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Impact of Government Investment and Chinese Investment on

Economic Growth of Pakistan.

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#### Abstract

The research aims to evaluate the impact of government development expenditure and Chinese foreign direct investment on Pakistan's economic growth from 1980 to 2020. The data sample used in the study was sourced from the World Bank database and the Pakistan Board of Investment Publications. The dependent variable was GDP growth, while the independent variables were Chinese foreign direct investment, CFDI government development expenditure, and Gross Domestic Product (GDE). The study used various tests, including Unit root test, Autoregressive Distributed Lag, Error Correction Model, White test, lag selection criterion, Akaike Information Criterion (AIC), and Granger Causality Test. The study found that Chinese investment and GDE have a positive impact on Pakistan's economic growth in the short run, while negatively affecting it in the long run. The positive relationship between CFDI government development expenditure and GDP growth is present in both the short and long run, as government fiscal policies in favor of Chinese investment aim to increase investment inflow. GDE stimulates CFDI, resulting in a positive impact on GDP growth.

The study was divided into two sub-period groups to analyze the relationship before and after the sharp decline of CFDI in pre-2007 and post-2007 sub-periods. In pre-2007, CFDI and GDE helped in economic growth with a negative relationship between CFDI and GDE. After the dramatic decline in 2007, the relationship changed, with GDE having a positive effect while CFDI negatively affected economic growth with a negative relationship in CFDI\*GDE.

These findings are valuable for policymakers and the government to formulate effective economic policies for Pakistan's economic development and are insightful for foreign investors to understand the trend.

Key words: Chinese Investment; Government Developmental Expenditure; Economic Growth; ARDL; Empirical Study



The capital structure and economic advancement of a country are significantly influenced by factors such as country, region, geography, technological advancement, and political and administrative structure. Government development expenditure and Foreign Direct Investment (FDI) are essential for economic growth, promoting domestic investment, human capital accumulation, and technology transfer. The Keynesian School of economic thought emerged after the Great Depression, emphasizing the importance of state intervention in sustaining and governing the economy. This research aims to study the impact of Chinese investment, CFDI, and government development expenditure (GDE) on economic development in Pakistan between 1980 and 2020, focusing on the relationship between CFDI and GDE to gain a deeper understanding of their impact.

For many years, the importance of foreign direct investment (FDI) as an improvement element in developing nations has been generally acknowledged. In any given economy, there are a variety of determinants that force FDI to contribute positively. There are three primary ways in which FDI may help a country's economy: by increasing the use and development of local natural resources, introducing cutting-edge business methods, and providing access to new technologies. Macroeconomic imbalances may be sustained by inflows of foreign direct investment (FDI). As compared to external indebtedness, foreign direct investment (FDI) does not result in repayment of interest and principal, but rather enhances the productive capacity of the economy by providing on-the-job training for the human capital. Various researchers' empirical investigations on the influence of FDI on economic growth have produced inconsistent results. For example, Research by Carkovic et al. (2002)<sup>[1]</sup> studied the link between economic growth and FDI during the period 1960-1995 and found that the relationship is reliant on the recipient country's trade openness, educational levels, economic and financial development, and other characteristics as well. Conversely, Foreign direct investment (FDI) had no significant impact on China's economic development between 1994 and 2003, according to Ek (2007)<sup>[2]</sup>. Saqib, et al. (2013)<sup>[3]</sup> concluded that FDI has been a negative impact on Pakistan's GDP growth between 1981 and 2010. Johnson (2006)<sup>[4]</sup> shows that foreign direct investment (FDI) leads to economic development in the host nation through the transition of technology and capital inflows between 1980 and 2002. International direct investment (FDI), in some previous works of literature it is documented that it helps emerging economies grow faster; on the other hand, FDI has not been an aid for underdeveloped



countries in economic growth in the long run. For a variety of reasons, foreign direct investment (FDI) does not benefit developing economies. These include instabilities in the economic and political environments, security concerns, and an absence of adequate law and order circumstances. Falki, N. (2009)<sup>[5]</sup> demonstrated that foreign direct investment (FDI) really hasn't played a factor in boosting Pakistan's economic growth. In an opposing manner, Khan et al. (2011)<sup>[6]</sup> demonstrated that foreign direct investment (FDI) is an increasing factor in Pakistan's GDP growth for the period 1981-2008. Melnyk et al. (2014)<sup>[7]</sup> also explored whether a rise in foreign direct investment (FDI) can be positively associated with the growth rate of a certain region in post-communist transition countries.

Government investment is a crucial aspect of fiscal policy, promoting economic growth and development. Economic development is a crucial aspect of a country's roots and actions for poverty alleviation. Government spending, such as taxes and expenditures, is used to improve the economic system and achieve rapid growth. Government spending has increased significantly in the 20th century, as it accounts for a large proportion of GDP in many developing economies. Wagner's Law suggests that public expenditure grows due to an increase in real per capita income, while Keynes advocates for more government expenditure to stimulate economic development. Both approaches contribute to a country's overall growth and development.

