Fiscal Decentralization and Educational Outcomes: Empirical Evidence from Pakistan

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Abstract

A large number of countries are transferring financial, administrative, and political powers to the local governments. In Pakistan, devolution reforms were launched through the Local Government Ordinance in 2001. This research investigates whether the higher autonomy of district governments could improve education outcomes in their respective districts or not. The Generalized Methods of Moments is employed for a panel of 34 districts of Punjab province, Pakistan, during 2003-2015. The results reveal that fiscal decentralization improves education outcomes in Punjab province of Pakistan. The enrolment in primary school is a measure of education outcome and improved in the districts of Punjab. In addition, the decentralization process during Pervez Musharraf's regime could not change the structure of the economy as a whole. Therefore, decentralization of the education sector in all provinces is suggested to reinforce the benefits of fiscal decentralization.

Keywords: Fiscal Decentralization; Local Government Ordinance; Educational Outcomes.

Introduction

Decentralization refers to the transfer of power and responsibilities from the central government to the local governments through fiscal, administrative, and political instruments (Dick-Sagoe, 2020; Liu et al., 2016; Martinez-Vazquez, Lago-Penas & Sacchi, 2016). This system allows local units to make decisions and execute functions through community participation (Androniceanu & Ristea, 2014). One of the critical objectives of fiscal decentralization is to improve public services such as education, health, social security, water supply, and sanitation (Liu et al., 2017; Hanushek et al., 2013). The arguments in favor of decentralization reveal that the government expenditures by the central government could not be able to improve education outcomes, i.e., student performance, enrolment rate, student-teacher ratio, pass-out ratio, and drop-out ratio (Ezcurra & Rodraguez-Pose, 2011; Falch & Fischer, 2012; Ghuman & Singh, 2013).

The arguments in favor of fiscal decentralization can be traced from the pioneering theories of fiscal federalism (Tiebout, 1956; Musgrave, 1959; Oates, 1972; Olson, 1969). The famous decentralization theorem (Oates, 1972) argued that decentralization would improve allocative efficiency by bringing diversity, in trading goods and services. This would bring equity in central government expenditures. In addition, productive efficiency can also be achieved by improving the quantity and quality of public goods (Wallis & Oates, 1988). Political participation could enable local governments to be more responsible for the provision of public services according to local demands (Shah, 1999). Therefore, well-designed decentralization reforms are expected to improve the equity, quality, and efficiency of public services and, thereby, outcomes (Otoo & Danguah, 2021; Lessmann, 2012).

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The Devolution Plan 2000 was formed in Pakistan on August 14, 2000, which was based upon five pillars-devolution of political power, de-concentration of management function, decentralization of administrative authority, diffusion of the power, and distribution of resources. The key objective was to safeguard the interest of the people, and ensure their participation in community welfare. The Devolution Plan was implemented through the Provincial Local Government Ordinance (PLGO) in 2001 in all provinces of Pakistan. According to this Ordinance, the local governments were responsible for the delivery of vital public services according to local preferences. This Local Government Ordinance transferred the administrative, political, and financial powers to the local governments. The district Nazim and Naib Nazim were elected for each administrative structure. The formula-based financial resources were distributed from the central to the local government (Cheema et al., 2005; Nayyar-Stone et al., 2006).

The key objective of these devolution reforms was to empower the local governments for the better provision of education, health, and other municipal services. Under this system, the powers were transferred from provinces to 110 District Governments, 335 Tehsil Municipal Administrations, and 6022 Union Councils.

Historically, Pakistan has been facing issues in the education sector, and various attempts have been made to improve education outcomes. In this regard, the central and provincial governments took initiatives to provide essential/primary education in remote areas (Ali, 2006; Mislevy, 2018). Similarly, after the devolution plan 2001, the reforms were also applied in the education sector, with a focus on primary education outcomes.

Later on, after the change of political regime in 2008, the powers were returned to the provinces. Furthermore, the 18th constitutional amendment enhances the responsibility of provincial governments to hold local government elections. However, provinces indeed remained reluctant to hold elections except for one province, Balochistan (Sherdil & Rana, 2008).

The assessment of the fiscal decentralization reforms is needed to evaluate its effects across districts in Pakistan. Nisa and Khalil, 2018 provided an assessment of fiscal decentralization reforms and their impact on public service delivery in the case of selected districts of Punjab Province, Pakistan. The research can be extended by analyzing the policy impact in the case of all districts of Pakistan.

Thus, the key objective of this study is to assess the impact of fiscal decentralization on education outcomes across 34 districts of the Punjab Province of Pakistan, focusing on the Local Government Ordinance (LGO) 2001. The period of the study is 13 years (2003-2015). The study is unique in various aspects;

- First, the contribution of the local Government ordinance, 2001 in the improvement of education outcomes across districts of Punjab.
- Second, the study objective is analyzed during two sub-periods, i.e., 2003 to 2008 and 2009 to 2015, to capture the effects after the change of political regime in 2008.

Thus, the hypothesis of the study states that fiscal decentralization improves education outcomes across 34 districts of Punjab province. The studies conducted previously on Pakistan could not provide empirical analysis of the decentralization and education outcomes across districts, while only a few studies could provide theoretical discussion on the same issue (Mehmood et al., 2010; Khan & Mirza, 2011; Husnain, 2010; Sherdil & Rana, 2008). The cross-district comparison provides information about the education performance in the poor districts of Punjab.

The following sections are organized as; the review of literature discussed in Section 2. Section 3 provides decentralization in Pakistan. Section 4 describes the models and econometric techniques for analysis, with sources of data. Section 5 presents the results and discussion. The last section (6) concludes and provides recommendations.

