Decentralisation and Quality of Fiscal Management: Empirical Evidence from Pakistan

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ABSTRACT

Effective use of public resources is crucial for developing countries facing persistent deficits. Fiscal decentralisation is believed to enhance government efficiency over resource use. Therefore, the paper intends to examine the association between Pakistan's Fiscal Decentralisation (FD) and Fiscal Management from 1988 to 2020. The authors develop a Composite Decentralisation Index (CDI) that captures the effect of both Expenditure Decentralisation (ED) and Revenue Decentralisation (RD) processes. After confirmation of stationarity through augmented Dickey-Fuller (ADF) and Philip-Peran (PP) unit roots tests, the study employs the Johansen cointegration method to draw long-run estimates. The study's findings reveal that composite decentralisation reduces public deficit significantly - lower corruption, weaker underground economy, and smaller government size help reduce the fiscal deficit. The Error Correction Term (ECM) is also negative and significant at 1%, which confirms the speed of convergence towards long-run equilibrium in case of any shock or dis-equilibrium in the short run. These study findings may help policymakers and legislatures draft effective long-term fiscal management policies.

Keywords: Fiscal Decentralisation, Public Deficit, Underground Economy, Cointegration.

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1. INTRODUCTION

Economic growth and development of any economy depends on the services its government provides and its public infrastructure. However, most developing economies lack these critical public resources that ultimately hamper their economic growth and retard the social sector's growth. High non-development spending, low tax base, and excessive leakages in government funds stress the government's fiscal situation to a point that it remains trapped in persistent stagflation without instant restructuring and reforms, adding to severe deficit (Neyapti 2010).

The developing economies worldwide face a persistent deficit in their budgets. Fiscal or budget deficits and consequent increases in public debt pose a critical problem for such economies. This often leads to unproductive and ineffective distribution of public resources. Scholars hold budget deficit responsible for low growth, low private investment, substantial current account deficit, high inflation, and consumption crowding out (Chaudhary and Abe 1999).

Pakistan is home to more than 215 million people (MoF 2021). A very narrow fiscal base was established in Pakistan after independence in 1947, and the country is still trying to expand it (Anwar and Ahmad 2012). Pakistan faces a potential fiscal deficit issue and a consequent increase in public debt consistently. Problems such as low GDP growth, high inflation, deficit in the current account, weak private investment, and consumption crowding out primarily result from this phenomenon (Chaudhary and Abe 1999; Gupta et al., 2002). Budget deficit is one of the significant hurdles in the economic growth of Pakistan as it was 8% of GDP in 1991, and recently, it appeared to be 8.1% of GDP (MoF 2021). High tax evasion and a large informal economy cause low tax to GDP ratio. The governments, facing high budget deficits induced by the low tax revenues, then approach International Financial Institutions (IFIs) for loans at the cost of their sovereignty (Kemal 2010).

Fiscal deficit may result from many macroeconomic problems such as limited fiscal decentralisation, large size of government, inflation, low tax-to-GDP ratio, corruption, massive rise in population, and a larger share of informal and underground economy. For instance, Shah (2006) concluded that decentralised fiscal systems provide a more significant potential for improved macroeconomic governance than centralised fiscal regimes. Also, certain political and institutional factors enlarge the fiscal deficit but are not studied widely in the existing literature (Feltenstein and Iwata 2005). Fiscal decentralisation and delegation of authority to local tiers are crucial in improving overall fiscal management. It encourages trust, harmony, and unity in society and proficiently ensures equitable access to basic public needs (Yakub et al., 2018). Mobilisation of resources and efficient resource utilisation also result from greater fiscal decentralisation (Baskaran and Feld 2013).

Decentralisation and Quality of Fiscal Management

Decentralisation refers to delegating authority to the lower level, i.e., streamlining tasks, possessions, and power away from the central or upper-level authority to local levels. Decentralisation may take the form of political, administrative, and fiscal decentralisation. Political decentralisation encourages the participation of local leaders in public decision-making. Administrative decentralisation stands for the extent of autonomy possessed by non-central government entities compared to the central government (Schneider 2003). Fiscal decentralisation (FD) deals with transferring revenue and expenditure assignments from the Federal to the provincial and local governments. Without this transformation, the autonomy of the local governments cannot be substantiated.

However, the opinion of scholars is mixed about the impact of decentralisation on the economy. Supporters argue that it stabilises the economy, increases efficiency, improves transparency and accountability, increases growth, equalises authority, and leads to equal distribution of public service (Akai and Sakata 2002; Brueckner 2006). In addition, since the provincial and local governments are more aware of the needs of the people, more efficient policies at the local level are expected from the local authorities (Oates 1993). However, critics claim that FD may destabilise the economy and hamper growth. The reason is that the composition and implementation of FD in developing countries differ significantly owing to their political and economic system (Thornton 2007; Xie et al., 1999). Hence, it is imperative to mention that it is a double-edged sword with specific pros and cons (Oto-Peralías et al., 2013; Neyapti 2010).

The link between FD and fiscal deficit can be seen by examining the former's revenue and expenditure features. By decentralising, expenditures may lead to a country's efficient delivery of public services. Taxpayers are more likely to collaborate with the Provincial Government because they know that paying taxes will, in turn, provide them benefits in terms of more developed infrastructure. Provincial Governments feel a sense of autonomy in collecting their revenues. It also creates a sense of innovation and trialling new projects to provide services. Hence, FD is a way to manage fiscal deficits, but it may lead to fiscal imbalances if not applied effectively (Bouton et al., 2008).

