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ROLES OF EQUALIZATION POLICIES TOWARDS THE REDUCTION OF REGIONAL DISPARITIES: A REALITY CHECK APPROACH OF ECONOMIC DEVELOPMENT, CASE OF PAKISTAN

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ARTICLEINFO	ABSTRACT
	Using a province-level panel dataset from 1990-2015, this paper determines the effect of fiscal decentralization (FD) and equalization efforts on the regional disparities (RD) in Pakistan. However, the FD provides substantial benefits about public efficiency; a significant large shortcoming is that it may increase in Regional disparities. This study develops hypotheses and empirically determines that FD, measured from revenue and expenditure side, leads to larger RD at the provincial level. Whereas, fiscal equalization efforts tend to alleviate the unfavorable outcomes of decentralization. This research is an attempt to examine and provide enough support for the potential cost associated with using FD as a part of the growth strategy, which is a step forward toward economic development. © 2019 INT TRANS J ENG MANAG SCI TECH.

1. INTRODUCTION

The role of decentralization in reducing regional disparities gains a lot of attention in the academic literature. Reducing regional inequalities is the key points in the Sustainable advancement goals 2030. The ongoing discussion revolves around the argument that public sector efficiency is enhancing through decentralization (Oates, 1972), but can prostrate inter-jurisdictional redistribution, increasing regional inequality (Prud'Homme, 1995). Consequently, a divergence between redistribution and efficiency may come up with decentralization. In most of the countries, this is a crucial problem, as there is an inclusive trend in public segment decentralization (Watts, 2008).

The long-standing questions of decentralization that, whether it is beneficial to transfer authorities and autonomy to sub-national governments or it is better to decide by the central government? The principal argument that increasing competition between the sub-national jurisdictions will direct to more efficient provision of public goods and in return, it will promote economic growth. Conversely, opponents of such types of government transfers, (Sinn & Cnossen, 2003) criticize the decentralization mechanism by allocation and redistribution of resources. Poor regions are not able to compete with richer regions, and it would result in that poor regions are getting poorer, and rich regions are getting richer (Prud'Homme, 1995). Finally, it looks like a clash of goals arises between economic performance and regional inequality, considering the case of Pakistan, which has high province-specific disparities.

Our analysis based on two key questions. First, does fiscal decentralization leads towards greater regional inequality? However, decentralization, is viewed, as increases growth and efficiency of an economy, in which local governments are empowered, and diverse preferences of constituents are satisfied, its inference for the progression of regional disparities is still in the vigorous inquiry. Earlier literature, using a sample of cross-country data, finds positive relationship of FD in reducing regional inequality (Lessmann, 2009; Shankar & Shah, 2003). Some recent studies conclude that regional inequality and decentralization relationship depends on diverse conditions, for instance, the country's level of development and the existence of a strong fiscal redistribution system (LeÃŸmann & Seidel, 2015; Lessmann, 2012; Rodríguez-Pose & Gill, 2005). Second, what is the role of fiscal equalization policies followed by the provincial government in balancing the effect of FD in reducing regional disparities? As an essential policy of decentralization reform in Pakistan is the establishment of NFC awards under the 18th constitutional amendment and expanded over the years to improve regional disparities.

Using provincial-level data from 1990-2015, this study adds to the literature in many ways. First, by using panel data analysis, the authors explore the impact of fiscal decentralization policies on inequality at the provincial level in Pakistan. Generally, most of the research focused on the general scopes of disparities at the country level. Only a little amount of studies in Pakistan have tested province-based inequalities (Raza & Hina, 2016; Shahzad & Yasmin, 2016). But these studies do not focus on the institutional arrangement that provides the base for FE efforts. Moreover, none of the studies have seen the impact of fiscal decentralization and fiscal equalization together through interaction, both measured at the provincial level, on regional inequality in the context of Pakistan. Further explorations targeting the same type of inequality, however, are fundamental because provincial inequality captures most of the regional inequality in a country (Cheong & Wu, 2013; Tsui, 1993). Therefore, a better understanding of inequality and it's determinants at provincial level play an important role in shaping policies for practitioners to cope with regional inequality in Pakistan.

Second, the study will explicitly investigate the role of provincial fiscal equalization determinations in minimizing the impact of fiscal decentralization on regional disparities. The ease of access of fiscal funds and the options of regional level governments, and in this case it means generally provincial authorities, can have a significant role in shaping the pragmatic results within the provinces. An essential component of this discussion is the sources of revenue used by provincial

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governments to finance local expenditures. Two main sources of revenue for the provincial government are (1) the own resources of the provincial government and (2) transfers from the federal government. Own resources (for instance, services fee and local taxation) give a strong incentive to the provincial government to enhance the tax shield, which increases regional growth/output but not essentially convergence. Transfers tend to balance the fiscal capacity of regions, hence permitting general standards of public goods across the country, however, give little incentive for casing regions to become equal with the frontier – mainly if the federal government captures the gains in terms of the improved tax base.

Third, using the instrumental approach the authors report the endogeneity issue for equalization efforts and fiscal decentralization. Since it is mentioned by Martinez-Vazquezetal (2015), a critical and unsettled problem in existing enormous literature of FD is about the failure to solve the problem of endogeneity. Finally, the study will see whether the results set off the literature by taking support from Pakistan for the given argument (mentioned above) that the regional disparities and decentralization relation depends on diverse situations, for instance, the country's level of development and the existence of a strong fiscal distribution system. Specifically, in Pakistan, fiscal decentralization possibly will cause larger provincial disparities, while valuable fiscal equalization efforts may have a propensity in alleviating the unfavorable effect of fiscal decentralization on regional disparities.

The paper is systematized as Section 2 labels the theoretical framework and the existing empirical evidence on the relationship between FD and regional disparities; next, Section 3 provides a discussion of the methodology used in the measurement of regional inequality and FD. Section 4 discuss and elaborate on the empirical results of the study. Section 5 discusses the robust analysis, and section 6 will simultaneously belong to the conclusion and policy recommendation part.