Literature Review

Financial resources indeed play a vital role in the development of any organization. The better quality and quantity of the education system require various kinds of resources such as human, financial, technology, and other learning resources (Chudgar & Shafiq, 2010). In the centralized education system, the central government makes financial arrangements and policy decisions, while local administrators are accountable to the central government for the use of resources. This, as a result, may cause an increase in monitoring costs. The inefficiency and inability of the central government the provision local services usually place budgetary constraints and affect the development of the education sector (Nisa & Khalil, 2018; Hanushek et al., 2013; Inamullah et al., 2012).

The roots of fiscal decentralization can be found in the traditional theories of fiscal federalism and intergovernmental fiscal relations, which are the contributions of Tiebout (1956), Musgrave (1959), Oates (1972), and Olson (1969). Their common argument states that devolution of expenditures and tax authority can achieve efficiency in the public sector. It is evident that financial resources indeed play a vital role in the development of any organization. The better quality and quantity of the education system require various kinds of resources such as human, financial, technology, and other learning resources (Martinez et al., 2016). In the centralized education system, the central government is involved in financial arrangements and policy decisions, while local administrators are accountable to the central government for the use of resources. This, as a result, may cause an increase in monitoring costs. The inefficiency and inability of the central government the provision local services usually place budgetary constraints and affect the development of the education sector (Ghuman & Singh, 2013).

It is generally argued that political groups at the local level in a decentralized system are involved in powerful opposition in different areas to attract the attention of local citizens (Shah, 1999). One group argues to raise taxes rather than the delivery of public services (Freinkman, & Plekhanov, 2009). While opponents believe that their interest is to manage the provision of local public goods, such as the construction of school buildings and hospitals in local areas, the appointment of new teachers is a significant effort by the political parties to attract the local people (Busemeyer, 2008). The cross-country studies, as well as single-country studies, reveal the strong relationship between fiscal decentralization and educational outcomes at various levels of education (Nisa & Khalil, 2018; Busemeyer, 2008). However, the improvement in educational results is highlighted at the expense of enrollment in training programs. It is also evident that prosperous the autonomous community, the more significant the impact of decentralization on educational outcomes (Salinas & Sole-Olle, 2010).

Disintegration in a country has shifted government spending and resources from production and infrastructure to spending on social services like education, water supply, and sanitation (Faguet & Sanchez, 2008). It is also evident that the student enrolment rate in government schools has improved in the districts where policy-making and financing for education were under the local authority (Faguet & Sanchez, 2008).

As far as the quality of public services is concerned, only some studies have examined the impact of decentralization on the quality of education and health. In Thailand, local control over school management was enhanced, which, as a result, improved the quality of education (Joshi, 2006; Mitchell & Bossert, 2010; Kazungu & Mabula, 2013; Olatona & Olomola, 2015). China's large population and regional diversification require decentralized administration. Shen and Zou (2015) examined data from China in detail and provided that under the present arrangements, public utilities are widely decentralized with sub-national governments. Research conducted on some other countries' cases revealed that education services had not been delivered to the expected degree. The local governments allocated resources for other essential services rather than

education (Caldeira et al., 2012). McCartan and Vyashulu (2004) and Peterson and Muazzimi (2005) identified improvements in education indicators after decentralization in India and the Philippines, respectively, while Lewis (2010) found a decline in education services due to deterioration in health output. Mehrotra (2006) conducted a cross-country comparison of data from India, Brazil, and Sub-Saharan Africa and found improvement in access and output of adult literacy rate.

The adverse impact of decentralization on access to public services was captured by some other studies (World Bank, 2005; Bandyopadhyay et al., 2011; Noori, 2006; Simatupang, 2009). In addition, some other studies reveal that decentralization is responsible for the deterioration in the quality of public services (Asthana, 2008; Capuno, 2008; Langran, 2011; Layug, 2009; Lewis, 2010; Sharma & Mwonge, 2010; Ghuman & Singh, 2013).

The efficiency of public services can only be achieved under specific conditions, such as an adequate political and institutional environment and a sufficient degree of expenditure decentralization accompanied by a sufficient degree of revenue decentralization. Education services are less in fact complex than health services, which should be less demanding for the local chief executive to oversee (Sharma & Mwong, 2010; Viet, 2009; Singh, 2008; Capuno, 2009; Sow & Razafimahefa, 2015).

More evidence can be found in the case of Pakistan. Most of the studies provided only theoretical debate on fiscal decentralization and education outcomes (Nisa et al., 2024; Nisa & Khalil, 2018; Khan & Mirza, 2011). A study on the impact of Fiscal decentralization on human development analyzed with empirical estimation is an addition to the theoretical literature in the case of Pakistan. The impact of fiscal decentralization was estimated at the provincial level in both the expenditure and revenue aspects. The empirical findings confirm the post-decentralization impact of fiscal decentralization on human development as well as on health and education outcomes. The study found the lowest fiscal decentralization autonomy in the case of Balochistan Province (Mehmood & Sadiq, 2010).

Khan and Mirza (2011) provided an overview of the implementation of decentralization reforms in 2001 in the education sector of Pakistan. The primary purpose was to identify the proper spirit to discover the focus and problems associated with the implementation of reforms. Devolution Plan 2000 was implemented in Punjab through PLGO 2001 (Punjab Local Government Ordinance) through a constitutional amendment. There needed to have been decentralization of federal-level powers, responsibilities, and duties at either the provincial or district level from planning, management, and monitoring. Under these reforms, the DCO was the official head of the district administration as well as the administrative head of the education department at the district level.

