorable postures of FDI on GDP get completely faded out at the back of rising oil prices. Moreover, the findings on industry value added have become otherwise, while compared with the results of the same in Model-I. Therefore, with a combined negative effect of FDI and oil prices, similar consequences are traced at industry value added, unlike infrastructure.

3.5 Estimation of Short-run Coefficients (Model-I to Model-III)

Table 6
Estimation of Short-run Coefficients

		Model-I		
Variable	**Coefficient**	**Standard Error**	***t*-Statistic**	**Prob.**
D(GDP(-1))	1.29	0.34	3.81	0.00
D(GDP(-2))	0.71	0.24	2.98	0.01
D(FDI)	0.82	0.29	2.87	0.01
D(FDI(-1))	-0.15	0.35	-0.44	0.67
D(FDI(-2))	0.73	0.29	2.52	0.03
D(IND)	5.15	3.19	1.61	0.13
D(IND(-1))	-5.81	3.03	-1.92	0.08
D(TRD)	-2.90	1.76	-1.65	0.12
D(TRD(-1))	4.53	2.30	1.97	0.07
D(TRD(-2))	3.04	1.59	1.92	0.08
D(PLA)	0.08	0.07	1.15	0.26
D(PLA(-1))	-0.24	0.08	-2.95	0.01
D(PLA(-2))	-0.35	0.06	-5.66	0.00
ECM(-1)	-0.50	0.07	-6.99	0.00
		Model-II		
Variable	**Coefficient**	**Standard Error**	**t-Statistic**	**Prob.**
D(GDP(-1)	0.04	0.36	-0.12	0.91
D(GDP(-2))	-0.01	0.25	-0.04	0.97
D(GDP(-3))	-0.45	0.27	-1.65	0.13
D(OLP)	-162.79	61.56	-2.64	0.03
D(OLP(-1)	171.91	198.66	0.87	0.41
D(OLP(-2)	103.68	134.80	0.77	0.46
D(OLP(-3)	-114.30	45.12	-2.53	0.03
D(IND)	0.72	2.27	0.32	0.76
D(IND(-1)	-3.15	1.98	-1.59	0.15
D(IND(-2)	-3.00	2.14	-1.40	0.20
D(INR)	0.04	0.04	1.01	0.34
D(INR(-1)	-0.11	0.04	-2.79	0.02
D(EXR)	-1.21	0.64	-1.90	0.07
D(EXR(-1))	1.28	0.54	2.38	0.03
ECM(-1)	-0.33	0.09	3.50	0.02
		Model-III		
Variable	**Coefficients**	**Standard Error**	**t-Statistic**	**Prob.**
D(GDP(-1)))	0.24	0.14	1.66	0.11
D(FDI × OLP)	0.01	0.44	0.02	0.99
D(FDI × OLP (-1))	0.52	0.46	1.12	0.28
D(FDI × OLP (-2))	0.67	0.36	1.84	0.09
D(IND)	-1.95	2.24	-0.87	0.40
D(IND(-1))	-1.85	2.36	-0.78	0.45
D(IND(-2))	0.17	2.41	0.07	0.94
D(IND(-3))	4.40	2.42	1.82	0.09
D(IFA)	-2.07	1.03	-2.00	0.06
ECM(-1)	-0.17	0.11	-1.56	0.14

The results of the short-run coefficient and ECM are given in Table 6. The findings summarize an almost similar trend of impacts of regressors over economic growth. Importantly, the disequilibrium is found adjusted at 33 and 50 percent in the case of Model-I and Model-II. Whereas, the *ECM* is although correct in negative signs but insignificant in the case of Model-III.

3.6 Diagnostic Checking

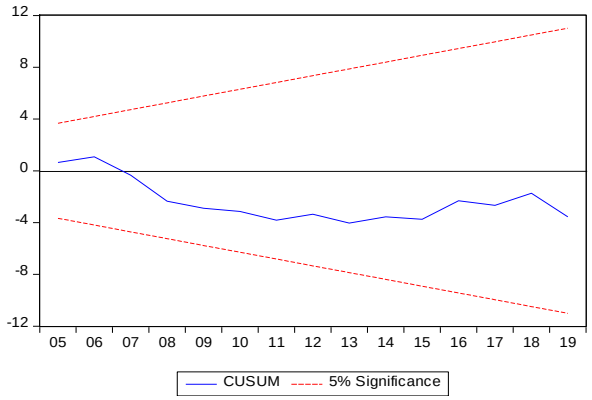
For the authentication of no existence of serial correlation, the Lag Range Multiplier (LM) Test of Breusch Godfrey is run on each model and the results are produced in Table 7.