2. REVIEW OF LITERATURE AND THEORETICAL FRAMEWORK

In the classic framework of Tiebout (1956), decentralization is beneficial because public goods preferences are discovered through inter-jurisdictional taxonomy, and standardized local taxes are in benefit since choices within the given domain are consistent. Few researchers are of the view that the Tiebout underlying principle for decentralization is not valid in the case of developing countries because of the restrictions of mobility. Though this ideology does not dependent on mobility, and although mobility could increase the potential benefits associated with decentralization, there are still possible gains, even if the mobility does not exist. As long as cost functions and preference for the provisions of the public goods fluctuate across different jurisdictions, the regional practitioners or policymakers have a (comparative) informational edge over the central policymakers. Kuznets (1955) has given the inverted U-shape theory. This theory states that an increase in the economic growth of a country firstly increases regional disparities, and afterward, it will decrease. Williamson (1965) empirically proves it twice by taking cross-sectional data of 24 samples of countries and time series data using 10 samples of countries. Data sets of both samples prove the hypothesis of inverted U-shape, i.e., the regions have a propensity to grow disparities at the start but will decrease following the period with the development process. Generally, developed countries had a more autonomous

fiscal structure of Sub-national governments, whereas in developing economies lower tiers of governments have less self-sufficiency in fiscal matters (Bahl and Cyan 2011).

2.1 ASSOCIATION OF FISCAL DECENTRALIZATION WITH REGIONAL DISPARITIES

The linkage between regional disparities and decentralization (Gbohoui et al., 2019; Rodríguez-Pose & Ezcurra, 2010) can be observed from both sides. On one side, decentralization decreasing the regional disparities because of more efficiency, greater transparency, and equalization (Ezcurra, 2019). Most studies mention that decentralization is related to a wide-ranging decrease in regional disparities (Boadway & Eyraud, 2018; Rodríguez-Pose & Gill, 2005; Shankar & Shah, 2003).

Additionally, positive results often come from country-specific case studies, for instance, the studies of (Hill, 2008) in Indonesia, and (Qiao et al., 2008) for China are the real-time existing examples. (Lessmann, 2012) mentions that the association between disparities and decentralization depends on different situations like the wealth of the nation, the aspects of its presented disparities, and the existence of sound systems of fiscal redistribution. Using an exclusive 54 countries dataset (Lessmann, 2012) mentions that decentralization minimizes regional inequalities on the whole, but this impact is associated with economic level development. On the other side, regional convergence promotes through decentralization (both fiscal and political) in developed countries, while it may increase regional inequalities in emerging and developing countries. (Kyriacou, et al., 2015) describes that government quality mediates between regional inequality and decentralization. Indeed, they take the data of 24 OECD countries for empirical evidence from 1984 to 2006, and their findings support the fact that decentralization stimulates regional convergence in good governmental setups and increase regional disparities in countries having poor governance. For better use of resources for growth, incentives are used to operate FD, which there should be higher capacity in covering regions than the regions which are already at the efficient frontier(Rodríguez-Pose & Ezcurra, 2010). Furthermore, through this system, FD can fasten a righteous process of regional convergence (Gbohoui et al., 2019).

Decentralization may increase regional disparities, possibly for the two main reasons. First, FD may increase the diversity in socioeconomic endowment and institutional capabilities across provinces (X. Zhang, 2006). Second, decentralization may reduce the influence of under-developed areas to allocate financial resources across the provinces (Feld et al., 2018; Rodríguez-Pose & Gill, 2005). Skeptics of FD mention that only developed countries can take advantage of FD, hence growing regional disparities. Especially, the recreational area is considered irregular with important distinctions in institutional capacity (competency of local administration and financial capacity) and socioeconomic endowments (Rodríguez-Pose & Gill, 2005). Moreover, mobile factors of production and their competition are expected to direct "race to the bottom" with inadequately lower rates of tax, hence intensifying the issues of less well-endowed regions (Wilson, 2015). Lastly, yet if tax competition tends to an efficient provision of resources, as the voting-with-your-feet model of Tiebout (1956), regional disparities may arise.

2.2 INSTITUTIONAL BACKGROUND OF PAKISTAN

Pakistan has rigorous restrictions on state capacity, both in delivering public welfare services and

raising revenue. Fiscal federalism and its structure are integral for better functioning of the economic performance, public sector & welfare of Pakistan. A federal government structure exists in Pakistan, where resources are divided among the provinces, and it directly affects the income and living standards of common people. In Pakistan, the necessity for transfer to provinces is tinted with the fact that provinces contribute only 8% in total revenues while they have a 28% share in the spending. Moreover, Provinces have varied fiscal capacity, where comparatively developed units/provinces are generating higher resources than others. Whereas, transfers are allocated according to the National Finance Commission (NFC) awards with a motive to minimize horizontal and vertical imbalances of expenditure and revenues. The NFC awards are one of the steps towards decentralization (Mustafa, 2011), which creates a mechanism for distribution of funds from federal to Provinces Finance Commission (PFC), and from PFC to district level. The announcement of 7th NFC award taken as an optimistic gesture and makes the federation strengthen, it also realizes to people that state is equally caring for the development of all provinces (Mustafa, 2011). This mechanism has been modified in the 7th NFC Award of 2009, based on numerous factors criteria of population, inverse population density (IPD), poverty/ backwardness, and revenue generation/ collection. Moreover, the 18th constitutional modification has played the role of the bridge to minimize the gap between provincial and federal disparities. In this amendment the provinces are more autonomous and decentralization process is more strengthened in Pakistan at this time.