During the decentralization period in Pakistan, district education was financed from three sources: district government sources, block grants, and ad-hoc federal education grants to provinces and districts (Khan and Mirza, 2011). Hasnain (2010) has examined the connection between devolution accountability and service provision in Pakistan. His comprehensive theoretical study provided that after devolution and local government elections, the accessibility of policymakers to citizens has become more outstanding. Furthermore, the local government sectoral preferences are massively bent towards the delivery of physical infrastructure such as roads, rural electrification, water supply, and sanitation, while education and health were on low priority.

Analytical Framework

A number of cross-country and country-specific studies were researched to evaluate the effect of some institutional reforms on public service delivery, represented by outcomes, i.e., literacy rate. These studies construct the following function:

$$FO = f (PX , I, C) \quad (1)$$

Where FO, is the final outcome of public service i.e. literacy rate/educational performance in case of improved education. The right hand side variable, PX is the public expenditure in that service. These studies also use the institutional variable (I) as discrete variable to quantify the presence or absence of institutional reforms. The control variables (C) may also affect the final outcome. The major problem in analyzing the function (1) is that it cannot consider all the relevant variables effecting final outcome, in a single equation. A long list of other factors can also affect the services outcomes i.e. demographic factors, political environment, geographical and weather conditions and cultural issues. In case of education outcome, better health care, safe drinking water and better sanitation help the children to achieve better scores at schools (WDR, 2004). Household income/production may also effect student completion rate or performance in tests and so on (Fuchs & Woessmann, 2004). All these independent factors may interact at the same time in such a way which could not be understandable.

The effects of some institutional/policy reform on service delivery are due to many uncontrollable, external and cross-sectional influences, thus final outcomes may be fuzzy variable and can makes model specification very difficult. Moreover, the interactions of various factors creates difficulty in analyzing the institutional reforms so, there is always the possibility of spurious effects. Therefore, it is better to provide a more robust and direct approach to evaluate the effects of decentralization reforms on service delivery.

In the light of above discussion, this research proposes the use of intermediate outputs such as, percentage of individuals having access to services rather than the use of final outcome. In case of education, the access/intermediate variables are, number of students enrolled, access to intermediate services, pass-out rate. The link of fiscal decentralization with the service delivery, through complete channel: from inputs to final output may help to understand the study. Figure 1 shows flowcharts to show the production of public services, starting from inputs[3] to form service delivery platform. These inputs produce services by paying salaries to professionals[4] , purchasing required supplies and equipment providing maintenance and improving facilities. These initial outputs further help to produce intermediate outputs; those are closely related to access variables[5]. Finally, these access related intermediate variables leads to final outcomes, such as improved education. There are number of other factors effect final outcome these are shown in the flowcharts. The link of decentralization reforms to this flowchart can also be explained. Each key initial input to produce service can be significantly influenced by fiscal decentralization reforms. Fiscal decentralization can link to the public service delivery in the way in which financial services are allocated to the services sector as well as within the sector, to achieve the technical and allocative efficiency.

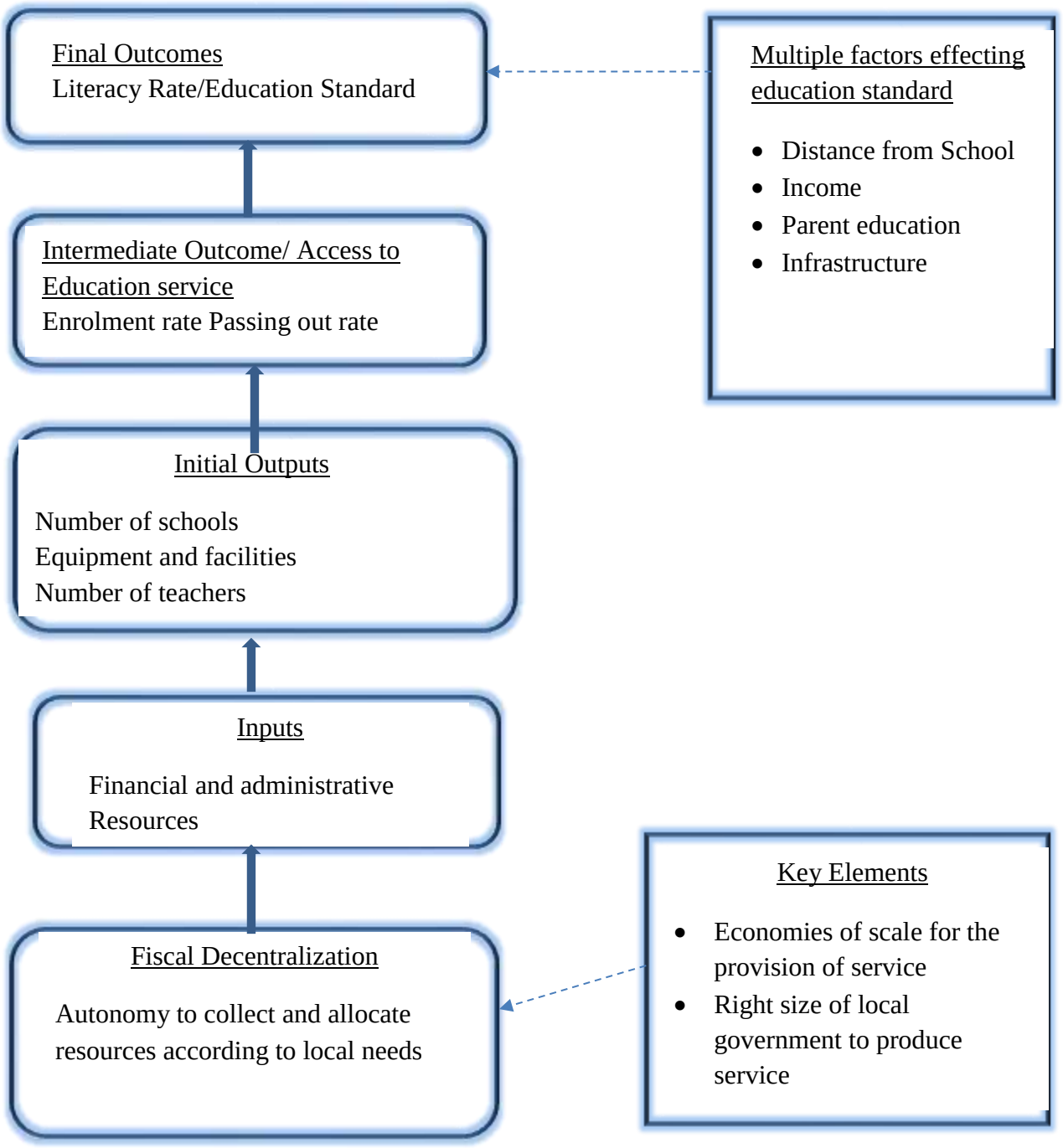
[3] *Financial and administrative resources.*