Empirical literature also highlights that fiscal management is significantly affected by some other institutional and political factors (Anwar and Ahmad 2012). For example, poor democratic norms prevailing in the country may result in high fiscal deficits (Ibid.). Scholars also argue that fiscal deficit primarily results from a large size of the government. A large and growing government put funds into people's bags that do not encourage economic growth, whereas small-sized governments are believed to develop competitiveness (Mitchell 2005; Jin and Zou 2002). Similarly, widespread corruption is another cause of high budget deficits that discourages national private investment. Per the figures provided by Corruption Perception Index (Transparency International 2021),

corruption has increased in Pakistan. This was the resulting average score by keeping four government spheres in view: public, executive, judicial and legislative. Thus, the proper functioning of a national system of fiscal control, cycle of legislative accountability and balance of political powers are of great concern (Santiso 2006).

In a corrupt system, taxes are avoided by paying heavy amounts to public officials as bribes, and in this way, taxes go uncollected (Kaufman 2010). Furthermore, a growing informal and underground economy causes tax evasion and avoidance which leads to a low tax base and revenues, putting upward pressure on the budget deficit in Pakistan. Since the formal sector accounts for only 30% of the economy, greater scope for manipulation and corruption in the informal sector creates higher tax evasion (Kemal 2010). Iqbal and Nawaz (2010) have also identified the need for fiscal decentralisation as a step toward a better economy for Pakistan and highlighted that the quality of governmental reforms such as National Finance Commission (NFC) Awards is contingent on the discretion of the political government.

In Pakistan, researchers have linked fiscal decentralisation with economic growth, poverty alleviation, government size and public investment (Kang and Arshad 2012; Hussain et al., 2021; Sohail et al., 2021; Hanif and Chaudhry 2015). However, there is a dearth of empirical evidence which specifically links fiscal deficit (fiscal management, public deficit) and FD. Therefore, the study explores public deficit factors with an explicit focus on FD. Furthermore, the study has developed a composite measure of FD to capture the comprehensive impact of FD on fiscal deficit. The authors also test the impact of government size, corruption, and the underground economy on Pakistan's fiscal deficit from 1988 to 2020. The paper contributes to the existing literature by estimating a composite index of FD using both expenditure and revenue decentralisation. Owing to persistent fiscal deficits faced by Pakistan, the study provides an intriguing aspect of dealing with this macro crisis. Fiscal deficit has become a significant hurdle for policy stakeholders in Pakistan aiming to achieve sustainable development. Therefore, the study offers valuable insights into the control of fiscal deficits through the channel of FD along with other policy options. The study finds that composite decentralisation significantly reduces the public deficit and has substantial policy implications. In terms of structure, Section Two explains the theoretical background of the study. Section Three discusses data and methods, and Section Four presents the results from empirical analysis. Section Five offers concluding thoughts.

2.   THEORETICAL BACKGROUND

Since World War II, FD has been considered a prosperous approach to better public sector management around the globe as it increases transparency and accountability of good public delivery (De Mello 2004).

2.1 Fiscal Decentralisation Theorems

Theoretically, FD is claimed to bring favourable outcomes from two particular perspectives. The first theorem of decentralisation suggests that people living in culturally and geologically distinct areas possess different preferences. Therefore, they would select public goods per their priorities (Oates 1972; Tiebout 1956). The second theorem argues that decentralisation enhances inter-jurisdictional competition and restricts the government from overtaxing citizens and business. It attracts investors and citizens by introducing a lucrative tax incentive scheme (Brennan and Buchanan 1980). Moreover, FD is an attribute of economic reform programmes based on the decentralisation of spending that increases effectiveness due to better local information and can better match policies with citizens' preferences. Taxpayers are further eager to cooperate with the local government due to tax representation (Oates 1993; Samuelson 1954; Wasylenko 1987).

2.2 Empirical Literature

Ebel and Yilmaz (2002) stated that if FD is implemented cautiously, public debt may be reduced significantly because of political stability, enhanced government efficiency, and increased overall welfare of society. Fiscal decentralisation and delegation of authority to local tiers are crucial in improving overall fiscal management. This encourages trust, harmony, and unity in society and proficiently ensures equitable access to basic public needs (Yakub et al., 2018).

Zhang (1997) found that economic growth was significantly affected by the distribution of resource structure between local and central governments in the post-1970s reform period. The study produced exciting results in light of the argument that the decentralisation of fiscal spending positively affects economic growth at the local level instead of at the national level. Likewise, Li et al., (2021) explored the asymmetric fiscal decentralisation effect on two facets, economic growth and environmental quality, in the context of Pakistan. While incorporating data from 1984 to 2018, they unearthed asymmetric effects of expenditure decentralisation on economic growth and CO_2 emissions in the short and long run.