2.3 THEORETICAL FRAMEWORK

The discussion on the association between fiscal decentralization and regional disparities goes back to the work of (Oates, 1972), who validate the strategy of decentralization as a mean of attaining economic effectiveness. With this supposition that public representatives react according to the wishes of their citizens, provincial administrations in the devolved economy are more capable of matching contrary preferences across jurisdictions. Though, improved efficiency in a decentralized context is among the generally established aims that lead the government programs. Numerous opinions are vital here. (Prud'Homme, 1995)in his study states that decentralization makes the federal government weaker in terms of budgetary powers, thus decreasing the extent to reallocate resources from wealthier to poorer regions. Simultaneously, decentralization often engages in fiscal competition, probably at the expense of deprived regions. As (Oates, 1972) mentioned that, regional governments have no appropriate system of redistribution. To balance the individuals and regions if regional governments increase the taxes, such phenomenon is not possible to go well, because the movement of mobile elements is very easy from one jurisdiction to another (Pauly, 1973). Thus, if the motive of the government is to balance the living standards of the areas, the transfer system should be applied nationwide (Musgrave, 1959). Decentralization could be the direct cause of regional inequality. In Tiebout (1956) agenda, decentralization entails that local goods facility is divided because of the changing inclinations of a diverse group of population. Hence, "there is a pressure between chasing goals of equality in greater decentralization and choice and service provision" (Besley & Ghatak, 2003).

From the arguments presented above, this study develops the following hypothesis:

Hypothesis 1: There is a positive association between Fiscal decentralization and regional disparities at the provincial-level in Pakistan.

The arguments presented above shows important impending into the effect of FD on regional disparities. Though, the discussion relies mainly on the supposition of the lack of essential complementary programs under decentralized structures. However, the net effect of FE in determining the FD cannot be ignored, and therefore, an additional, comprehensive study of the fiscal decentralization requires to be considered. The type of equalization policy executed is expected to reduce the possible harmful consequences of fiscal decentralization on disparities. After the decentralization theorem, Regional authorities can offer better and efficient quality and quantity of domestic public goods, as regional authorities know better about domestic needs (Oates, 1972). Based on these arguments, (Rodríguez-Pose & Ezcurra, 2009)confer an illustration of how decentralization influences less-developed and developed areas of a country in a different way. The purpose of regional governments is to organize local resources to uphold productive efficiency; however, the endogenous capacity of resources is different among the regions. Decentralization provides regional governments with the chance to chase economic development procedures because they better know the relative strengths and weaknesses of their localities than the federal governments. Equalization systems aim to divide and redistribute the transfers to provinces in such a way that inversely associates with their capabilities. To alleviate the negative effects of decentralization, the scope of competition between poor and rich areas needs to decrease. (Yongzheng Liu, 2014).

These arguments provide reasoning for the second hypothesis

Hypothesis 2: The Positive effect of fiscal decentralization will be mitigated by the Fiscal equalization reforms on increasing regional disparities

3. ECONOMETRIC TECHNIQUE, VARIABLES, AND DATA

3.1 ECONOMETRIC MODELING

This section discussed the econometric strategy to test hypotheses 1 and 2. Following (Roodman., 2009a, 2009b) we have estimated a two-way fixed effect in the following form. In this case, T is large and N is small, thus dynamic panel bias becomes insignificant, and fixed effect estimation becomes more suitable. For now, with large T, system GMM and total instruments likely to explode. With small N, Arellano–Bond autocorrelation test and cluster robust standard error will not be reliable. So to assess empirically in determining the effect of FD on regional disparities, we have estimated a two-way fixed effect in the following form,

$$RD_{it} = \alpha_i + \beta_1 FD_{it} + \beta_2 EQ_{it} + \beta_3 (FD * EQ)_{it} + \beta_4 X_{it} + \eta_i + \upsilon_t + \varepsilon_{it} \qquad (1)$$

In Equation (1), t characterizes year and i symbolizes provinces. We have taken RD_{it} as a measure for regional disparities in the economic development level taking the provincial level data; FD_{it} indicates fiscal decentralization in the province; EQ_{it} denotes the level of FE by the subnational and central government and $FD_{it} * EQ_{it}$ is the interaction term between FE and FD.

Based on Hypotheses 1 and 2, we would anticipate a positive sign for β_1 and would anticipate a negative sign for β_3. Additionally, the Econometric model presented above contains provincial dummies (η_i) in order to direct heterogeneity across the given provinces and to control the year effect

we use year dummies (v_t) that affect provinces; ε_{it} denotes a stochastic error term. X_{it}denotes the control variables in the model that includes the wide-ranging factors of significance in shaping regional disparities on the basis of the existing empirical literature. Various factors including GDP per capita, urbanization, trade openness, and unemployment rate, have been recognized as essential in elaborating on the regional disparities in Pakistan. Per capita GDP denotes the economic development at the provincial level. The literature proposes that the level of economic development has a substantial effect on spatial disparities. However, it is still unclear. The research of economic growth from the new geography is associated with economies with lead towards spatial inequality (Fujita & Thisse, 2002; Krugman, 1998). On another side, it is also proposed that economic progression might provide the areas with a large choice for redistributive political affairs besides intergovernmental transfers and grants (Lessmann, 2009). The Urban-rural gap has firmly explained a greater part of regional disparities (Kanbur & Zhang, 1999; Sicular et al., 2007; Tsui, 1993), which, is predominately embedded in the institutional bequests which offered increase to an influenced social and economic plan of the urban regions. Thus, the level of urbanization is designed as the ratio of the urban population in the country's total population. The urban-rural gap is anticipated to decrease the level of regional inequality at the provincial level (Sicular et al., 2007; Tsui, 1993). But in the less developed country like Pakistan where the larger population is living in rural areas, the policy of urbanization may not be the last resort, and the provincial government should focus on the development within rural areas. The tariff rate is used as a proxy for the openness of the provincial economy. The traditional method i-e share of trade in the total GDP is not used because of two potential reasons. One reason is data constraints, and another reason is that in many cases, the trade ratio is perfectly collinear with FD measurements. To avoid spurious outcomes, we used a proxy as tariff revenue divide by total imports (Song, 2013). The unemployment rate is an important economic indicator, and it increases the regional inequalities in developing countries (Berger et al., 2018; Deyshappriya, 2017). An increase in the rate of unemployment denotes that an economy is not utilizing its resources properly. This, in turn, shows that the economy is not operational, and there is a chance of economic growth only if the existing resources are utilized effectively and efficiently(Jäntti & Jenkins, 2001).

3.2 MEASUREMENT OF VARIABLES

This section will provide a detailed measurement of the key variables used in the paper.