[4] *Teachers, Doctors, Nurses and managers.*

[5] *%age of birth attended by skilled health professional, Immunization coverage, student's enrolment, access to improved drinking water source, access to improved sanitation.*

Fiscal Decentralization and Educational Outcomes

Figure 1: Fiscal Decentralization and public service delivery framework



Model Specification

The analysis of this study is conducted by constructing econometric model represented by equation-(2). The explanatory variables are fiscal decentralization measured through expenditures and revenues and public education expenditures across districts controlling for the output, infrastructure and population. The dependent variable is education measured through primary school enrolment. Moreover, selected control variables are also included in the model.

$$ENR_{it} = \alpha + \alpha_1 FDE_{it} + \alpha_2 FDR_{it} + \alpha_3 \ln EXE_{it} + \alpha_4 X_{it} + \varepsilon_{it} \quad (2)$$

Model-1 represented by equation (2) which shows dependent variable (ENR) is measure of education using a proxy variable which is percentage of students enrolled in primary school aged (6-10). The independent variable FDE is a measure of fiscal expenditure decentralization. Another measure of fiscal decentralization is FDR which is fiscal revenue decentralization thus two proxies are chosen to measure the fiscal decentralization. The third independent variable is lnEXE is the measure of public expenditure on education in each district of Punjab; this variable is selected because budget is the main source of financing for the education sector to provide better resources to increase the school enrolment. The fourth independent variable, X represents a set of control variables[6]. Without adding control variables into the model, the clear impact of main model variables becomes hard to explain. All these explanatory variables and control variables are used in log form except fiscal decentralization variable (FDE and FDR) and population variable[7]. The model-1 is constructed to test the first hypothesis. In addition, $\alpha_4$is the set of parameters of control variables, represented by X.

Methodology

To estimate the models constructed earlier (model-1 to model-4), the First Differenced Generalized Methods of Moments (DGMM) and System Generalized Methods of Moments (SGMM) are chosen. Generally, for panel data analysis, both fixed and random effects techniques, and GMM are applied in the literature. The GMM techniques are usually used for dynamic analysis of the models and suitable for the data set of large individual and lesser time periods, meaning that number of years must be less than the individual units.

Generalized Methods of Moments (GMM)

To estimate the models of the study the panel data econometric techniques are selected. Before selection of the technique, the Doornick Hansen normality test is applied, and result shows that the study data is not normally distributed. Generalized Methods of Moments (GMM) techniques provided for dynamic models of panel data originally provided by Holtz-Eakin et al. (1990), Arellano & Bond (1991) and Arellano & Bover (1995) are chosen to obtain the efficient and consistent parameters. Thus, following two versions of GMM Methods are selected for estimation of equations 5.2, 5.3, 5.4 and 5.5, and have been discussed in detail.

First Difference Generalized Methods of Moments

Arellano & Bover (1995) and Blundell & Bond (1998) have provided the first-differenced GMM. There are a number of advantages of GMM: it controls endogeneity of all variables. It includes lagged dependent variable as regressor also includes the time series elements of the data. In addition, it also controls for district-specific effects, same as discussed in fixed effects method. There exists few conditions for use of GMM; the number of individual units (N) must be greater than the time period (T) of the study. The endogeniety problem exists among explanatory variables. Furthermore, individual specific effects must be correlated with explanatory variables also error term must not exhibit serial correlation. The pooled regression estimator becomes biased despite the removal of district-specific effects by taking first differences.

The first difference GMM, by Arellano and Bond provided the model in form of system of equations, one for each time. The first differences of the predetermined endogenous variables, instrumented with lags at levels. After that, all exogenous variables as well as instrumented

[6] *The detail of control variables is given in, Variable selection section.*

[7] *As the value of total population is selected in millions.*

variables after taking first differences are set into a matrix, with one column per instrument. The GMM method is designed for dynamic panels that have small T but large N, means dynamic dependent variable and explanatory variables those need not strictly exogenous, with the presence of heteroskedasticity and autocorrelation within effects.