Gurgur and Shah (2002) argued that the public sector is not based on a service-oriented framework. Also, internal bureaucratic controls, colonial past, and weak democratic institutions are key corruption factors. Decentralisation has more impact on corruption in unitary countries than in federal. The study also confirmed that decentralisation is essential in making the public sector accountable and reducing corruption. On the other hand, Arikan (2004) studied the effect of revenue expenditure decentralisation on corruption. He found that competition for capital among jurisdictions increased due to a higher level of FD, resulting in low corruption. He used cross-country data for testing these results and hypotheses confirmed by the empirical findings. Similarly, Devas (2005) conducted a theoretical study on problems of decentralisation in Uganda and Kenya,

focusing on local government reforms. The results showed that answerability of sub-level government is controlled by many parameters such as lower institutional ability, insufficient accounting mechanism, scarce information availability, and restricted resources. He suggested that it is valuable to design a robust system of centralised monitoring and propagation information that ensures proper implementation of brittle situations.

From a political perspective, Shi and Svensson (2006) analysed the existence of the political budget cycle by using 85 countries' samples for the period 1975-1995. They revealed that the government runs a higher deficit in an election year. This effect is a diverse subject to development as the political agent can get higher personal benefits due to weak institutions in developing countries and vice versa. Based on a panel data of 95 countries, Enikolopov and Zhuravskaya (2007) measured the effect of political institutions and governance on FD. The study found that the impact of FD strongly depends on the strength of fractionalisation of government parties and the national party system measured by the age of significant parties. They also tested Riker's Theory of Federalism (1964) and concluded that a robust party system significantly improves the outcomes of FD for public goods provision, economic growth, and quality of government in developing countries.

Drummond and Mansoor (2003) empirically tested that fiscal control is higher in well-governed countries even with a high degree of FD. They also explored that FD is linked with better fiscal outcomes for middle-income countries with strong governance. Fan et al., (2009) studied the effect of decentralisation on the bribe extraction of corrupt government administrators. They conducted this analysis on a firm-level survey of 80 firms intended to bribe along with cross-national data set on specific kinds of political and FD. They found that nations with more administrative and government tiers and local public workers led to more frequent bribery. They also found that in highly decentralised government, with strong institutions, restricts bribery.

Freille et al., (2007) investigated the empirical relationship between decentralisation and corruption. They conducted a panel study of 174 countries and found that market FD was linked with lesser corruption while constitutional federalism referred to higher corruption. Moreover, they also ascertained that the positive effect of constitutional decentralisation on corruption was set by political decentralisation. They suggested that previous empirical work may have grossly overestimated the aggregate impact of decentralisation on corruption. Agnello and Sousa (2009) studied the institutional, political, and economic sources of public deficit volatility. They used panel data of 125 states from 1980 to 2006. They argued that democracy, unstable politics, rapid cabinet changes, government crises, and other economic variables were key drivers of public deficit volatility. Bayar and Smeets (2009) analysed political and economic factors of public deficit. They found that a

higher interest rate enhanced fiscal deficit in terms of high debt servicing costs, while higher growth led to a lower deficit in terms of high revenue. Pasten and Cover (2010) explained political factors' contribution to public sector deficit in Chile by using time series data from 1833 to 1999. They found that the government's increasing tendency towards tilting taxes to the future and fiscal condition was weak in response to political instability. They used the intertemporal model of public finances and empirically derived that the tax tilting parameter 'γ' behaved consistently with the idea that political instability causes financial instability. From a panel of Asia and ASEAN countries, Javid and Arif (2012) analysed budget deficit's political, institutional, and economic sources from 1984 to 2010. Results showed that budget instability was linked with growing inflation, a high budget-to-GDP ratio, and high income. External shocks made the budget deficit more fickle/unstable; however, higher populated countries had a lesser explosive budget deficit. The results revealed that budget instability could be reduced by improving political stability, social and economic condition, and democracy; however, low- quality institutions and massive corruption caused a more unstable budget. The study recommended that institutional and political factors were more critical to stabilising the fiscal situation.

Neyapti (2010) analysed the macroeconomic effects of public policy by using panel data for 16 countries from 1980 to 1998. Results showed an antagonistic relation between budget deficit and FD. Positive effects of FD increased with population size and the absence of sub-level elections. However, ethnolinguistic fractionalisation decreased the advantages of FD. Similarly, Baskaran (2010) revealed that heavy borrowing by local government was measured as a peril of public policy decentralisation. On the other side, fiscal strength of the public sector was linked with FD and the limitation of a leviathan government. Panel data of 17 OECD nations showed that public indebtedness was reduced by FD, while vertical fiscal imbalance and tax decentralisation had no significant impact (Baskaran and Feld 2013).

Fiscal decentralisation has excellent potential to control budget deficits through its impact on control over corruption. Oto-Peralías et al., (2013) utilised data from 31 OECD economies over the period 1986-2010 and proved that FD reduced the negative impact of corruption on the budget deficit. The authors suggested that the countries more prone to corruption needed to decentralise fiscal powers to reduce budget deficits by bringing in more responsible fiscal management. Qiao et al., (2019) used data from 76 developed and developing economies from 1972-2013 and claimed that FD led to smaller government size. A smaller government size means a lower percentage of government consumption expenditure than its total expenditures. Hence, a higher degree of FD could lead to more responsible spending by democratic governments. The authors argued that political regimes, proxied by their democracy levels, were essential for different decentralisation theories to predict the impact of FD on government size.