3.2.1 REGIONAL DISPARITIES

The dependent variable is regional disparities; coefficient of variation (cov) of GDP per capita (GDPpc) is used as a measure of regional disparities, which is calculated following the literature (Hoshino, 2011; Lessmann, 2009). The criteria are that it satisfies the principle of Pigou-Dalton transfers (Cowell, 2011; Dalton, 1920; Pigou, 1912). The population-weighted coefficient will be used to check the robustness (Song, 2013).

$$\text{cov} = \frac{1}{y}\left[\frac{1}{n}\sum_{i=1}^{n}(\bar{y} - y_i)^2\right]^{1/2} \qquad (2)$$

In Equation (2), $\bar{y}$ denotes the average level per capita income at the national level,y_i denotes

income per capita of the province, and n is the total provinces in Pakistan.

3.2.2 INDICATORS OF FISCAL DECENTRALIZATION

Following the first hypothesis, our independent variable will be FD measured through revenue decentralization, expenditure decentralization. According to many authors, FD is a complex phenomenon that cannot be measured with a single variable (Martinez-Vazquez & Timofeev, 2010). So multiple dimensions will be used following the literature (Y Liu et al., 2013). The degree of FD is measured using both revenue and expenditure decentralization. Provincial-level measurement of FD much better fits in this framework, as we are interested in explaining the provincial disparities in the economic development level (Weingast & Pöschl, 2013), specifically, extending and following (Wu & Wang, 2013). Although most of the quantitative studies in Pakistan suing the FD and equalization concept have relied on data at the central level and times series data (Raza & Hina, 2016; Shahzad & Yasmin, 2016), we have utilized provincial and panel data to measure fiscal decentralization. This is more accurate because provincial authorizes in Pakistan enjoy more or less full freedom in designing their policies within their jurisdiction.

3.2.3 LEVEL OF EQUALIZATION EFFORTS

Equalization effort reflects the degree of transformation in the allocation of resources from central to provincial and from provincial to local governments, both with and without the existence of transfers from central authorities and then at the provincial level. Following the concept from(Martinez-Vazquez & Timofeev, 2008), FE at the provincial level is measured as the change in the percentage of provincial disparities, taking the before and after fiscal revenue, after receiving the total equalization transfers acknowledged by the provincial authorities. We would calculate the FE of the provincial government as follows

$$\text{Fiscal Equalization} = \frac{F_{it}^b - F_{it}^a}{F_{it}^b} \qquad (3)$$

where F_{it}^b is the coefficient of variation (population-weighted) of own-source revenue for year t in province i based on provincial-level data; F_{it}^a it is the coefficient of variation (population-weighted) of total revenue by taking into consideration the equalization transfers received by provincial governments for year t in province i.   (Total revenue=equalization transfers + own source revenue).

The difference of dispersion shown by the negative (positive) sign in the numerator of the equation suggests the introduction of fiscal transfers from the central government to provincial government increases (decreases) revenue disparities at the provincial level. As the fiscal transfers flow from central to the provincial government is the discretion of central authorities in Pakistan which is applicable through NFC awards, a greater value of EQ_{it}, therefore, designates greater equalization efforts followed by the federal government. A formula-driven method is used for the equalization transfer program in Pakistan with a clear motive to balance these fiscal resources within and across the provinces.

3.3 DATA

We use the panel data set for quantitative analysis covering four provinces (a federal state of has four provinces) of Pakistan from 1990-2015. The time period of data is selected from 1990-2015

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because of two reasons (1) the data aims to cover the fiscal equalization plan under NFC awards 1990, 2006 and the most recent one is 2009. Moreover, the data is online variable on the websites of Pakistan bureau of statistics and Ministry of Finance up to 2015, and 2015 is the last year that fiscal data at the provincial level is released.

In this study, we specifically focused on four provinces of the federation of Pakistan because the limitations of the data availability do not allow us to extend the scope of research. Data used for the calculation of main variables are taken from Statistical Yearbooks of Pakistan published by Pakistan Bureau of Statistics, Economic survey of Pakistan from Ministry of Finance and Public Finance data from State Bank of Pakistan. The Provincial Gross Domestic Product (PGDP) were calculated for the first time by Dr. Kaiser Bengali (Bengali & Sadaqat, 2006), the PGDP estimation and its provincial figures are available for 1972-2000. By following the same estimation methodology for the estimation of PGDP Shaheen Malik (Research Analyst at unit SASEP) for World Bank estimated the PGDP from 1999-2015. Price indices data for provinces is not available in Pakistan, so GDP deflator is used as an alternative method. The year 2005-06 is taken as a base year for the calculation of GDP deflator and nominal GDP to real GDP ratio is used as a proxy (The most recent national GDP is available at the base year of 2005-06). Table 1 in the supplementary materials shows the sources and description of the variables used, while Table 1 in the main text shows their summary statistics.

4. ECONOMETRIC RESULTS

4.1 BASELINE MODEL

Table 2 shows the results for the basic model presented. All the empirical results presented here are reported after correcting the robust standard errors and with the use of the two-way fixed model. R-squared for each specification of the model is given in Table 2 around 0.90, which explains that 90% of the variation in the regional disparities is explained the baseline model. Beginning with the baseline results, we estimate the impact of FD on regional disparities along with the main controlling variables. Column (a) represents the corresponding results using the revenue decentralization as a main variable and column (b) represents the corresponding results using the expenditure decentralization as the main variable. The empirical results presented in the column (a) show the positive and significant value of the coefficient of revenue decentralization supporting our first hypothesis showing an increase in the FD increases regional disparities. The interaction term between revenue decentralization and FE shows the negative value of the coefficient, which supports our second hypothesis that an introduction of FE with FD helps in reducing regional disparities and achieving sustainable economic development. Column (b) shows the positive and significant value of the coefficient of expenditure again supporting our first hypothesis showing an increase in the FD increases regional disparities. The interaction term between expenditure decentralization and FE shows the negative value of the coefficient, which supports our second hypothesis that an introduction of FE with FD helps in reducing regional disparities, showing a step toward sustainable economic development.