According to this viewpoint, casualties should be transferred from government expense to national income. Abbas and Afzal (2010)<sup>[8]</sup> documented research in Pakistan to determine the validity of the Wagner hypothesis. They employed time-series data from Pakistan spanning the period 1960-2007, as well as the Cointegration and Granger Causality tests. The Wagner Law has been investigated in Pakistan for four different time periods, according to the authors. 1961 to 1972, 1981 to 1991, 1981 to 2007, and 1991 to 2007. These are the four-time periods covered. According to the findings, the Wagner Hypothesis is invalid during the time period 1981-1991. As a significance of the causality analysis, it was discovered that there exists a linear relationship between the budget deficit with state expenditure. In a similar vein, revenue and budget deficit have a unidirectional causality. Income, on the other hand, has no direct correlation with governmental expenditure.

Maintaining economic stability requires not just balancing government expenditure, but also promoting and accelerating economic development via the creation of jobs and so



eradicating poverty Ahuja (2013)<sup>[9]</sup>. Budgetary expenditures by the government (such as infrastructure construction, health-care provision, agriculture, transportation, and energy generation) can stimulate economic growth, improve economic performance and increase productivity while also attracting Foreign Direct Investment (FDI). Excessive government spending, on the other hand, might result in significant deficit and debt difficulties.

Previous research on Chinese investment in Pakistan has been limited in understanding the relationship between Chinese Foreign Direct Investment (CFDI) and government investment/development expenditures (GDE) on GDP growth. Some studies show a favorable correlation between FDI and GDP growth in the short and long term, while others find a negative correlation. Additionally, there is no clear empirical answer on whether increased government development expenditure improves the economic situation of the nation. This study aims to fill this gap by studying the link between Chinese FDI and government development spending and examining reasons why investment has grown in certain years while dropping down in others. Some researchers predict that CFDI and government development expenditures in Pakistan have a significant and positive impact on income stabilization and economic growth, while others argue that CFDI has a disadvantageous impact. Previous research results emphasize both positive and negative impacts on GDP growth in the short and long term.

The study's research aims are clearly defined here. The authors clarify the relevant concepts and outline the general design of the study is to analyze the impact of development expenditure and Chinese investment (FDI) on the economic growth of Pakistan from 1980 to 2020. It also aims to study the relationship between CFDI and local government development expenditure on the economic growth of Pakistan. Numerous studies have investigated the impact of Chinese Foreign Direct Investment (FDI) on the economy, but the results are inconsistent. Some studies show both negative and positive impacts, while others show a clear relationship between CFDI and government development expenditure. This research aims to explore these areas and understand the relationship between Chinese investment and government development expenditure to better understand GDP development in the long and short-term. The study examines the relationship between variables in two sub-period groups, pre and post 2007.

Researchers and economists have studied the instruments of GDP growth and their factors affecting economic growth. Government development expenditure plays a dynamic



role in economic habitation, promoting efficient resource allocation, rapid economic progress, technical advancement, and social well-being. Chinese foreign direct investment (CFDI) is widely acknowledged as making a significant contribution to Pakistan's economic development. However, empirical research has not established the benefits of this relationship in reality. The study found that in the long term, government spending, GDE, and Chinese investment (CFDI) are not in favor of GDP growth and have a negative influence on the economy. The data corroborate the hypothesis that extractive CFDI may not be beneficial to economic development in the long run.

A sub-period empirical analysis was conducted to examine the effects of CFDI and GDE when CFDI was on a sharp rise and sharp decline. Chinese investment was recorded highest in 2007 with a remarkable rise. In the pre-2007 era, Chinese investment and government expenditure had a positive impact on GDP growth. However, there was a negative relationship between CFDI and government spending. In the post-2007 period, government expenditure retained its positive impact on GDP, while CFDI had a negative impact on economic growth due to Chinese investment decline. The strong relationship between Chinese investment and government expenditure in recent years is due to the China-Pakistan Economic Corridor (CPEC) and government efforts to improve resource allocation and development expenditure.

#### 2-Literature review

Research on the relevance of Foreign Direct Investment (FDI) on the economic growth of host countries has been established for decades by various scholars. FDI has a range of impacts on the host country's economy, including increased domestic investment, technology transfer, and human capital formation. Developing countries, like Pakistan, require a large amount of cash to effectively develop their economies. The grant and loan programs, however, have a detrimental influence on the country's balance of payments. As a result, FDI helps in accelerating capital formation because it carries no financial risk for the host country. FDI has a slew of advantages, including increased employment, increased exports, improved managerial and technical capabilities, and improved balance of payment and lifestyle Falki (2010)<sup>[10]</sup>. Foreign direct investment (FDI) is widely believed by policymakers, researchers, economists, and other domestic and foreign organizations to be an important factor in a country's economic development Sokang (2018)<sup>[11]</sup>.

Between 1945 and 1965, many developed countries assumed that increasing government



development expenditure and the scale of the public sector was necessary. Greater government intervention, according to the underlying ideology, was indeed the best, if not the only method to achieve particular economic and social goals. In recent years, developed countries increasingly questioned the legitimacy of this idea. Not alone has there been a rise in cynicism about the effectiveness of government expenditure, even though there has been a rise in awareness of the negative consequences of taxation. As a result, concerted strategies have been implemented to limit the increase of government spending, if not completely eliminate it. The effort of reforming the economic model and supporting faster growth in developing countries also pushed the policies of ever-increasing public spending and involvement. However, in the tight financial climate that most of these nations had between 1973 and 1979, a similar drive to reduce public spending growth can be seen.