The dynamic models include lag of the dependent variable as explanatory variable i.e., ENR_{it-1} ,in the model. The term (μ_i) is an unobserved district effect, while ε_{it} represents the error term, and the subscript i and t shows district and time respectively. Thus to reduce the district-specific effects, the first differences of equations 5.2, 5.3, 5.4 and 5.5 are taken as

$$ENR_{it} - ENR_{it-1} = \alpha(ENR_{i,t-1} - ENR_{it-2}) + \alpha_1(FDE_{it} - FDE_{it-1}) + \alpha_2(FDR_{it} - FDR_{it-1}) + \alpha_3(EXE_{it} - EXE_{it-1}) + \alpha_4(X_{it} - X_{it-1}) + \varepsilon_{it} - \varepsilon_{it-1} \quad (3)$$

The use of instruments in the GMM method is suggested by Levine et al. (2000) for two reasons: First, to solve the problem of endogeniety raised in the models of fiscal decentralization and public services (education, health, water supply and sanitation) and second, as after error including term ($\varepsilon_{it} - \varepsilon_{it-1}$), for equations (3), (4), (5) and (6), are found correlated with dependent variables which are in the lagged form,
$(ENR_{i,t-1} - ENR_{it-2})$. The following moment conditions used by the GMM panel estimator:

$$E\,[\,Y_{it} \text{ -s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \quad \text{for} \quad s \geq 2;\ t=3,\ldots\ldots,T \quad (4)$$

$$E\,[\,X_{it} \text{ -s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \quad \text{for} \quad s \geq 2;\ t=3,\ldots\ldots,T \quad (5)$$

By making assumption that there is absence of serially correlated error term, ε , also exhibit the weak exogeniety of explanatory variables. It refers to difference estimator. Although, this method is also not free from shortcomings. Alonso-Borrego & Arellano (1996) and Blundell & Bond (1998) explained that when the explanatory variables change over time, the lagged variables makes instruments ineffective for the difference equations. In order to decrease the biasedness of the difference estimator, an estimator can be used by making a system which expresses the equations in differences and in levels. This new, modified version of GMM is discussed in the next section.

System Generalized Methods of Moments

To handle the problem of the weaknesses of the first-differenced GMM, discussed above, the endogeneity issue raised when development indicators used for institutional reforms, particularly when dependent variable is a measure of economic growth in the regression. However, in literature the research produced previously on the issue of decentralization and service delivery indicators, using cross-country, cross-states or cross-local units, is not common (Treisman, 2002)[8]. The question arises that why the decentralization system was initiated is important here and a large body of literature provides that these reforms are exogenous to service delivery. International Evidences shows that decentralization process in most countries did not initiate with the objective of improvement in service delivery and economic efficiency rather those were initiated due to political reasons[9]. The counter agreement provided that regional inequality in services provision could be a reason for regional tensions and deepening decentralization reforms.

As discussed earlier, Blundel and Bond (1998) and Bond (2002) highlighted the problem with the difference GMM, that the lagged levels sometimes are weak instruments and can make a series close to random walk. In addition, the estimators can sometimes express large finite sample biases.

[8] See chapter-2

[9] Regional tensions, political sharing agreements

The GMM technique takes lagged differences of dependent variables and use instruments of these variables for levels form equation, with using lagged of dependent variables which are used as instruments for other equations, which are transformed into first differences. An extended GMM approach provided by Blundell and Bond (1998), which offers efficiency gains in case of poor performance of the first difference. The use of instruments requires some assumptions; there may be a correlation between district effects and the explanatory variables in the level equation, but the correlation may not be found if there is use of district specific effects and differences of the variables. The second part of the system is moment conditions which are:

$$E\left[\left(y_{it-s} - y_{it-s-1}\right)\left(\left(\mu_i + \varepsilon_{i,t}\right)\right)\right] = 0 \quad \text{for} \quad s = 1 \tag{6}$$

$$E\left[\left(X_{it-s} - X_{it-s-1}\right)\left(\mu_i + \varepsilon_{i,t}\right)\right] = 0 \quad \text{for} \quad s = 1 \tag{7}$$

As lagged instruments are used in form of differences, and as an instrument the most recent difference is selected. The moment conditions discussed above are used to apply a GMM technique that is expected to produce consistent as well as efficient parameter estimates. To provide complete examination, this research addresses to handle the endogeneity problem through the use of the System GMM method. The main reason behind this selection is that, the good instrumental variables to reflect the trend of decentralization process do not exist for estimation. The situation gets more complex if we look for appropriate instrumental variables for different dimensions of the decentralization. Thus, it is better to use internal instruments by using System GMM. The modified version of the difference GMM, is the System GMM, discussed in the previous section and is developed by Arellano and Bover (1995) and Blundell and Bond (1998) whereas, Roodman (2006) has provided a simple way to differentiate the system GMM method from the original Method (difference GMM) and states that the instruments are used as instruments in differences at levels while the instruments at levels with differences uses in system GMM. The authors of both techniques justified that the transformed equations in system GMM produce efficient estimates of the panel data set that combines larger individual units than the number of years/time period.

Advantages of GMM over Instrumental Variable (IV) Method

Now the question is that why endogeniety issue arises. Endogeniety problem could arise because of the simultaneous effects of omitted variables on both decentralization and some of the seemingly exogenous variable. Similar case of reverse causality may arise in study of the relationship between decentralization and regional economic disparities (Kyriacou et al., 2015). Some studies have used the limited values of the independent variables in order to handle the endogeniety issue (Akai & Sakata, 2002). While the other line of studies tried to solve this issue using lagged independent variables as instrumental variables (Limi, 2005; Gemmell et al., 2013). This instrumental variable (IV) approach is the most appropriate way to handle the endogeniety issue.

Various studies have measured the IVs including land area (Enikolopove & Zhuravskaya, 2007) or fiscal autonomy (Baskaran & Feld, 2013). But there is a question about the correlation between these instruments and fiscal decentralization. Canavire et al. (2012) explained the relationship of geographical variables and fiscal decentralization, so these are included as exogenous and can be valid instruments. But this variable is time invariant which does not support penal data estimation also it creates interaction with infrastructure development, which in turn, brings endogeneity issue. In the presence of heteroskedasticity, the GMM estimator is appropriate technique than the IV estimator. This is the reason that a test to detect the heteroskedasticity may be useful in deciding whether instrumental variable (IV) method or GMM would be better to apply.