Table 1: Summary Measurement Statistics (observation n = 104)

Variables	Mean	SD	Min values	Max values
Cv_per capita GDP	0.2907	0.1647	0.0068	0.5136
Wcv_per capita GDP	0.2796	0.1879	0.0050	0.6633
Revenue Decentralization	0.2555	0.1540	0.0784	0.5713
Expenditure Decentralization	0.3724	0.5106	0.0704	4.1400
Fiscal Equalization Efforts	0.3499	0.2241	0.0211	0.9874
Per capita GDP log	4.2583	0.5129	3.5098	4.8414
Urbanization	0.3169	0.1338	0.1585	0.5855
Tariff rate	0.0072	0.0072	0.000067	0.0371
Unemployment rate	5.4503	2.3326	2.58	13.09
Interaction term(RD*EQ)	0.0830	0.0649	0.0017	0.3040
Interaction term(ED*EQ)	0.1058	0.0882	0.0023	0.4883
W_revdec	0.1739	0.2149	0.0166	0.6077
W_expdec	0.2826	0.6033	0.0141	4.6139
Trans_depen	0.1857	0.1487	-0.2367	0.7264

As shown, the coefficient's magnitudes in both revenue and expenditure also show that the assessable effect of fiscal decentralization do not significantly differ in both cases, which is in consistence with the traditional knowledge that both revenue and expenditure decentralization seems to stay an accurate and meaningful measure of FD in Pakistan.
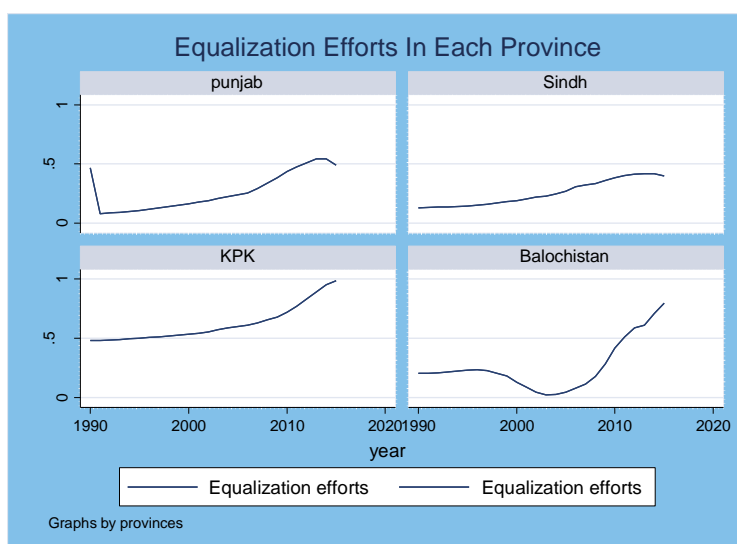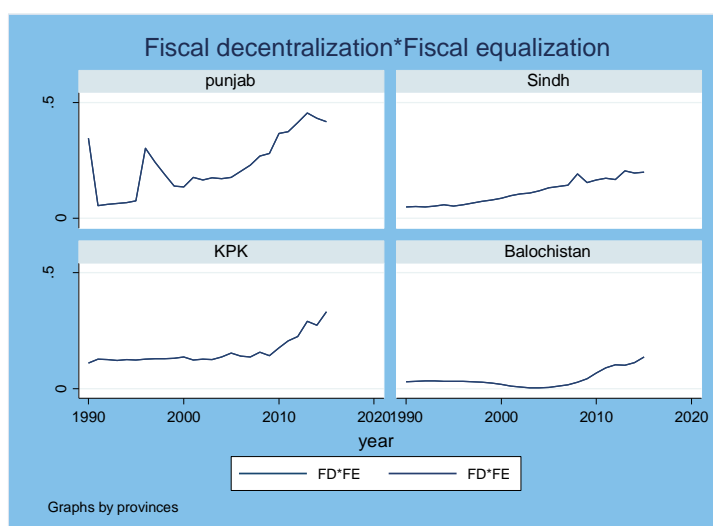

Figure 1: Trends of Equalization Efforts in each province.

Figure 2: Trends of Interaction between FD*EQ efforts in each province

Figure 1 shows the equalization efforts incorporated over the selected sample of years. The graphs show an increase in the equalization efforts in the Sindh, KPK, and Baluchistan over the years; however, the trend in Punjab decreases a little bit around in the year 2014.

Figure 2 shows the Interaction between Fiscal decentralization and the level of Equalization efforts incorporated over the selected sample of years. The graphs show an increase in the interaction term in the Sindh, KPK, and Baluchistan over the years; however, the trend in Punjab decreases a little bit around in the year 2014. The increase in the trend of the interaction term between FD*EQ shows helps a step toward achieving regional development and in reducing regional Disparities at the provincial level.   For each variable in Tables 2, 3, and 5, the values in columns (a) and (b) are the values of coefficient and the value in parenthesis referring to t-value.

Table 2: Main Results: Fixed Effects Estimation

Variables	(a)	(b)
Revenue Decentralization	0.963**	
	(2.51)	
Expenditure decentralization		0.145**
		(3.74)
Equalization Efforts	0.504***	0.475***
	(4.60)	(4.19)
Revenue Dec* Equalization Efforts	-1.322***	
	(-4.03)	
Expenditure Dec* Equalization Effort		-0.775***
		(-2.88)
GDP per capita log	3.347***	3.284***
	(9.86)	(9.43)
Urbanization	4.529***	3.284***
	(6.88)	(6.34)
Tariff Rate	0.138	-4.245
	(0.07)	(-0.99)
Unemployment rate	-0.012***	-0.016***
	(-2.44)	(-3.39)
Constant	-13.07***	-12.58***
	(-9.53)	(-12.58)
Provincial Fixed Effect	Yes	Yes
Yearly Fixed Effect	Yes	Yes
Obs	100	100
R-squared	0.91	0.92