Oto-Peralías et al., (2013) showed the impact of corruption on fiscal deficit through FD from 1986 to 2010. They estimated panel and cross-section regression in which fiscal deficit was explained by corruption, expenditure decentralisation, and an interaction variable using the GMM estimator and OLS system. Later, they separated the sample into groups based on corruption. Nmesirionye and Ihendinihu (2016) ascertained the underground economy's determinants and explained the reverse relationship between non-tax and tax growth and factors in UGE in Nigeria. Anwar and Ahmad (2012) conducted a time series analysis to determine the political reasons for Pakistan's persistent budget deficit. They examined the long- and short-run association between budget deficit, cabinet size, and democracy on Pakistan's economy. The result showed a long-run relationship between political variables and budget deficit with a strong indication that budget deficit was exaggerated in large government size while democracy was productive for economic growth. Ivanyna et al., (2016) established a quantitative theory of economic growth and fiscal policy that incorporated tax evasion and corruption. They found that corruption in the market and economy tended towards significant government borrowing. The public debt and corruption interaction term also created endogenous periodic equilibria of debt cycles in low and high values of the corruption index. They also found that public debt increased significantly with tax evasion and corruption as countries with the lowest corruption experienced a slight change in debt levels, and high corruption levels led to higher public debt.

From the above literature analysis, it can be said that FD leads to better fiscal management if it is implemented carefully. Contradiction in literature was developed due to different measures to proxy decentralisation. Overall, studies support better fiscal outcomes if countries are relatively more decentralised.

2.3 Study Hypothesis

To capture the multidimensionality of FD, a composite indicator was developed following Martinez-Vazquez and Timofeev (2010) that included revenue and expenditure decentralisation and examined its impact on fiscal deficit in Pakistan for the period 1988-2020 for the hypothesis that FD (fiscal decentralisation) may lead to a lower fiscal deficit. The primary research question was whether FD increased or decreased the burden of persistent fiscal deficit or not.

3.   METHODOLOGY

Empirical and theoretical literature advocates that FD has a significant effect on public sector management, but derived results are not consistent and are somewhat ambiguous due to different FD measures. To empirically study FD's role, it is essential to develop an effective FD measure incorporating its maximal characteristics. This study developed a multidimensional measure of FD using data from the 'Handbook of Statistics on Pakistan Economy', incorporating FD's adequate degree by making significant adjustments. The

main issue for applied econometric work in the science of fiscal federalism was to derive a perfect measure of FD. Most authors used the IMF's Government Finance Statistics (GFS) yearbook. The IMF's GFS FD parameters do not incorporate its extent of subnational importance and independence (Ebel and Yilmaz 2002). The data set is also incomplete due to missing values.

Developing an effective FD measure that considers all characteristics is vital to studying FD's role empirically. Expenditure Decentralisation (ED) and Revenue Decentralisation (RD) are two subtypes of FD. RD is the ratio of lower-tier government revenues to federal government revenues (Oates 1977).

The following method is used to measure RD:

$$RD= PR \, / \, PR+FR)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots Eq\ 3.1$$

PR stands for Provincial Government revenues, and FR stands for Federal Government revenues. Similarly, ED is the relative proportion of Provincial Government expenditure to national government expenditures (Oates 1977).

$$ED= PE \, / \, (PE+FE)\dots\dots\dots\dots\dots\dots\dots..\dots\dots\dots\dots\dots\dots\dots\dots\dots.....Eq\ 3.2$$

Here PE is provincial expenditures, and FE stands for Federal Government expenditures. After making a few adjustments, Woller and Philips (1998) redefined FD measures.:

$$RD= (PR\ -AID)/ (PR+FR)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.....Eq\ 3.3$$

$$ED= PE \, / \, PE+(FE-SS-DEF)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.....Eq\ 3.4$$

3.1 Construction of Composite Fiscal Decentralisation Measure

According to Martinez-Vazquez and Mcnab (2003), RD and ED are single dimension measures; however, FD is a multidimensional phenomenon. To capture the multidimensionality of FD, a composite indicator was developed by Vazquez and Timofeev (2010). Hence, this study used Equation 3.5 as the main approach to measuring Composite Decentralisation (CD) Index given below:

$$CD= RD \, / \, (1-ED)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..Eq\ 3.5$$