The implication that an excessive level of government development expenditure may exert a negative impact on economic growth is very often apparent in the public discussion surrounding these policy reforms. Monetary and fiscal policies adopted by governments accommodating foreign investors create a favorable economic environment, which attracts more foreign investments and eventually helps in economic growth. Nonetheless, the case is not the same for developed countries. Some researchers suggested that FDI sometimes damages the host economies instead of contributing to their development. The domain and sphere of their research differ in their times, variables, and purposes of research. In this chapter, previous literature has been reviewed to get meaningful insights.

Is it true, based on empirical research, that nations with high levels of government expenditure have reduced rates of economic development? Nevertheless, despite the fact that this is an important question, actual empirical study has been limited, with scholars reaching a variety of contradictory findings. A study by Landau (1983)<sup>[12]</sup> of 96 developing economies found that a greater government size, as evaluated by the fraction of public consumption expenditures in the gross national product (GNP), was linked with slower growth in per capita income. For underdeveloped economies, foreign direct investment plays a key role in economic development when local funds are scarce Tahir M (2020)<sup>[13]</sup>.

A study by Balasubramanyam et al. (1996)<sup>[14]</sup> examines how FDI affects economic growth in developing countries. Using cross-sectional data and ordinary least squares regressions, he finds that FDI has a beneficial impact on economic growth in host countries with an export promotion strategy, but not in host countries with an import substitution

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strategy. According to Borensztein et al. (1998)<sup>[15]</sup>, who did a study on the issue in developing nations, FDI plays a vital role in the spread of technology and the growth of the economy. When it comes to economic growth, they found that a country's human capital has a significant role in the success of foreign direct investment (FDI). A similar analysis may be found in Olofsdotter (1998)<sup>[16]</sup> For countries where property rights are better protected and the bureaucracy more efficient, the increase in FDI stock has a greater impact on economic growth, according to cross-sectional data. The author finds that FDI growth is positively correlated with a country's level of institutional capability.

The role of the domestic financial sector is examined in an important study by Khan (2007)<sup>[17]</sup>, who claims that including financial sector indicators will improve and strengthen the link between FDI and economic performance and reflect the level of absorption capacity of the recipient country in enjoying the benefits associated with FDI inflows. Real GDP growth, FDI-to-GDP, financial sector development, labor, and physical capital are all examined using the Bound testing technique to cointegration in the context of Autoregressive Distributes Lags (ADL) to analyze the long-term connection between these variables (ARDL). It seems that FDI inflows would be successfully transformed if Pakistan's local financial system has evolved to a particular degree of development, according to the results of the research. Pakistan has a positive interaction term between FDI and the financial development index, but a negative coefficient of FDI. Only if the local financial system is properly established and working effectively can foreign direct investment (FDI) have a positive influence on economic development; otherwise, the impact of FDI on economic growth is likely to be negative. FDI and growth are causally linked, according to the research, with FDI driving financial sector expansion. Shah, et al. (2003)<sup>[18]</sup> used the Granger non-causality approach to evaluate the causal link between FDI, exports, and production from 1972 to 2001. In contrast to the above-mentioned research, they found that FDI had a considerable impact on domestic production.

A recent study by Ullah et al. (2022)<sup>[19]</sup> investigated the causality between Chinese investment and the economic growth of Pakistan reflecting CPEC projects. They used time-series data and a research sample for 10 years between 2009 and 2018. Their findings demonstrate unidirectional causality for the economic growth of Pakistan and CFDI. However, in the short run, causality doesn't exist in their findings. Chen et al., (2018)<sup>[20]</sup> described in their paper that China-Pakistan Economic Corridor (CPEC) is only a success in the long run if



native Pakistanis are given the opportunity to participate in the project. Pakistan's Sindh province has been granted a tax break and an extra incentive to hire local employees as a result of the CPEC.

According to Tasneem (2018)<sup>[21]</sup>, the province of Punjab's main cities' telecommunication, energy, and communication sectors' Labor Quotients (% of total employment in one sector compared to the province's overall employment in the same sector) have been researched. She believes that the formation of small and medium-sized firms (SMEs) in industrial and technology parks along the CPEC route would lead to an increase in job possibilities. There will be an increase in the number of entrepreneurial initiatives, while the cottage industry will prosper and be able to compete in overseas markets.

In the context of Pakistan, Ashghar et al. (2012)<sup>[22]</sup> discovered that a major benefit of government expenditures on primary and secondary education is that it helps lower-income groups get out of poverty by providing them with the basic education they need to acquire the necessary skills, which ultimately allows them to acquire the knowledge and skills to join the workforce. Spending on secondary education is also found to lower poverty, but to a lesser extent than spending on higher levels of education. The findings show that higher levels of spending on education reduce poverty only through their impact on human capital formation; they do not improve incomes directly. It was also found that spending on primary education is highly regressive in nature and tends to increase poverty rather than reduce it, while secondary and higher levels of education tend to reduce poverty. This confirms the findings of studies conducted by Amin et al. (2008)<sup>[23]</sup>, which suggest that whereas higher education reduces poverty significantly through its impact on human capital formation, primary education does not. Future research could be conducted to examine the impact of government spending on primary education, local government spending, and other social services on poverty.