$p < 0.01***$; $p < 0.05**$; $p < 0.1$

Among the other main variables that are incorporated in our model, the equalization efforts have a significant and positive relationship; however, together with the FD, the coefficient for the interaction between FE and FD is significant and negative. However, after estimating the mean value of the sample of either of the fiscal decentralization terms, the effect of FE efforts is always significant and negative signifying that, taking the mean values, greater equalization efforts is related to a decrease in the provincial disparities. Among the control variables, per capita GDP and urbanization are found to have a significant and positive relationship while unemployment has a significant and negative relation with regional disparities. Trade openness, however, is found insignificant with the magnitude of 0.138 with revenue decentralization and 4.24 along with

expenditure decentralization. Urbanization, in the case of Pakistan, increases regional disparities because majorities of the population living in rural areas need the resources and facilitation to be allocated in respective rural areas. Inconsistency with Myrdal theory, the developed regions grow at the expense of underdeveloped regions. Inconsistency with the previous literature (Deyshappriya, 2017), is related to an increase in the level of regional disparities especially in developing countries like Pakistan where there is a high unemployment rate.

4.2   INSTRUMENT VARIABLES

One major potential concern of FD is the issue of endogeneity that may bias the results in Table 3. The chances of endogeneity may be there because the decrease in provincial disparities may have stronger support for centralization, so lowering the level of fiscal decentralization through increase FE efforts. (Sacchi & Salotti, 2014) in his findings provide more strong arguments for the presence of potential endogeneity in association with FD.

Various previous studies have also acknowledged the endogeneity issue in estimating the effect of fiscal decentralization, though they do not control for it due to either lack of good instrument or a problem of sample size (Jin et al., 2005; Qiao et al., 2008). This specific section is about controlling for endogeneity in our model using the approach of instrument variable. The instruments used here includes one period lagged (i) the weighted_average of revenue decentralization on the basis of ranking among the provinces (ranking according to Household Income and Expenditure and Asian Development Bank) (Ghaus-Pasha et al., 2010), (ii) the weighted average of expenditure on the basis of ranking among the provinces (ranking according to According to Household Income and Expenditure and Asian Development Bank) (Ghaus-Pasha et al., 2010) and lastly (iii) is the degree of fiscal transfer dependency of provincial governments on the central government.

Precisely, the wgt _average of revenue decentralization and the wgt_average of expenditure based on a ranking among the provinces are employed as decentralization's instruments. The soundness of first and second instrument is valid on the basis that the aim of FD policy in a province is associated with the decentralization policies in the adjacent strategies because the ranking assign to these provinces is on the basis of different development status, (including per capita GDP, average household income, human development index, the incidence of poverty, Deprivation index and vulnerability) while inequality among the provinces have practically no straight effect on FD of the adjacent provinces in the past year. The fiscal transfer dependency of provincial authorities on the central government is calculated by taking the ratio of total fiscal transfers to the total expenditures of the province.

Tables 3 and 4 show the results obtained after employing the method of instrument variables (IVs). Both revenue decentralization, expenditure decentralization, FE efforts, and the interaction among the given variables are used as an endogenous variable. To check the validity of instruments, some tests like Sargen Statistic of over-identification restriction are used. For the results Table 3, the Sargen statistic and the p-value are higher than 0.30, indicating that there is no correlation between the IVs and the error term that we are unable to reject the null hypothesis in the regression. (Null hypothesis states no correlation of instrument and error term).

Table 3: Estimated Results of Fixed Effects along with IVs

Variables	(a)	(b)
Revenue Decentralization	0.892** (2.37)	
Expenditure Decentralization		0.151** (3.87)
Fiscal Equalization Efforts	0.551*** (4.78)	0.524*** (4.23)
Revenue Dec* Fiscal Equalization Efforts	-1.602*** (-4.65)	
Expenditure Dec* Fiscal Equalization Efforts		-0.818*** (-3.02)
Per capita GDP log	3.464*** (9.64)	3.181*** (8.77)
Urbanization	4.803*** (7.30)	4.267*** (6.34)
Tariff rate	0.809 (0.40)	-2.462 (-0.92)
Unemployment rate	0.012*** (-2.54)	-0.015*** (-3.28)
Constant	-13.58*** (-9.40)	-12.26*** (-8.47)
Provincial-level fixed effect	Yes	Yes
Yearly Fixed effect	Yes	Yes
Obs	98	98
R-Squared	0.91	0.90
Cragg–Donald F Statistics	25.30	8.15
Sargan statistic	0.091 (0.7634)	0.947 (0.3305)

$p < 0.01$***; $p < 0.05$**; $p < 0.1$.

Another important requirement of a valid instrument is that they have a close relation with endogenous variables. To check this, the endogenous variables are regressed on the instrument variables along with the exogenous variables included in the model to perform the Sanderson-Windmeijer multivariate F test (p-value) to check the significance of the instruments. The results of the first-stage are presented in supplementary material Tables S2(a) and S2(b). Table 4 shows that in the case of each specification, the Sanderson-Windmeijer multivariate F test value is greater than 10 (Sanderson & Windmeijer, 2016) showing that our variables are associated with the endogenous variables. Moreover, the LM test is employed to check the under-identification,i-e to see that the equation is identified. In other word, the instruments are relevant to the endogenous variables. The null hypothesis states the equation is under-identified. The results presented in Table 4 for each specification of the LM test suggest the rejection of the null hypothesis. In other words, each specification suggests that instruments correlate with the endogenous variables. The test is basically for matrix rank: According to the null hypothesis, the excluded instrument that has the reduced form coefficients matrix on L1 has the rank (K1-1), where K1 shows the figure of endogenous regressors. The null states that, the statistic is chi-squared distributed with (L1-K1+1) degrees of freedom. A rejection of the null shows that the matrix is full column rank, or we can say the model is identified (Sanderson & Windmeijer, 2016).

If we compare our results in Tables 2 and 3, we can confirm our previous findings that FD increases regional disparities at a provincial level in Pakistan while the equalization efforts employed by the fiscal transfers helps in reducing the unfavorable effects of FD in creating regional disparities.