Figure 1 shows the trend of CDI in Pakistan. This represents the combined outcome of both processes. The trend shows that the CD measure ranges from 13 to 40%.
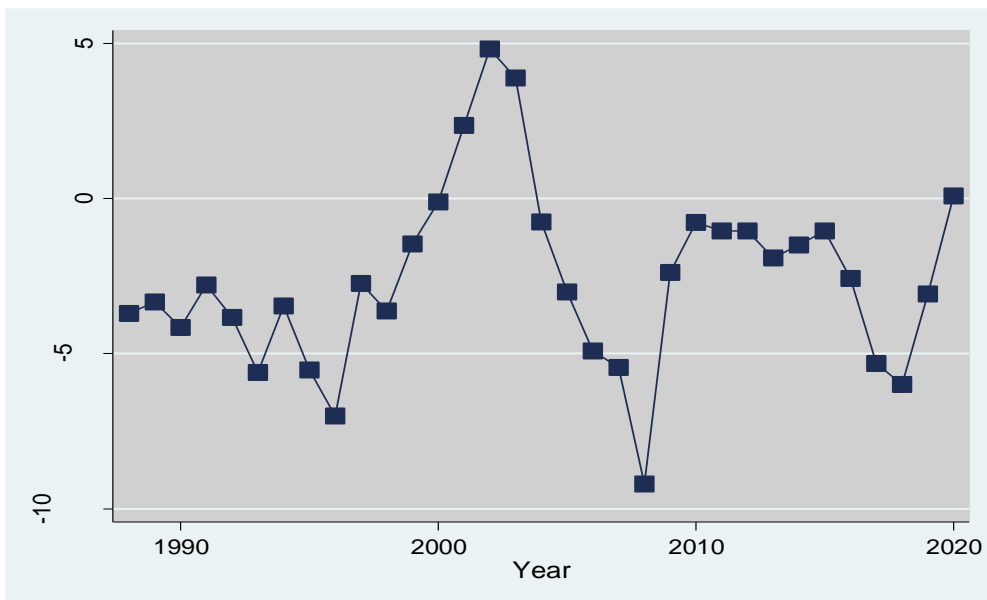
Figure 1: Trend of Composite Decentralisation
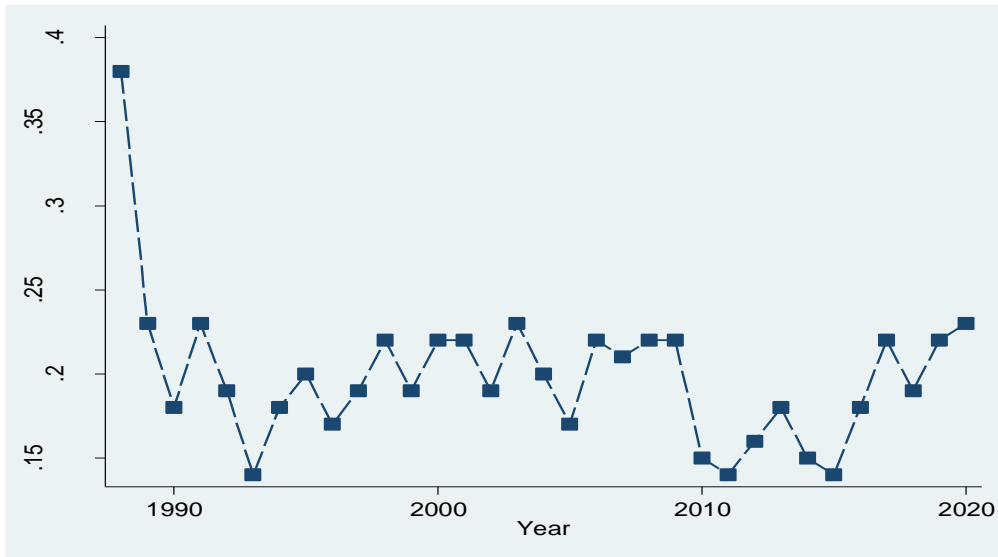
Source: Authors' calculation.

Figure 2 shows the trend of the current account balance over the years in Pakistan. The trend shows that the current account remained positive only in years 2000 to 2004 and remained negative in all other years.

Figure 2: Current Account Balance

Source: Authors' calculation based on various Economic Surveys of Pakistan.

3.2   Variable Justification, Description and Sources of Data

3.2.1 Composite Decentralisation Index (CDI)

CDI was developed by extracting revenue and expenditure figures of the Provincial and Federal Governments from HBS ('Handbook of Statistics on Pakistan Economy 2020',) and a range of yearly reports published by Pakistan's Ministry of Finance, namely, 'Economic Surveys of Pakistan' from 1988-2020. This study used multidimensional measures of FD to capture the combined effect of Revenue and Expenditure Decentralisation in Pakistan, as discussed earlier. This represents the combined outcome of both processes. A higher index value shows higher FD in the economy (Martinez-Vazquez and Timofeev 2010; Oto-Peralías et al., 2013).

3.2.2 Debt-to-GDP Ratio

The dependent variable was the general government deficit over GDP obtained from the 'Economic Surveys' and budgets from 1988 to 2020. This is a true reflection and proxy of the country's fiscal management. If it is in control, it is considered that there is better fiscal management and vice versa. Its higher value means higher debt and consequent poor fiscal management, which are in line with the base studies (Neyapti 2010; Oto-Peralías et al., 2013).

3.2.3 Government Size

Government size (GS) was taken as the ratio of federal consumption expenditure to total federal expenditure, derived from HBS data from 1988-2020. It showed the cabinet size and captured the effect of a large government size on the economy (DiPietro 2008). Its higher ratio shows that government size is more significant and vice versa.

3.2.4 Underground Economy

Data on the underground economy was taken from Medina and Schneider (2019), who used the MIMIC (Multiple Indicators Multiple Causes) model to estimate the size of the underground economy for 157 countries. The higher value of the variable shows a higher underground economy and vice versa.

3.2.5 Corruption Index

This study used the corruption index from the ICRG data set. ICRG (International Country Risk Guide) Researchers Dataset is extensively used to measure governance. ICRG uses three dimensions (political, economic, and financial) to assess risk factors in a country, using 22 sub-indicators to guide investors and analyse potential business risks in each country. This data is available from 1988 till 2020. Corruption is ICRG's control over the Corruption Index within the political system. ICRG Corruption Index is rated on threat to foreign investment, economic and financial environment, government and business efficiency. Six points weight control over corruption. Lower ratings are given high corruption, while higher ratings are given minimal corruption. It is used by Oto-

Peralías et al., (2013) and Neyapti (2010) in their time series analysis of FD, public debt, and corruption.