In a separate study, Asghar et al. (2011)<sup>[24]</sup> discovered that government expenditure in social sectors has a favorable impact on economic development and that government spending has a good outcome on work capital and economic development as well. They suggested that this result should be taken into account because human capital is a leading indicator and among other factors, it is one of the prominent determinants of economic performance. Therefore, in this study, it is sought to investigate whether government expenditure on the social sector in Pakistan with the aim of improving the health status of the population is



having a positive impact on employment creation. Employment generation is a vital aspect of economic development because it can bring about a growth in per capita income. It is an essential prerequisite for increasing the country's economic growth. Therefore, policies of the government to create job opportunities for those who have none. It is critical that adequate funding be granted to the education sector for the advancement of education because, without adequate funding, it will be impossible to achieve all of the objectives Yousaf et al. (2008)<sup>[25]</sup>. He concluded that, government institutions must be directed towards raising funds for the betterment of education, and they also must be made accountable for utilizing the allocated budget.

# **3-Research methodology**

#### **3.1-Data collection**

In this study economic growth (GDP) is taken as a dependent variable, whereas, Chinese Investment (CFDI), Government Developmental Expenditure (GDE), and the relation between CFDI and GDE are taken as independent variables, as follows

The quantitative statistics sample for all variables was obtained from reliable secondary resources. The collected data was time series and was analyzed statistically. The time frame under analysis was 41 years. Variable with their proxies and secondary resources is given in the table below.

Variables		Proxy	Data source
Dependent	GDP Growth	GDP Growth (annual %)	World Development
variable			Indicators.
Independent	CFDI	Chinese FDI, net inflows (% of	Board of Investment
variables		GDP)	Pakistan Publications.
	GDE	Gross capital formation (annual	World Development
		% growth)	Indicators.

Table 0-1: Data Sample and sources

#### **3.2-Hypothesis**

H1: There is a strong and positive relationship between Chinese investment and the GDP growth of Pakistan.

**H2**: There is a strong and positive relationship between Government Developmental Expenditure and GDP growth of Pakistan.



**H3**: There is a strong and positive relationship between Chinese Investment and Government Expenditure on the GDP growth of Pakistan

#### **3.3-Economic model specification**

The econometric model for this study is:

$$GDP_t = \alpha_1 + \beta_1 CFDI_t + \beta_2 GDE_t + \beta_3 CFDI * GDE + \varepsilon_t$$
(3-1)

Where  $GDP_t$  represents GDP (economic) growth of Pakistan,  $\alpha_0$  is Intercept,  $CFDI_t$  is Chinese foreign direct investment,  $GDE_t$  shows government development expenditure of Pakistan whereas,  $CFDI^*GDE_t$  represents the relationship between Chinese Investment and Government Expenditure and  $\varepsilon_t$  is the error term.

#### 3.4-Data estimation technique

For empirical analysis sample data was processed in two parts. In the first part, the whole data sample was analysed for lumpsum estimations. In the second part, data was divided into two groups having interesting trends to observe the relationship between dependent and independent variables. Several data estimation techniques were applied to estimate the empirical model and test data and corrections were applied to attain normality. Many time series approaches use the assumption that the data is steady, which is not always true. The fact that the mean, variance, and autocorrelation components do not change over time is one of the features of a stationary process. Our definition of stationarity is a series that looks flat and without trend, has constant variance over time, has a consistent autocorrelation structure across time, and does not contain periodic oscillations in the data points. Non-Stationary series can produce spurious regressions that two unrelated series show high R<sup>2</sup> and significant t-statistic as in research it's not significantly important.

$$E(Y_t) = \mu \tag{3-2}$$

$$Var.(Y_t) = \sigma 2 \tag{3-3}$$

$$Cov.(Yt, Y_{t-1}) = f(h)$$
 (3-4)

Keeping in view the objectives of this study and with the help of existing literature following statistical techniques were selected to fulfill the objectives of this study. To ensure the stationary of the data being used for 1<sup>st</sup> objective Unit Root Test through E-Views was used and was checked by the value of ADF (Augmented Dickey-Fuller) Test provided by the software. The variables are stationary at which level is explained in the next sections. The Granger Causality Test was used to determine the existence of a causal link between variables.



To check cointegration among variables F-Test was applied again through E-Views. To check the long-run causal relationship ARDL (Auto Regressive Distributed Lag) approach and ECM (Error Correction Model) for short-term relationship among variables.

#### **3.5-Another Tests:**

In this paper many tests done to make the accuracy final regression. These tests are cointegration test, ARDL, Error correlation test, Lag selection Criteria, AIC (Akaike information criteria), and Granger causality test.

#### 4-Result and discussion

#### **4.1-Descriptive statistics**

It is possible for a data collection to be representative of the whole population or just a subset of it, and yet use descriptive statistics to characterize it. There are two types of descriptive statistics: measures of central tendency and measures of variability (spread). Measures of central tendency such as the mean, median, and mode are all instances of central tendency measurements whereas measures of variability such as standard deviation and variance are examples of measures of variability, respectively.

In the sample data for this study, the mean of dependent variable GDP (gross domestic product) in this study sample is 118.42 whereas, minimum and maximum are observed at 23.65 and 314.56 (Billion US dollars). Chinese foreign direct investment, CFDI has a mean of 1.203 with maximum of 5.59 and minimum of 0.17 Billion USD. Government development expenditure, GDE has higher values than CFDI recording mean, maximum and minimum values of 12.90, 36.84 and 2.3 billion USD respectively. To observe the connexion among government development expenditure and Chinese investment, CFDI\*GDE is added in the model which shows the relationship of Chinese investment and government investment which has a higher mean of 23.22. The descriptive statistics can be observed in table 4-1.