Many studies have used this approach to analyze fiscal decentralization issue such as Strumpf and Oberholzer-Gee(2002). Kyriacou et al. (2015), Filippetti and Sacchi (2016). System GMM has advantage over first difference GMM due to its ability to address the endogeneity problem. In System-GMM approach, when lagged values of fiscal decentralization include as instrumental variables (IVs), in turn fiscal decentralization may become stable over time and have persistent impact on the dependent variable, resulting in the correlation between the instruments and the error term.

Diagnostic Tests

For diagnostic checks two specific tests are suggested by Arellano and Bond, (1991), Arellano and Bover, (1995) and Blundell and Bond, (1998), one is the Sargan test and second is the test of serial correlation. After applying GMM for estimation, it is better to apply some diagnostic test to verify the validity of test results. Thus, these two tests are selected in order to verify the results obtained of the study model.

Sargan Test

Sargan test initially proposed by Arellano and Bond (1991), which is used to check whether there is found presence of any association between the instruments used and dependent variables. The hypothesis check whether there exist a correlation between the instruments used and the error term while the alternative sets the opposite. The test uses the Chi-square distribution with degree of freedom (J-K), in which, J shows the number of instruments used while K represents number of regressors used. If test result accepts the null hypothesis, then this means that the valid instruments are used for estimation of the model.

Serial Correlation Tests (AR1, AR2)

Arellano and Bond (1991) proposed the serial correlation tests for diagnostic check. The null hypothesis is that there is absence of second order serial correlation in the model, while alternative states that there is the presence of serial correlation. This test applied to the difference residuals. The serial correlation of second order in first differences has much importance, because it is used to detect autocorrelation at levels. If the test result accepts the null hypothesis, then this will verify that the autocorrelation does not exist.

Data Description and Sources

The data set used in the study covers a panel of 34 districts of Punjab province, Pakistan. The total districts in Punjab province are 36, but two districts[10] emerged in 2008, these two districts were excluded from the sample due to non-existence from study time period. The study data is related to the education outcome. For assessment of quality of the education service, the intermediate outcomes variables are selected, which leads to assess the final outcomes. The second set of variables is related to government finance. The major explanatory variable is fiscal decentralization and others are public expenditures on above mentioned services. Data related to final outcome indicator-education performance- was not available across districts. This is the major constraint in collection of proxies to measure final outcome. The detail of the data used for analysis of this research, the definition and construction of variables is provided in Appendix (A-3 (a,b,c). The data on public services such as, percentage of students enrolled in primary school aged 6 to 9 (education) , is collected from Pakistan Social and Living Standard Measurement

[10] *Chiniot and Nankana Sahib.*

(PSLM)[11] and Multiple Integrated Cluster Survey (MICS)[12] published by the Federal Bureau of Statistics (FBS), Government of Pakistan and Punjab Bureau of Statistics (PBS), Government of Punjab respectively. The data on public expenditures on health sector and education sector and total district expenditures is collected from the Finance Department, Government of Punjab. Similarly, the district wise receipts/revenue data is collected from Finance Department, Government of Punjab. The data on total central government expenditure and total revenue is collected from Handbook of Statistics, published annually by the State Bank of Pakistan, Govt. of Pakistan. The data on important control variables; population, population density, total yield and road infrastructure is taken from Pakistan Social and Living Standard Measurement (PSLM)[13], Punjab Development Statistics (PDS)[14] and Multiple Integrated Cluster Survey(MICS)[15]. The detail of proxies used to measure variable, calculation formula, expected signs and data source is provided in Appendix- (A-2).

Results

The results obtained for model-1 by estimating equation-(2) are described in table-1 and table-2. The coefficient values obtained after applying first difference Generalize Method of Moments are shown in table-1 in column-1 to column-6 with the t-statistics values in parenthesis. The results in column -1 are without the effects of control variables while the results including control variables are given in column-2 to column-6. Overall the results of system GMM are almost according to the expectations as compared to the results of difference GMM. The lag value of dependent variable (ENR L1) is significant in case of equation 1 to equation 6. The coefficient value of fiscal (Expenditure) decentralization (FDE) is significant at one percent level in case of all six equations which shows that one percent increase in share of district expenditures may be responsible of 15 % to 19% rise in school enrolment at primary level. The positive sign with the coefficient value of fiscal decentralization is according to the expectations. This explains that fiscal decentralization improves education. The coefficient values of fiscal (revenue) decentralization (FDR) are significant at 10 percent level in results of four equations with very low magnitude such as 0.45 to 0.35 in all specifications obtained from results of equation one to equation 6. Moreover, public expenditures on education significantly improves the
percentage of school enrolment as the coefficient value is 4 to 6 in all six equations meaning that one percent increase in public expenditures on education in a district responsible of increase in primary school enrolment by six percent. Controlling the other factors does not affect the above mentioned results. In addition, improvement in road infrastructure also has positive and significant effect in raising primary school enrolment to some extent as coefficient value is significant in two specifications.

The Sargen test statistic is insignificant in all specification, which indicates the validity of over-identified restrictions, meaning that there is no endogeneity problem. The high probability value of AR (2) represents that there is no evidence of serial correlation of second order. Thus the difference GMM results are consistent as well as efficient for model-1. Thus keeping in view the above findings, hypothesis one is rejected.