Table 4: Validity of the Instruments

Endogenous variable	Revenue decentralization
Sanderson-Windmeijer multivariate F test (p-value)	60.30 (<0.001)
Anderson canon. Corr. LM statistic (p-value)	44.83 (<0.001)
Endogenous variable	Expenditure decentralization
Sanderson-Windmeijer multivariate F test (p-value)	18 (<0.001)
Anderson canon. corr. LM statistic (P-value)	20.94 (<0.001)
Endogenous variable	Fiscal equalization with revenue decentralization
Sanderson-Windmeijer multivariate F test (p-value)	25.60 (<0.001)
Anderson canon. corr. LM statistic (P-value)	35.31 (<0.001)
Endogenous variable	Fiscal equalization with expenditure decentralization
Sanderson-Windmeijer multivariate F test (p-value)	18.94 (<0.001)
Anderson canon. corr. LM statistic (P-value)	28.98 (<0.001)
Endogenous variable	Revenue decentralization*Fiscal Equalization Efforts
Sanderson-Windmeijer multivariate F test (p-value)	47.91 (<0.001)
Anderson canon. corr. LM statistic (P-value)	31.029 (<0.001)
Endogenous variable	Expenditure decentralization*Fiscal Equalization Efforts
Sanderson-Windmeijer multivariate F test (p-value)	12.23 (<0.001)
Anderson canon. corr. LM statistic (P-value)	20.93 (<0.001)

5. ROBUST ANALYSIS

For robustness check, we have conducted a sensitivity analysis, along another dimension using an alternate measure for regional disparities and equalization efforts incorporated by the governments. In all robust analysis, in every specification, the results are in coordination with the main results. The results presented are equivalent to those presented in Tables 2 and 3.

5.1 ALTERNATIVE MEASURE OF REGIONAL DISPARITIES

Firstly to check the robust analysis, we use a different measure of regional disparities. This may be necessary because different estimations and different approaches may lead to different analysis distribution (Rodríguez-Pose & Ezcurra, 2009). So we measure again both regional inequality using different measure i-e Popweighted_Cov is broadly used in the empirical works of regional disparities(Song, 2013). This is calculated as follows

$$\text{Wcov} = \frac{1}{\bar{y}} \left[\frac{1}{n} \sum_{i=1}^{n} p_i \left(\bar{y} - y_i \right)^2 \right]^{1/2} \tag{4}$$

In Equation (4), $\bar{y}$ denotes the average level per capita income at the national level, y_i denotes income per capita of province i, p_i represents the share of the province population in the country and n is the total provinces in Pakistan.

Table 5 shows the results of the substitute measure of provincial disparities of provincial authorities using popweighted_Cov. The results again illustrate that larger levels regarding revenue and expenditure decentralization create larger regional disparities in provinces, while greater FE

efforts by the central authorities help in reducing the negative effects associated with fiscal decentralization on the regional disparities.

Table 5: Robustness Check: Pw_Cov Degree of Regional Disparities

Variables	Fixed effect values		Fixed effects along with IVs	
	(a)	**(b)**	**(c)**	**(d)**
Revenue Decentralization	0.043*** (2.07)		0.032*** (2.14)	
Expenditure Decentralization		0.142*** (2.94)		0.153*** (3.30)
Fiscal Equalization Effort	0.016 (0.11)	0.007 (0.05)	0.027 (0.20)	0.064 (0.44)
Revenue Dec*Fiscal Equalization Efforts	-1.607*** (-2.10)		-1.542*** (-3.63)	
Expenditure Dec*Fiscal Equalization Efforts		-0.50** (-1.98)		-0.66** (-2.07)
Per capita GDP log	0.810** (1.80)	0.911** (2.10)	1.350*** (3.04)	1.047** (2.42)
Urbanization	1.786** (2.05)	1.631** (1.95)	2.517*** (3.10)	1.875** (2.34)
Tariff rate	-1.657 (-0.62)	-6.903** (-2.17)	0.446 (0.18)	-4.433 (-1.40)
Unemployment rate	-0.0024 (-0.37)	-0.007 (-1.27)	-0.003 (-0.53)	-0.007 (-1.26)
Constant	-3.167* (-1.74)	-3.266** (-1.87)	-5.331*** (-2.99)	-3.865*** (-2.24)
Provincial-level fixed effect	Yes	Yes	Yes	Yes
Yearly Fixed effect	Yes	Yes	Yes	Yes
Obs	100	100	98	98
Value of R-Squared	0.74	0.79	0.81	0.81
Cragg–Donald F-statistics			4.80	8.41
Sargan statistic			0.001 (0.98)	2.423 (0.11)

6. CONCLUSION AND POLICY RECOMMENDATION

There is a long and ongoing discussion on the effect of decentralization on regional disparities. The empirical studies showed mixed results even if the study has focused on the same group (OECD) of countries. After cautiously examining this matter in Pakistani institutional perspective, we hypothesized that in Pakistan FD increases regional disparities, while the FE efforts executed by the central government in favor of provincial (regional) government helps in mitigating the detrimental effect of FD hence helps in the sustainable economic development. The results offer sufficient provision for our hypothesis. The results are also robust using different specifications and different measures for regional disparities. The effect of FD on regional disparities are consistent with the work presented by (Lessmann, 2012; Rodríguez-Pose & Ezcurra, 2009), which shows that in the developing countries, FD increases regional disparities. This study gives a better understating of regional disparities at the provincial level in Pakistan with special attention given to the FD policies adopted by the provincial government. Another finding that reinforces our traditional point of view is the importance of equalization efforts by the central authorities towards the local level for the successful implementation FE along with decentralization for the achievement of sustainable

economic objectives. However, it is still an open question of whether the regional administrations are also adequately involved in executing those equalizations plans in perusing a balanced, sustainable regional development plan for the citizens. Greater FE plans and efforts at the regional levels will increase the overall grants that are allocated for equalization and make the available funds more predictable and stable.