	GDP	CFDI	GDE	CFDI*GDE
Mean	118.4667	1.203529	12.90348	23.22733
Median	79.48440	0.716253	7.120806	5.145719
Maximum	314.5675	5.590000	36.84725	90.17326

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n	23.65444	0.029457	2.377273	(

Minimum	23.65444	0.029457	2.377273	0.096503
Std. Dev.	93.38755	1.374715	10.52903	30.08658
Skewness	0.786096	1.754762	1.016219	1.053520
Kurtosis	2.148036	5.823714	2.587034	2.578722

#### 4.2-Unit root test

Data showing a trend is one of the features of time series data; as a result of this property, the data is referred to be non-stationary data. Time series data must be steady in order to prevent the data showing a trend, and in reality, in order to avoid the data showing false findings. The Unit Root Test is used to determine whether or not data is stationary or not. By using the unit root test, the ADF Test (Augmented Dickey Fuller) value is observed and compared to several critical values at the 1 percent, 5 percent, and 10 percent significance levels, as given by the program. Whenever the ADF value is smaller than all or any of the critical values at the level or first difference, then the particular variable is stationary at the level or first difference at any significance level, regardless of the significance level. Each and every detail is laid forth in the following table. A time series with a constant mean over time and a constant variance is referred to as a stationary series, however, if the mean and variance do not remain constant over time, the series is referred to as a non-stationary series (see below).

Variables	At Level P Value	At 1 <sup>st</sup> Difference P Value	Order of Integration
GDP	0.0041		I(0)
CFDI	0.1024	0.0000	I(1)
GDE	0.9997	0.0184	I(1)
CFDI*GDE	0.5628	0.0000	I(1)

Table 0-3: Unit Root and Stationary Test

The table above demonstrates the unit root test. It shows GDP is stationary at level with P-value of 0.0041. Whereas, CFDI, GDE, and CFDI\*GDE series are stationary at level I(1) with 1<sup>st</sup> difference P-value of 0.0000, 0.0184, and 0.0000 respectively. Therefore, as per the guideline, Autoregressive Distributed Lag (ARDL) Cointegration is checked.



Augmented Dickey-Fuller t	est statistic	t-Statistic	Prob.*
		2 (78704	0.0092
T ( '(' 1 1	10/1 1	-3.0/8/94	0.0083
lest critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	
*MacKinnon (1996) o	ne-sided p-values.		
	Table 0-5: ADF of GDE at	1st difference	Δ
Augmented Dickey-Fuller t	est statistic	t-Statistic	Prob.*
		-5.330007	0.0001
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	
*MacKinnon (1996) o	ne-sided p-values.	7 Sy - 9 🛽	
	Table 0-6: ADF of CFDI at	1st difference	
Augmented Dickey-Fuller t	est statistic	t-Statistic	Prob.*
	4	-4.422070	0.0011
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	
*MacKinnon (1996) o	ne-sided p-values.		
Ta	able 0-7: ADF of CFDI*GDI	E at 1st difference	
Augmented Dickey-Fuller t	est statistic	t-Statistic	Prob.*
		-4.930475	0.0003
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	
*MacKinnon (1996) or	ne-sided n-values		

#### Table 0-4: ADF of GDP at level

4.3Autoregressive Distributed Lag (ARDL)



ARDL cointegration is adopted when considered variables have different order of integration that is some variables are stationary at 1st difference level and some are stationary at level. For this purpose, ARDL cointegration or bound test is used. If F-statistics is higher than the value of the upper bound, this shows there is cointegration.

First, the Autoregressive Distributed Lag (ARDL) is done with GDP growth as a dependent variable whereas, Chinese Investment (CDFI) and government development expenditure (GDE) as an independent variable for the data sample from 1980 to 2020. The equation for ARDL is formed as;

CDD f(CEDICDE)

	$GDF = \int (CFDI, GI$	<i>)</i> ()		(4-1)
	Cable 0-8: ARDL cointegration	ion (F-Bound Test)		
F-Bounds Test	Null	Hypothesis: No lev	vels relationship	1
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic	: n=1000
F-statistic	5.316759	10%	2.63	3.35
К	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

As given in the table 4-7 above, F-static value is 5.31 which is greater than the upper bound value 3.87 at 5% significance level. Greater value of F-Statistic than Upper Bound I (1) indicates to reject Null Hypothesis (Ho) and accept Alternative Hypothesis (H1). So there exists a long run relationship (Cointegration) among variables.

Then to analyze the relationship between Chinese investment and government development expenditure, CFDI\*GDE is added to the model as an independent variable. The results are shown in table 4-8 below, and the equation for ARDL is as;

$$GDP = f(CFDI, GDE, CFDI * GDE)$$

$$(4-2)$$

Here the F-static value is 5.82 is again greater than the upper bound value 3.67 at 5% significance level. Therefore, reject Null Hypothesis and assumed there exists a long-run relationship (Cointegration) among variables.