The specifications obtained after applying system GMM are given in Table-2. The coefficient values of fiscal (expenditure) decentralization (FDE) are positive and significant at one percent level in results attained from almost all equation. The magnitude is 16 to 24 which confirms the

[11] *Various issues*
[12] *Various issues*
[13] *Various issues*
[14] *Various issues*
[15] *Various issues*

previous findings of difference GMM (Table-1). The coefficients of public education expenditures are positive and significant in three equations whereas addition of more factors makes the results insignificant. Like previous results, the fiscal (revenue) decentralization with very low magnitude, shows insignificant coefficient values in almost all cases which verifies that revenue at district level does not have sufficient role in raising primary school enrolment in Punjab province of Pakistan.

The Sargen test statistic is insignificant in all specification, which indicates the validity of over-identified restrictions, meaning that there is no endogeniety problem. The high probability value of AR (2) represents that there is no evidence of serial correlation of second order. Thus the difference GMM results are consistent as well as efficient for Model-1. Thus keeping in view the

Table 1: Estimation results on impact of fiscal decentralization on education

Dependent Variable	% of students enrolled in primary school					
Model Specifications	Difference GMM					
	(1)	(2)	(3)	(4)	(5)	(6)
Regressors						
Lag of Education (ENR L1)	0.62***	0.63***	.62***	0.62***	0.62***	0.62***
	(10.19)	(9.97)	(9.95)	(9.85)	(9.68)	(8.92)
Fiscal(Expenditure) Decentralization (FDE)	15.92***	16.68***	16.40**	16.17***	18.40***	19.01***
	(2.36)	(2.37)	(2.34)	(2.37)	(2.55)	(2.52)
Fiscal (Revenue) Decentralization (FDR)	0.45*	0.45*	0.45*	0.48*	0.37	0.35
	(1.83)	(1.81)	(1.79)	(1.84)	(1.42)	(1.22)
Public Education Expenditures (lnEXE)	6.13***	6.31***	6.25***	6.35***	5.29**	4.91*
	(2.84)	(2.85)	(2.69)	(2.80)	(2.29)	(1.79)
Population (POP)		-0.80				-2.97
		(-0.42)				(-0.56)
Population Density (PD)			-1.85			26.29
			(-0.11)			(0.59)
Output (OPT)				-0.42		-0.51
				(-0.33)		(-0.36)
Road Length (RL)					5.90**	6.18**
					(2.11)	(2.15)
Sargan Test chi-square (p-value)	78.22	131.01	23.15	82.15	14.76	6.59
	(0.231)	(0.132)	(0.04)	(0.04)	(0.563)	(0.361)
AR (1)	-5.72	-5.69	-5.71	-5.71	-5.47	-5.41
	(0.312)	(0.612)	(0.043)	(0.043)	(0.34)	(0.041)
AR (2)	-0.91	-0.51	-5.71	-0.83	-0.51	-0.42
	(0.361)	(0.451)	(0.043)	(0.40)	(0.61)	(0.68)
F-statistics (p-value)	217.45	172.12	169.42	173.50	157.32	94.66
	(0.000)	(0.000)	(0.000)	(0.00)	(0.000)	(0.000)
Observations	340	340	338	340	340	338
Number of groups	34	34	34	34	34	34
Number of Instruments	65	65	65	65	65	65

Note: t and z statistics in parenthesis
*significant at 10%;**Significant at 5%;***Significant at 1%

administrative changes in the sector ultimately contributed educational outcomes (school enrolment) to some extent.

Table 2: Estimation results on impact of fiscal decentralization on education

Dependent Variable % of students enrolled in primary school (ENR)

Model Specifications	System GMM					
	(1)	(2)	(3)	(4)	(5)	(6)
Regressors						
Lag of Education(ENR L1)	0.76***	0.77***	0.77***	0.75***	0.78***	0.75***
	(16.59)	(16.12)	(16.09)	(12.64)	(14.31)	(11.28)
Fiscal(Expenditure) Decentralization	16.31***	20.56***	24.31***	16.46***	17.53	24.13***
(FDE)	(3.28)	(3.39)	(3.17)	(3.21)	(3.32)***	(3.03)
Fiscal(Revenue) Decentralization	0.09	0.07	0.30*	0.11	-0.03	0.35
(FDR)	(1.22)	(0.99)	(1.76)	(0.75)	(-0.16)	(1.04)
Public Education Expenditures	1.86***	1.90***	3.70***	2.11	0.74	4.48
(lnEXE)	(3.92)	(3.96)	(2.74)	(1.47)	(0.43)	(1.41)
Population (POP)		-0.79				-0.87
		(-1.21)				(-0.62)
Population Density (PD)			-6.37			-3.66
			(-1.42)			(-0.61)
Output (OPT)				-0.21		-0.50
				(-0.19)		(-0.36)
Road Length(RL)					0.98	-0.81
					(0.67)	(-0.28)
Sargen Test chi-square (p-value)	18.56	25.13	23.91	108.99	16.53	33.23
	(0.421)	(0.06)	(0.140)	(0.00)	(0.523)	(0.321)
AR (1)	-6.31	-6.22	-6.18	-5.97	-5.93	-5.70
	(0.23)	(0.41)	(0.52)	(0.23)	(0.61)	(0.13)
AR (2)	-0.81	-0.90	-1.00	-0.81	-0.74	-0.98
	(0.42)	(0.366)	(0.315)	(0.42)	(0.46)	(0.33)
F-statistics (p-value)	29282.41	22935	22715.52	23455.9	23017.8	14053.0 (0.00)
	(0.000)	(0.00)	(0.00)	(0.00)	(0.00)	
Observations	374	374	373	374	374	373
Number of groups	34	34	34	34	34	34
Number of Instruments	21	21	21	21	21	21

Note: t and z statistics in parenthesis

*significant at 10%;**Significant at 5%;***Significant at 1%

Conclusion and Recommendations

The purpose of this study is to examine the impact of fiscal decentralization on education outcome in the thirty four districts of Punjab province of Pakistan. Since independence, Pakistan was one of the most centralized countries in the world. Whereas, different attempts were made to implement decentralization reforms but a comprehensive decentralization program was implemented in 2001. This system aims to better provision of public services, like education health care and other services.