3.3   Model Specification

The objective of the study was to estimate the effect of Fiscal Decentralisation (FD) on public deficit using time series analysis. To achieve this objective, the following model was formulated:

PDT = f (CDT, Corrupt, GST,GEt)……………………………………………………Eq 3.6

Transforming the above function into the econometric model:

PDt = α0 + β1 CDt+ + β2 Corrpt +β3 GSt + β4 UGEt +εt …………………………Eq 3.7
Where:

PD = Public Deficit as a percentage of GDP

CD = Composite Decentralisation Index

CORR = Control of Corruption

GS = Government Size

UGE = Underground Economy

= Error Term

In the above equation, public deficit was taken as the dependent variable, while CD, CORR, GS UGE were taken as independent variables, while αo was the intercept term. This study used yearly data on Pakistan's economy from 1988 to 2020 to estimate the effect of FD on public deficit.

Before applying time series analysis, the stationarity of the variable and series must be tested. In the case of stationary series, the variance and means are constant. The applied econometrics technique estimates the long-run relationship between variables, assuming that the investigated variables exhibit constant mean and variance properties; their mean and variances are independent of time. However, time series data usually violate this property, as indicated by empirical investigations. Hence F and T-tests applied on models without considering the static properties of the time series data fail to predict accurately.

Unit root tests were used to test the static properties of the series. The test implied that the shock effect would persist forever, while the stationary series implied the shock effect would be reduced as one moved further in the past (Jalil and Idrees 2013). Stationary data implies the shock effect would fade over time, and the data series would return to its equilibrium means value in the long run. Time series analysis has various unit root tests used to test the stationary of a series or data. Phillips Perron (PP) and Augmented Dickey-Fuller (ADF) techniques are the most accurate test to estimate the stationary level of given data. ADF test is the extended version of the Dickey-Fuller test, which incorporates

extra lagged values of dependent variables as explanatory variables used to remove serial correlation in a series.

Further, several cointegration methods extract the long-run cointegrating relationship among the macroeconomic variables. Since the 1980s, cointegration analysis has been considered the most innovative process in Econometrics. Cointegration gives long-run relations between variables that individually drift upward and downward over time. This trend of typical drift tends to establish a long-run relationship between variables (Gillani et al., 2009). Paul Newbold and Clive Granger introduced the concept of spurious regression published in 1987. Later on, Nobel laureates Robert Engle and Clive Granger (1987) presented the concept of cointegration. Before this, in order to track relationships among multiple longitudinal processes, economists widely used linear regression instead. Granger and Newbold highlighted the weakness of linear regression that the chances of generating a spurious correlation cannot be avoided, which proved the use of linear regression for such particular scenarios erroneous. A spurious correlation indicates an unknown third factor or a mere coincidence causing a casual association among two or more variables of interest. This may generate a misleading statistical output depicting a non-real relationship among multiple time series variables.

In published research during the late '80s, Engle and Granger (1987) formalised the approach of cointegrating vectors. Their findings unearthed that in the long run, non-stationary time series variables will depict certain cointegration as they cannot go far from the equilibrium. Thus, both of these economists argued that using linear regression in aforementioned scenario was not suitable, and for non-stationary longitudinal data, they instead suggested checking for cointegration. The Engle-Granger two-step approach initially creates residuals while applying static regression and then tests such residual outputs to identify the existence of unit roots. While checking for stationarity units for longitudinal data, the approach incorporates the Augmented Dickey-Fuller Test (ADF) or other tests. If such longitudinal variables are cointegrated, the Engle-Granger approach is supposed to reflect the stationarity of the residuals. Similarly, the Johansen test also examines cointegration among multiple non-stationary longitudinal data. However, in contrast to Engle-Granger, the Johansen test is convenient for multiple cointegrating relationships at a time. Applying this test to identify the cointegration of multiple longitudinal data sets helps avoid the problems that may appear while carrying forward errors to the next step. Researchers, thus, suggest that the limitation of sample size should be considered before applying such a method as a larger sample size tends to provide more reliable results.

Johansen's cointegration technique depends on order integration, which states that if the variables are integrated of order I (1), one can expect the existence of cointegration between them. Engel and Granger's proposed Error Correction Method (ECM) is an

appropriate method to find the adjustment process of disequilibria. The technique employs that the short run is subject to error but may not occur in the long run.

4.   RESULTS AND DISCUSSION

The unit root and Johansen cointegration test outcomes are given in this part. Johansen cointegration is applied to find out the number of cointegrated equations, long-run results, and ECM, and the results are reported below. The stationarity of the data and series is checked through Unit Root Tests. PP and ADF are the most popular tests developed by Phillips and Perron (1988) and Dickey and Fuller (1979), respectively. The outcomes of the ADF tests are presented in Appendix A1. Derived outcomes demonstrate that the Budget/Public Deficit (BD/PD), Composite Decentralisation (CD), Government Size (GS), Underground Economy (UGE), and control over corruption are integrated into order (1). Similarly, the PP unit root outcomes shown in Appendix A3 also depict that BD, CD, GS, UGE, and corruption are integrated of order (1).