Table 0-9: ARDL cointegration (F-Bound Test) with CFDI\*GDE

Test Statistic	Value	Signif.	I(0)	I(1)

Asymptotic: n=1000

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 $(1 \ 1)$ 



F-statistic	5.828218	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Null Hypothesis: No levels of relationship

#### 4.4-long-run Coefficient

A long-run analysis is done in two parts as well, first with dependent (GDP) and independent variables (CFDI and GDE). Then the relationship between two independent variables is added to the model as the third variable (CFDI\*GDE). The analysis results point out that Chinese investment and government development expenditure have a negative and significant impact on economic development. With the higher value of CFDI (-0.81).

EC = GDP - (-0.0827 \* GDE - 0.8194 \* CFDI + 2.1886)(4-3)

Details are specified in the table below.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDE	-0.082703	0.039857	-2.075010	0.0473
CFDI	-0.819439	0.196041	-4.179931	0.0003
С	2.188552	0.465903	4.697443	0.0001

Here in the long-run coefficient, we can see the significant and positive effect of the combined relationship CFDI\*GDE on GDP, whereas, GDE and CFDI have a negative and significant effect on GDP. The presence of long-term relationships is important for accurate measurement and compliance with model parameters. If long-term equality relationships exist, the ARDL process can be used to measure long-run coefficients. The F-statics is higher than the upper limit indicating the long-term relationship of our model. Results are observed in table 4-10 and the equation below.

$$EC = GDPG - (-0.2848 * GDE - 2.0670 * CFDI + 0.1308 * CIXGDE + 3.6491)$$
(4-4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDE	-0.284765	0.048827	-5.832129	0.0000
CFDI	-2.067026	0.382416	-5.405184	0.0000

#### Table 0-11: Long Run Coefficient with CFDI\*GDE variable



С	3.649125	0.414650	8.800492	0.0000
CFDI*GDE	0.130812	0.027341	4.784508	0.0001

It is interesting to observe that the relationship between CFDI and GDE yields a positive and significant impact on GDP growth. That indicates that the development expenditure and Chinese investment stimulate the outcome and are favorable for economic growth in the long term.

#### 4.5-Short run coefficient and long run adjustment

An error correction model is used in this situation. In order to examine short-run relationships, it is necessary to determine if variables have a substantial short-run connection. Long-run adjustment is used to determine whether the model is capable of returning to long-run equilibrium after experiencing a shock or not.

In the first model analysis, GDP = f (*CFDI*, *GDE*) Chinese Investment and government development expenditure have a positive impact on GDP growth with coefficients of 0.28 and 0.47, with GDE showing a higher change per unit change in GDP growth. The speed of equilibrium from short-run to the long-run is 77%. Details are present in table 4-11 below.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDE)	0.474868	0.156013	3.043780	0.0050
D(GDE(-1))	0.558535	0.182873	3.054230	0.0049
D(GDE(-2))	-0.085776	0.234128	-0.366365	0.7168
D(GDE(-3))	0.560361	0.233799	2.396758	0.0235
D(CFDI)	0.284988	0.373288	0.763453	0.0406
CointEq(-1)*	-0.771072	0.158906	-4.852385	0.0000

Table 0-12: Short Run Analysis

As we can see in table 4-12, the short-run coefficient of Gross Domestic Product, *GDP* and, government development expenditure, *GDE* shows a positive and significant relationship whereas, Chinese foreign direct investment, *CFDI*, and CFDI\*GDE have a positive and insignificant relationship. In the Long Run Adjustment, we can see that the coefficient is negative and significant which shows the model will adjust monotonically.

Table 0-13: Short Run Analysis with CFDI\*GDE in model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	0.626276	0.211575	2.960070	0.0068



D(GDE)	0.433341	0.140080	3.093516	0.0050
D(GDE(-1))	0.881698	0.185041	4.764890	0.0001
D(CFDI)	1.608020	0.970495	1.656907	0.0106
D(CFDI*GDE)	0.009289	0.050825	3.182756	0.0565
CointEq(-1)*	-0.667285	0.285946	-5.830775	0.0000

#### 4.6-Heteroskedasticity test

There should be no heteroskedasticity of residuals in linear regression, which is one of the most fundamental assumptions of the method. For the most part, this implies that the variance of residuals should not grow as a function of the fitted values of the response variable. For detection of heteroskedasticity White Heteroskedasticity test is used with the null hypothesis that there is no heteroskedasticity in the model.

1. H0: no heteroskedasticity in the model

2. P-Value > 0.05, we accept H0 and assume there is no heteroskedasticity

3. P-Value > 0.05, we reject H0 and assume there is heteroskedasticity

As we can see here in F-statistics in table 4-13, the P-value is greater than 0.05 which implies that there is no heteroskedasticity in the model

Table 0-14: Heteroskedasticity Test: White

Heteroskedasticity Test: White						
F-statistic	0.574321	Prob. F(27,10)	0.8779			
Obs*R-squared	23.10193	Prob. Chi-Square(27)	0.6795			
Scaled explained SS	17.08510	Prob. Chi-Square(27)	0.9290			

#### 4.7-Homoscedasticity:

Homoscedasticity, or homogeneity of variances, is the idea that the variances of different groups are similar or comparable. This is a critical assumption since parametric statistical tests are sensitive to differences across groups. As a consequence of unequal variances across samples, test findings are skewed and prejudiced.

Table 0-15: Tests of Normality

 Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
Statistic	Df	Sig.	Statistic	Df	Sig.