This research investigates the key aspects of fiscal decentralization, to provide a deep understanding of the effects of fiscal decentralization reforms on education outcome in Pakistan. The research has been conducted by collecting the data of 34 districts of Punjab province for 12 years from 2003 to 2015. Previous studies evaluated this issue at Pakistan level with comprehensive theoretical discussions while very few studies have evaluated this issue with empirical testing. This study is unique, and adds value to the literature because of providing empirical testing on decentralization and education service delivery across-districts of Punjab province Pakistan. In addition, the method of this study handle the endogeneity problem by applying first difference Generalized Methods of Moment (GMM) and system Generalized Methods of Moment (GMM).

The results are obtained by applying the panel data econometric techniques, to capture the effect of fiscal decentralization on primary school enrolment. The empirical analysis of the study sample exhibits that decentralized government seems to improve education service significantly which expressed by improvement in education measure i.e. percentage of children enrolled in primary schools. This improvement in service delivery is identified through expenditure decentralization whereas revenue measure of decentralization does not contribute in improvement of service delivery.

The bottom-line finding states that the last/third military government in Pakistan has achieved the objectives of fiscal decentralization to some extent. In the light of the findings of this research, it is suggested to the government of Pakistan to share the financial power and resources to the local government level, so that the social welfare of the local people can be achieved. The provincial government must transfer the administrative authority to the local government for the best interest of the local citizens.

Although the percentage of students enrolled in primary schools improves significantly, but still further improvement is needed. For this purpose the resources, financing and administrative system must be managed. Local governments must be qualified to run its own administration. Moreover the improved governance structure and suitable institutional environment must be created to get improved outcomes. The findings also support the idea that the importance of decentralization reforms and its mechanism is best for the development at the disaggregated level which will in turn contribute to the economic development of Pakistan. In addition, the continuous monitoring is suggested for successful implementation and effectiveness of the policies. By summing the discussion it is strongly recommended to distribute the fiscal powers as well as resources to the local governments to achieve the social welfare objective in Pakistan.

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Appendices

Appendix-A

A-1: All Districts of Punjab Province

Sr.No	Districts	Sr.No	Districts
1	Rawalpindi	18	Narowal
2	Sahiwal	19	R.Y. Khan
3	Pakpattan	20	Layyah
4	Khushab	21	T.T. Singh
5	Kasur	22	Jhelum
6	Sheikhupura	23	Rajanpur
7	Bahawalpur	24	Mianwali
8	Faisalabad	25	Hafizabad
9	Mandi Bahauddin	26	Muzaffargarh
10	Multan	27	Sargodha
11	Chakwal	28	Okara
12	Gujranwala	29	Vehari
13	Bhakkar	30	D.G.Khan
14	Lahore	31	Jhang
15	Attock	32	Khanewal
16	Gujrat	33	Lodhran
17	Bahawalnagar	34	Sialkot

Two independent districts were emerged later and excluded from the sample due to non-availability of data

A-2: Normality Test

Normality Test	Chi^2- statistics	Probablity
Doornik-Hansen Test	215.32	0.0012
Null Hypothesis: Data is Normally Distributed.		

A-3: Variables Description

(a) Description of dependent and Explanatory Variables

Variables	Calculation Formula	Expected Sign	Data Source
Education (ED)	Percentage of students enrolled in primary school (age 6-10)	Positive	PSLM, MICS
Fiscal (Expenditure) Decentralization	Total District expenditures/ Total Central Govt. Expenditures	Positive	Finance Department Ministry of Finance Punjab
Fiscal (Revenue) Decentralization	Total District revenue / Total Central Govt. Revenue	Positive	Finance Department Ministry of Finance Punjab
District wise Govt. Expenditure on Education		Positive	Finance Department Ministry of Finance Punjab

Source: Author

(b) (Description of Control Variables)

Variables	Calculation Formula	Expected Sign	Data Source
Total District Population (Million)		Negative	PDS, PSLM
Population Density	Total district Population / Total Area of district	Negative	PDS, PSLM
District Output	Total Yield = Sum of all crops produced in a district annually	Positive	PDS
Road Length	Total Length of metaled roads in district (kilometers)	Positive	PDS

Source: Author

Appendix-B

B-1: Summary Statistics of Dependent and Independent Variables

Variables	bs	Mean	Min	Max	Std. Dev.
ENR	408	65.56	30	91	14.06
FDE	408	0.211	0.07	0.91	0.12
FDR	408	3.95	-0.02	22.37	3.75
EXE	408	2235.88	255.42	9604.1	1476.61
TX	408	3773.18	898.78	18774.81	2470.32

Source: calculated by author using STATA-12

Variables	ENR	FDE	FDR	EXE	EXH	TX
ENR	1					
FDE	0.66	1				
FDR	-0.18	0.37	1			
EXE	0.68	0.49	-0.26	1		
TX	0.35	0.68	0.71	0.91	0.84	1

B-2: Summary Statistics of Control Variables

Variables	obs	Mean	Min	Max	Std.Dev.
POP	408	2.61	0.92	9.25	1.56
PD	407	2.66	2.02	3.72	0.33
OPT	408	1874.64	77	11767	1273.57
RL	408	2457.43	949.53	154623	7593.15

Source: calculated by author using STATA-12