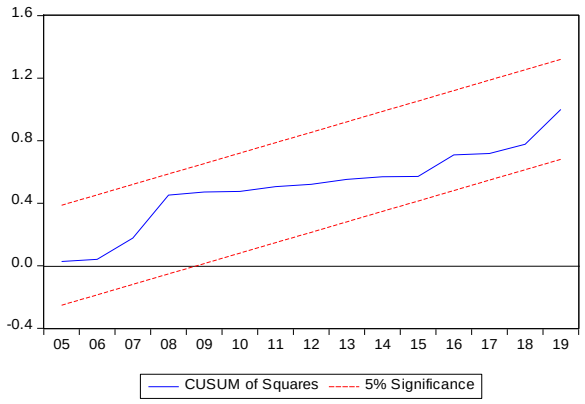
Table 7
Lag Range Multiplier Test

Test	Statistics	Probability
LM test Model-I	1.61	0.27
LM test Model-II	1.35	0.30
LM test Model-III	1.69	0.23

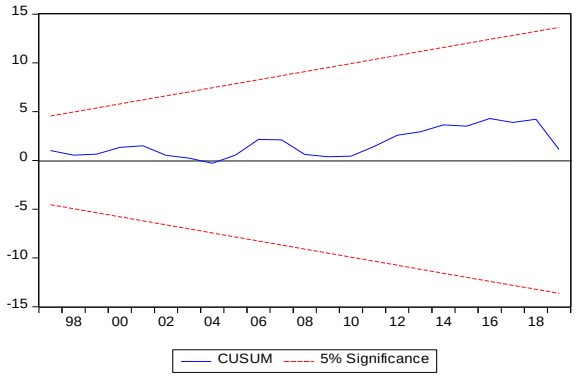
3.7 Stability Test

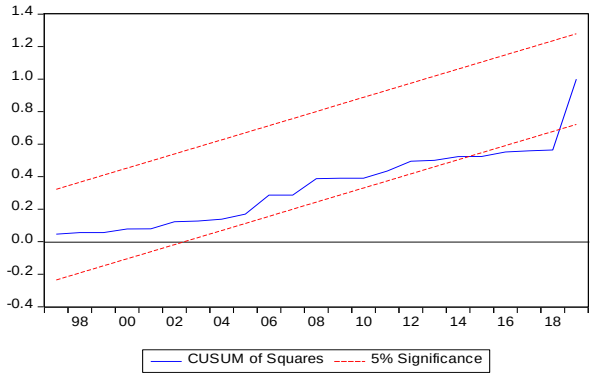
The diagnostics are extended to CUSUM and CUSUMSQ. Figure 1 helps in the identification of the accuracy of a long run and short run parameters because the graphs of CUSUM and CUSUMSQ are positioned within the limits of the 5% level of significance.



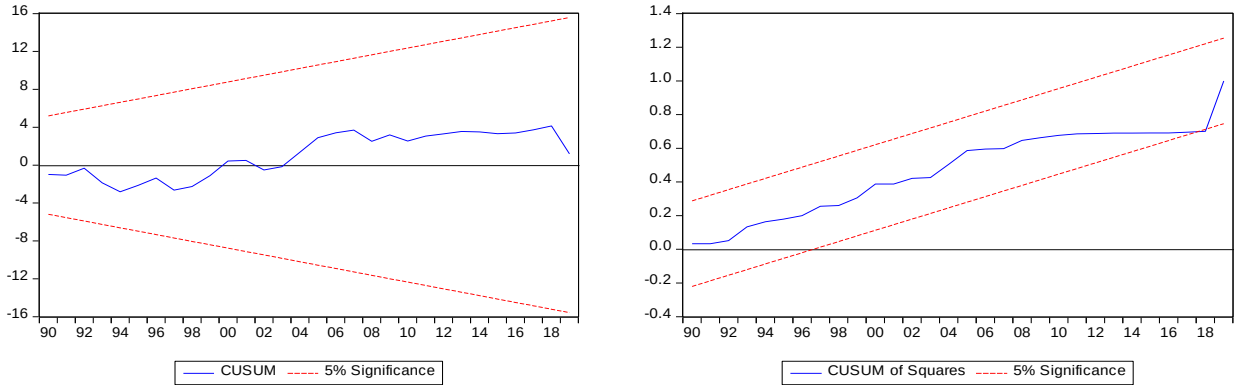


Model-I





Model-II



Model-III

4. Conclusion and Policy Recommendation

This paper in-focused the relationship between FDI, industry-valued added, and oil prices on the economic growth of Pakistan. The time-series analysis is based on the ARDL technique with the data ranging from 1980 to 2020. The findings have located significant effects of FDI, Oil prices, and Industry value added on the economic growth of Pakistan. However, Oil prices is found to be damaging for economic growth.

The findings enable to suggest the policy for the concerned authorities to facilitate FDI and industrialization in Pakistan with a strive to keep the oil prices within the manageable range so that the goals of economic growth must not be quashed. For future studies, the robust techniques of analyses be employed for the further verification of the findings that are presented in this study.

Authors Contribution

Khawaja Asif Mehmood: study design and concept, data interpretation, drafting
Ahsan Iqbal: literature search, data collection, data interpretation
Furrukh Bashir: critical revision, incorporation of intellectual content
Rashid Ahmad: literature search, data analysis, drafting

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

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