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Variables			Individual	Optimal Lag		
GDP			2			
CI			0			
GDE			2			
CFDI*GDE			1			
GDP	.062	41	.200*	.991	41	.000

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

#### 4.8-Optimal lag

The next step in relation to the ARDL-ECM model, the boundary assessment process requires the appropriate residual length of all variables. The best varieties have different heights of height for each variety. Lütkepohl, (2006)<sup>[73]</sup> found that strong links between the series can be captured if the right lag is used. The correct delay should be chosen by the model itself. Table 4-15 below shows the optimal delay for all variables.

Table 0-16: Optimal lags

#### 4.9-Empirical analysis Sub period

There are two prominent trends of the CFDI that can be observed in the pre-2007 period which can be visually assessed the figure 4-3 below. There is a remarkable increase in CFDI from the year 2003 to the year 2007. Similarly, a dramatic decline lies ahead of 2007 when CFDI is reduced significantly. This part is divided into two sub-periods, the pre-2007 period and the post-2007 period. In the pre-2007 period, the impact of Chinese investment, *CFDI* on GDP growth is examined to check whether in reality this increase in CFDI has a positive impact or have a negative impact on the economic growth of Pakistan. Whereas, in post-2007 the opposite study of the impact on GDP growth rate is observed when CFDI reduced dramatically. Here the relationship between CDFI and GDE is analyzed as well.





Fig. 0-1 Chinese Investment, CFDI in Pakistan

#### 4.10-Pre-2007 series analysis

This period, pre-2007 can be defined as the rise of CFDI in Pakistan. During this era except for some fluctuations, a constant increase in CFDI inflow in Pakistan was observed. Here in this sub-period of the study, it can be observed that in the pre-2007 period GDE and CFDI have a positive and significant impact on GDP with coefficients of 0.151 and 0.854 respectively. Whereas, in the pre-2007 sub-period, the combined effect of the relationship between Chinese investment and government expenditure, *CFDI\*GDE* has a negative and significant impact on GDP growth with a coefficient of -0.058. During this era with every one unit increase in *CFDI\*GDE*, will have a unit 0.058 negative impact on GDP. The regression results can be seen in detail in table 4-16 below.

Variable	Coefficient	Std. Error	t-Statistic	Prob.		
GDE	0.151655	0.032364	4.685921	0.0001		
CFDI	0.854976	0.245957	3.476128	0.0020		
CFDI*GDE	-0.058979	0.014254	-4.137797	0.0004		
С	2.828581	0.153165	18.46749	0.0000		

Table 0-1: Pre-2007 Regression analysis

For heteroskedasticity, null hypothesis, H0: no heteroskedasticity in the model Table 4-17 shows P-Value > 0.05, we accept H0 and assume there is no heteroskedasticity in the model.



Table 0-2: heteroskedasticity test of pre-2007 period

F-statistic	0.472520	Prob. F(8,19)	0.8605
Obs*R-squared	4.646344	Prob. Chi-Square(8)	0.7946
Scaled explained SS	4.925659	Prob. Chi-Square(8)	0.7655

Heteroskedasticity Test: White

#### 4.11-Post 2007 period

During this sub-period, the CFDI in Pakistan decreased dramatically after 2007 and has never returned to the same value. However, in the post-2007 sub-period, Pakistan has seen increased economic growth, *GDP* trend year on year with the same increasing fashion in the government development expenditure. It was quite interesting to study the impact of CFDI on GDP growth when the amount of CFDI was decreasing sharply. The regression analysis can be observed in detail in the table 4-18.

Table 0-3: Regression analysis of Post-2007 sub-period

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDE	0.028502	0.008037	3.546485	0.0053
CFDI	-0.029124	0.059558	-0.489008	0.0154
CFDI*GDE	0.000441	0.003249	0.135622	0.0048
С	4.741625	0.170470	27.81505	0.0000

Here as well there is no heteroskedasticity in the model. As Table 4-18 shows the observed P-Value > 0.05, we accept H0 and assume there is no heteroskedasticity in the model.

Table 0-4: heteroskedasticity for post-2007 sub period

F-statistic	0.560685	Prob. F(8,5)	0.7776
Obs*R-squared	6.620301	Prob. Chi-Square(8)	0.5781
Scaled explained SS	2.768089	Prob. Chi-Square(8)	0.9481

Heteroskedasticity Test: White



### 4.12-Discussion

The link between FDI and economic growth has long piqued the curiosity of academics and policymakers in developing countries. Economic development is one of these nations' most important problems, thus measures geared at luring foreign direct investment have taken precedence. As a result, policies aimed at attracting foreign direct investment have been prioritized in the context of economic growth and enlargement in these countries. This study was conducted to examine the effects of Chinese foreign direct investment, CFDI government development expenditure, GDE on the economic development, GDP growth of Pakistan, and the relationship between CFDI and GDE. In this research, some of the findings were unexpected and quite interesting. In the earlier assumptions, the positive relationship between all variables and GDP was assumed. However, the finds of this study demonstrate that in the long run, government development expenditure, GDE and Chinese foreign direct investment, CFDI are not in favor of economic growth. In the long-run, however there exist a positive relationship between economic growth and CFDI\*GDE. As in the efforts of the Pakistani government to attract more FDI, some of the fiscal policies are in its favors and stimulate the FDI. In the short term, however, government development expenditure, (GDE) and Chinese foreign direct investment, CFDI shows positive and significant contribution to the development of GDP. Similarly, development expenditure and Chinese investment stimulate the outcome and favorable for economic growth.