Since data were integrated of order (1), the authors first differenced all the series to make them stationary. Due to the order of integration, the study employed the Johansen integration technique to estimate the long-run relationship between the variables of interest. The lag length of the series was selected using the AIC, FPE, and SC that suggested a minimum of two lags for cointegration analysis.

Five variables (BD, CD, CORR, GS, and UGE) need to be checked for long-run association or cointegration among them. The following two hypotheses were tested in Appendix A5 and Appendix A6.

First Null Hypothesis: H0: No Cointegration among the variables.
Second Null Hypothesis: H0: There is at least one co-integrated equation.

The Trace and Eigen Statistics that at least one cointegrated equation or long association exists in the model. Max Trace Statistics endorses the same results in Appendix A6.

Table 2 shows the long-run relationship between public deficit and a set of independent variables (CD, CORR, UGE, GS) over time in Pakistan. The results illustrate that composite decentralisation negatively affects public deficit, and the coefficient is significant at one percent. The coefficient of CD indicates that in the long run, one point rise in CD leads towards a 0.53 point reduction in public deficit in Pakistan. The results are consistent with the findings of various studies (Baskaran 2010; Neyapati 2010; Oto-Peralías et al., 2013). [1]

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[1] For details, see Medina and Schneider (2019) and the MIMIC dataset: <sementicscholar.org>.

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Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
CORR	33	1.99	0.32	1.50	3.00
UGE	33	34.25	2.96	30.10	39.30
CD	33	0.20	0.04	0.14	0.38
PD	33	-2.61	2.92	-9.20	4.82

Source: Authors' calculations.

Table 2: Long Run Results

Variables	Cointegration Results		
	Coefficient	SE	T Value
Composite Decentralisation (CD)	-0.53	0.05	-10.60***
Control over Corruption (CORR)	-2.39	0.06	-39.83***
Underground Economy (UGE)	0.29	0.07	4.14**
Size of Government (GS)	1.02	0.08	12.75***
ECM	-0.62	0.30	-2.07**
R2	0.90		
Adj. R2	0.80		
F Test	9.40**		

Source: Authors' calculations.
Note: (***) and (**) stands for significance at 1% and 5% level.

The coefficient of CORR was negative, revealing that high corruption significantly enhances budget deficit by higher intensity as it jeopardises the government's fiscal position in many ways. The magnitude of the control coefficient over corruption was relatively higher, which states that a one-point improvement in CORR curtailed public deficit by 2.39 points. Literature also endorsed the same as Kaufman (2010) found that corruption was strongly related to public deficit. Outcomes of his analysis derived that 1% reduction in corruption led to a significant reduction in fiscal deficit by 3.5 percentage points. Similar findings were also noted by Ivanyna et al., (2016), who explored that corruption increased public debt significantly in their study on corruption and public debt. Kaufman (2010) also found corruption promoted tax evasion and reduced tax collection. Resultantly, the budget is compensated by high-cost borrowing. Institutions become weak in the long run due to corruption in politics and the economy.

The coefficient of the UGE was positive and significant, which describes that a high percentage of the UGE increases the size of the budget by higher intensity as it not only retards government tax collection but also damages the country's image. The coefficient

of UGE was 0.29, which states that a one-point rise in UGE pushes the public deficit by 0.29 points endorsed by Kemal (2010). He also noted that Pakistan's budget might have been in surplus for many years (i.e., 1995-97 and 2000-2005) if tax evasion did not exist. The size of the government also affects public deficit positively and significantly. The coefficient showed that a one-point increase in the index of government size increased public deficit by 1.02 points.

There is theoretical plausibility as the signs of all coefficients of independent variables were significant and consistent with theory. Due to the use of single-dimensional and inappropriate measures of FD, inconclusive results were found, but this study endorses that FD leads to lower budget deficits. The coefficient value of ECM was also negative and significant at the 1% level, which confirmed the speed of convergence towards long-run equilibrium in case of any shock or dis-equilibrium in the short-run. The coefficient values disclosed that any deviation from the long-run path is adjusted by 62%. Both the R-squared and F Statistics confirmed overall significance of the model.

The authors ran post estimations to test the validity of the regression estimates - the Lagrange-multiplier test with a null hypothesis of no autocorrelation in residuals. The test statistics had a value of 3.0234 with a p-value of 0.203, accepting the null hypothesis. The model did not suffer from the issue of autocorrelation. Furthermore, the authors tested the normality of disturbance through the VECNORM command in Stata. The programme tests the normality of errors through Jarque-Berra, skewness, and Kurtosis test. All three tests confirmed that errors were normally distributed, thereby endorsing the validity of the study's estimation approach.

The results are also consistent with the findings of Neyapti (2010). The study explored that consumption expenditure and lower fractionalisation had an inverse relationship with public deficit. Similarly, Zhang (1997) also found that economic growth was significantly affected by the resource distribution structure between the local and central governments in the post-1970s reform period. They produced results in light of the argument that decentralisation of fiscal spending positively affected economic growth at the local level instead of at the national level. Likewise, Li et al., (2021) explored the asymmetric fiscal decentralisation effect on two facets, economic growth and environmental quality, in the context of Pakistan.

Several arguments from existing literature may be presented to endorse the study findings, i.e., the impact of FD on fiscal deficit. For example, FD is considered a vital policy feature of all economic reform programmes for the following reasons:

1. Since local governments have better knowledge of local preferences and their provisions better match local preferences, expenditure decentralisation enhances economic efficiency (Samuelson 1954; Oates 1972).