Regarding the policy perspective, this study provides important insights into reducing regional disparities and achieving sustainable economic development at the regional level in Pakistan. (Shankar & Shah, 2003) have discussed the earlier officious policy by federal authorities, perusing to encourage regional development will outcome in reducing regional disparities. The academic and pragmatic arguments recommend that provincial governments are an essential and liable element of the national system of government. The subsequent proposals have been provided to reinforce their role to promote comprehensive and sustainable development and decrease regional disparities in Pakistan. Decentralization, along with FE, has improved the situation in areas. However, such economic and social policies should be adapted, which helps to eradicate the issue of regional inequality and develop backward regions. Given the large size of Pakistan's provinces, achieving a considerable improvement in the delivery of basic services will need real involvement of regional governments. So a clear and time-bound framework for enlightening public finance systems, administrative capacity, and local administrations are needed to provide resources from central to provincial and then to local governments will provide grounds in providing on the socio-economic assurance of decentralization. Attaining a far-reaching consent on the development of strengthening the fiscal agenda will require extensive dialogue to stabilize the provincial concerns about protecting their independence on one side, and the requirement for flexibility and more coordination recover overall economic outcomes. In this framework, a closer understanding of federal and provincial economic goals could help develop coordination systems and common strategies over time.

7. AVAILABILITY OF DATA AND MATERIAL

Information used and generated from this work is available by contacting the corresponding author.

8. AUTHOR CONTRIBUTIONS

Dr. Yan Jie has supervised & administrated the project and present the main concept of the paper. Ms. Qurat ul Ain has done the following tasks; Formal Analysis, methodology of the paper, and applies techniques through software. Mr. Tahir Yousaf writes, review and edit the draft, also helped in data collection. Ms. Yasmeen Akhtar has reviewed and edit the draft and also help in data collection.

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11. SUPPLEMENTARY MATERIAL

Table S1: Variable Description and Data sources

Variables	Definition	Sources
Cov_gdppc	coefficient of variation of GDP per capita at the province level	Data of provincial GDP is estimated and disaggregated by Shaheen Malik (Research Analyst at unit SASEP) for World Bank, Regional Accounts of Pakistan, Methodology, and Estimates 1973-2001and author's calculations
Pw_cov_gdppc	Population_weighted coefficient of variation of provincial GDP per capita	Data of provincial GDP is estimated and disaggregated by Shaheen Malik (Research Analyst at unit SASEP) for World Bank, Regional Accounts of Pakistan, Methodology, and Estimates 1973-2001and author's calculations.
Revenue Decentralization	The ratio of provincial revenue in the country's total revenue	Pakistan Bureau of Statistics
Expenditure Decentralization	The ratio of provincial expenditure in the country's total expenditure	Pakistan Bureau of Statistics
Equalization efforts	Percentage change in intra-provincial inequality in fiscal revenue before and after taking into account the transfers received; based on C.V. measure	Ministry of Pakistan and authors own calculations
Per capita GDP log	Log of Per capita GDP	Data of provincial GDP is estimated and disaggregated by Shaheen Malik (Research Analyst at unit SASEP) and Regional Accounts of Pakistan, Methodology, and Estimates 1973-2001
Urbanization	The share of provincial urban population to the total provincial population	Population census of Pakistan
Tariff rate	The Ratio of tariff revenue to imports(total)	Pakistan Bureau of Statistics and Ministry of Pakistan Finance division
Unemployment rate	Unemployment rate as a share of the provincial population	Labour Force Statistics
Wgt_rev_exp	Weighted _average of the revenue decentralization according to the development ranking among the provinces	Authors own calculations (ranking according to Household Income and Expenditure and Asian Development Bank)
Wgt_exp_dec	Weighted_average of the expenditure decentralization according to the development ranking among the provinces	Authors own calculations (ranking according to Household Income and Expenditure and Asian Development Bank)
Trans_depen	The share of total fiscal transfers to the province to total expenditures of the province.	Author's own calculations

Table S2(a): First Stage Regression Estimated for IV

Endogenous variable	Revenue Dec	Fiscal Equalization efforts	Renvenue dec*Equalization efforts
Wgt_revenue decentralization$_{t-1}$	0.608*** (12.73)	-0.585*** (-3.65)	0.066* (1.86)
Trans_depen$_{t-1}$	-0.375*** (-5.40)	-0.927*** (-8.29)	-0.178*** (-5.09)
Wgt_revenue* Trans_depen$_{t-1}$	-0.705** (-2.51)	0.057** (1.93)	-0.055 (-0.19)
Per capita GDP log	0.0068 (0.63)	0.000*** (7.73)	0.072*** (7.09)
Urbanization	0.342*** (8.41)	0.000*** (-6.87)	-0.072** (-1.90)
Tariff rate	2.473*** (2.41)	0.764 (0.30)	-0.274 (-0.29)
Unemployment rate	0.002 (0.96)	0.967 (0.04)	0.002 (-1.04)
Constant	-0.007 (-0.21)	-0.187* (-1.69)	-0.173*** (-5.00)
Observations	98	98	98

*T values in brackets :$p < 0.01$***; $p < 0.05$**; $p < 0.1$**

Table S2(b): First Stage Regression Estimated for IV

Endogenous variable	Expenditure Dec	Fiscal Equalization efforts	Expenditure dec*equalization efforts
Wgt_Expenditure Decentralization$_{t-1}$	0.874*** (4.43)	0.084 (-1.47)	0.089*** (6.82)
Trans_depen$_{t-1}$	0.018 (0.43)	-0.716*** (-6.93)	-0.170*** (-4.76)
Wgt_expdec* Trans_depen$_{t-1}$	-1.233*** (-4.59)	-1.301** (-2.50)	-0.005 (-0.02)
Per capita GDP log	0.0075 (0.50)	0.253*** (7.43)	0.074*** (6.10)
Urbanization	0.562*** (10.05)	-0.804*** (-6.52)	-0.030*** (-2.02)
Tariff rate	-2.123 (-1.28)	-4.974*** (-2.03)	0.732 (0.54)
Unemployment rate	0.041* (1.72)	-0.002 (-0.28)	-0.001 (-0.51)
Constant	-0.064 (-1.24)	-0.278*** (-2.41)	-0.191*** (-4.57)
Observations	98	98	98

*t-values in brackets :$p < 0.01$***; $p < 0.05$**; $p < 0.1$**

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