Findings of the sub-period study indicate that before 2007 in the pre-2007 era, Chinese Investment and government development expenditure both have a positive relationship with the GDP growth while Pakistan has seen a dramatic increase in CFDI. Although the relationship of CFDI\*GDE has a negative impact on GDP. In the post-2007 period, however, CFDI has been reduced significantly. In the post-2007 era, the GDE has been found to stimulate economic growth whereas CFDI has a negative impact on GDP growth.



Over the years, researchers and economists have taken a keen interest in studying the instruments of GDP growth and their factors affecting economic growth. It is largely documented that government development expenditure plays its dynamic role in economic habitation. The concept of public expenditure explains that cumulative state action promotes efficient resource allocation, rapid economic progress, technical advancement, and social well-being. This is supported by data. Economic benefits and costs are included in government spending (Grossman, 1988)<sup>[53]</sup>. The economic and social environments of the nation are favorably impacted as a result of the efficient deployment of available resources. The public sector of an economy is regarded as the most important for the performance of productive activities, and this sector owns a significant portion of the economy's resources. Government actions, by employing the resources of the economy, offer valuable services for the well-being of the community and, as a result, have an impact on economic growth and development. In a similar vein, Chinese foreign direct investment is widely acknowledged as making a significant contribution to the economic development of Pakistan. Economics has recognized a number of channels via which Chinese investment may be advantageous to Pakistan's economy. These channels are included below. So far, the empirical research has established the association, but it has had greater difficulty identifying the benefits of this relationship in reality. Most notably, a great number of applied articles have examined the relationship between CFDI and GDP growth as well as the relationship between GDE and GDP growth, but their findings have been far from clear. Despite the lack of any conclusive findings, and maybe unexpectedly, Pakistan continues to aggressively pursue policies targeted at increasing foreign direct investment (FDI).

The conclusions of this study are quite fascinating, and they do not accord with the findings of other academics who have looked into the link between economic development and Chinese foreign direct investment inflows and government expenditure in Pakistan, for example. In the long term, it is noted that government spending, GDE, and Chinese investment, CFDI, are not in favor of GDP growth and have a negative influence on the economy, according to the research sample covering the period 1980 to 2020. The data seem to corroborate the hypothesis that extractive CFDI may not be beneficial to economic development in the long run. Despite the fact that, in the long term, there is a favorable and beneficial link between Chinese investment and government expenditure. According to

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Economou (2019)<sup>[74]</sup>, foreign direct investment has a negative influence on the gross domestic product (GDP). Moreover, he said that foreign direct investment had no role to play in encouraging economic development in the host country's economy. Government spending and Chinese investment both have a substantial influence on Pakistan's economic development in the near term, though. Public spending and Chinese investment also have a favorable link in the long term, according to the World Bank.

A sub-period empirical analysis was done in order to examine the effects of *CFDI* and *GDE* when *CFDI* was on a sharp rise and sharp decline. Chinese investment was recorded highest in 2007 with a remarkable rise as compared with other years. In the pre-2007 study, it is found that Chinese investment and government expenditure has a positive impact on *GDP* growth. Though, interestingly there was a negative relationship between CFDI and government spending. After 2007, a noteworthy decline in CFDI was observed nevertheless statistics show that *GDP* growth was still rising continuously. In this study, it is documented that in the post-2007 era, government expenditure retains its positive impact on GDP whereas, CFDI has a negative impact on economic growth as Chinese investment declined heavily. In the post-2007 period there exist a positive and significant relationship between CFDI and government expenditure. The strong relationship between CFDI and government development expenditure in recent years is because of China-Pakistan Economic Corridor, *CPEC* some of the major government and public spending are in line with Chinese investment. Moreover, in recent years government has taken bold steps to improve the efficiency of resources allocation and development expenditure.

#### **5.1-Policy recommendation**

The study highlights the positive impact of Chinese foreign direct investment (CFDI) and government development expenditure (GDE) on economic development. In the short run, a positive relationship exists between CFDI and government spending, indicating satisfactory economic development. However, there is a significant negative impact of CFDI and GDE in the long run on economic growth. To achieve long-term growth, Pakistan's government should adopt fiscal policies and allocate government expenditure, as current policies only aid short-term growth. Pakistan has made reforms in sectors like energy, information technology, exports, aviation, and oil and gas, attracting Chinese investors and increasing CFDI. To achieve long-term growth, Pakistan must develop more infrastructure, reduce domestic production costs, and adopt advanced production technologies.



Pakistan can learn from China's extraordinary development model, which has successfully achieved long-term development through technological advances, trade facilitation, capable infrastructure, and fair resource distribution. Pakistan should develop more policies by providing tax benefits and a safe environment for Chinese investors to take more interest in development projects. The education level in Pakistan is not high, and many Chinese investors bring their technical and management teams from China. The government should spend more on education and adopt special education and training policies to increase skills and competencies for foreign direct investment. Government spending should stay on productive projects, and interest in the private sector will grow as the government expands its influence in this sector. Pakistan can adopt the model of China for economic development and poverty by applying similar reforms to make attractive grounds for foreign investors to increase their business in the country.





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