2. FD also boosts transparency and accountability in service delivery (De Mello 2004).
3. If local accountability exists, taxpayers cooperate more with local governments (Wasylenko 2001).

5. CONCLUSION

Fiscal Decentralisation improves efficiency and provides economic benefits as sub-national/local governments are more aware of people's preferences and their revenue power to provide needed public goods. Additionally, it increases competition among local governments for preventive tax control and maximising service delivery. Transferring authority to local governments leads to accountability and encourages citizens to participate and give input on the most required infrastructure. Moreover, citizens can closely monitor the transparency of financing the services.

The study developed a Composite Decentralisation Index to test the impact of FD on the budget deficit in Pakistan over the period 1988-2020. It found that composite decentralisation (CD) significantly reduced public deficit. Inconclusive results in the literature were found due to the use of different single dimension measures of FD. This study developed a multidimensional index of FD that incorporated both the effect of ED and RD (Martinez-Vazquez 2011). FD was found to significantly reduce budget deficit of Pakistan. The authors also found that public deficit was reduced by restricting government size, corruption, and the underground economy.

Persistent fiscal deficit is a growing problem in Pakistan. The tax-to-GDP ratio is low due to tax evasion and an informal economy. Low tax revenue tends toward a heavy budget deficit which ultimately compels the government to arrange loans from International Financial Institutions (IFIs) at a heavy cost (Kemal 2010). This grave landscape of fiscal deficit in Pakistan calls for urgent policy intervention to improve the situation. In this context, the findings highlight the importance of fiscal decentralisation in reducing the country's budget deficits as a viable option. However, Tanzi (2001) suggests that the effectiveness of the allocative efficiency of resources through FD may depend on several other country-level factors, such as size of the country; extent of privatisation in the economy; ability of local governments to raise revenue; transparency and local administrative and institutional capacity. Von Braun and Grote (2002) have also tested the factors empirically.

Therefore, policy design to reduce the fiscal deficit in Pakistan through the channel of fiscal decentralisation must integrate these factors into the agenda to get potential benefits from the intervention. The authors suggest that a 'Composite Fiscal Decentralisation Strategy' should be adopted where expenditure and revenue decentralisation are targeted. Also, there must be an effort to enhance the institutional capacity of provincial

institutions to reduce tax evasion and corruption. An independent and transparent bureau is necessary to restrict economic and political corruption. Furthermore, the government should take steps to formalise the underground economy.

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APPENDICES

Appendix A

A1: Results of ADF Test with Intercept

Variables	ADF Test Statistics @ Level	Critical Value @ 5%	ADF Difference
Budget Deficit	-2.08	-2.97	-7.34*
Composite Decentralisation	-2.13	-2.97	-5.31*
Size of the Government	-1.32	-2.98	-4.10*
Underground Economy	-1.15	-2.97	-5.71*
Control Over Corruption	-2.33	-2.98	-5.392*

Note: *Test statistics are higher than the critical value @ 5%.

A2: Results of ADF Test with Trend and Intercept

Variables	ADF Test Statistics @ Level	Critical Value @ 5%	ADF Difference
Budget Deficit	-2.58	-3.58	-7.26*
Composite Decentralisation	-3.80	-4.34	-5.30*
Size of Government	-1.71	-3.60	-3.67*
Underground Economy	-2.31	-3.58	-5.63*
Control Over Corruption	-2.24	-3.59	-5.12*

Note: *Test statistics are higher than the critical value @ 5%.

A3: PP Unit Root Test

Variables	PP Test Statistics @ Level	Critical Value @ 5%	PP Difference*
Budget Deficit	-2.05	-2.97	-7.36
Composite Decentralisation	-2.11	-2.97	-5.37
Size of Government	-1.39	-2.98	-6.94
Underground Economy	-1.15	-2.97	-5.71
Control Over Corruption	-3.22	-3.58	-5.11

Note: *Test statistics are higher than the critical value @ 5%.

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A4: Lag Selection Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-92.06	NA	0.01	8.09	8.34	8.15
1	-28.69	95.06*	9.66	4.89	6.36	5.28
2	51.58	35.80	2.92*	2.37*	6.29*	3.41
3	-2.13	28.77	0.01	4.77	7.46	5.47*

Note: * indicates lag order selected by the criterion, 'LR: sequentially 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.'

A5: Unrestricted Co-integration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.81	82.61	69.82	0.003
At most 1	0.54	41.28	47.86	0.179
At most 2	0.46	21.72	29.80	0.314
At most 3	0.17	6.31	15.49	0.659
At most 4	0.06	1.64	3.84	0.200

Note: Trace test indicates 1 cointegrating eqn(s) at the 0.05 level.
* denotes rejection of the hypothesis at the 0.05 level.

A6: Unrestricted Co-integration Rank Test (Max Eigen Value)

Hypothesised No. of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.81	41.33	33.88	0.005
At most 1	0.54	19.57	27.58	0.371
At most 2	0.46	15.41	21.13	0.261
At most 3	0.17	4.67	14.26	0.782
At most 4	0.06	1.64	3.84	0.200

Note: Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level,
* denotes rejection of the hypothesis at the 0.05 level.