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Assessing the Effects of Fiscal Decentralization on the Efficiency of Education Sector: Analysis of Punjab, Pakistan

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ABSTRACT

The present study investigates the impact of fiscal decentralization (FD) on the efficiency of public service delivery (PSD) in the education sector of Punjab, Pakistan, from the year1982 to 2017. Firstly, the efficiency coefficients for secondary school enrolment are estimated using Stochastic Frontier Analysis (SFA). Secondly, the impact of FD on PSD in the education sector of Punjab, Pakistan, is analyzed using the Auto-Regressive Distributed Lag (ARDL) method of estimation. The findings suggest that revenue decentralization positively enhances PSD efficiency in the education sector. In contrast, the effect of expenditure decentralization is negative on the efficiency of the education sector.

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1. Introduction

Fiscal decentralization (FD) is a process that gives the local government more autonomy in economic decision-making. Sub-national governments can use this autonomy to increase the quality of human capital by investing more in the education and health of the masses. Since education is an important determinant of the quality of life of individuals (Tajvar, Arab, & Montazeri, 2008), the Millennium Development Goals (MGD) also stress the importance of an efficient education system. Better educational services create employment opportunities for the masses (Brown, 2003; Pearson & Daff, 2010), and it also help countries in the form of improved human capital. The present study is designed to check the impact of FD on the efficiency of public service delivery (PSD) in the education sector of Punjab, Pakistan.

Market imperfection in the provision of basic needs of life is the most common characteristic of developing countries. In the presence of such imperfections, states' role becomes crucial in providing basic public goods like health and education. At the same time, lower tax revenues are also hurting developing countries. High population growth rates in developing countries and low levels of tax collection make it impossible for states to spend large sums on public services like education facilities. Optimal use of scarce resources and putting them to effective use is essential in this case. This involves assessing the efficacy of social spending and setting up reasonable goals and targeting the right areas for resource use. According to the World Bank (2003), poorly managed public spending is a major contributor to poor outcomes in developing countries such as Pakistan.

Developing countries like Pakistan are striving for higher economic growth rates. In this scenario, human capital can play a vital role in the form of skilled labor in the labor market.

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Hence, there is a need to invest in the education sector to improve the country's human capital. Governments and policymakers can either increase the spending on education or implement efficient policies. When restrained by limited resources, policymakers aim to optimally use the limited available resources. Health and education are the best social sectors where long-term returns are quite high. The spending on the education and health sector can solve many socio-economic issues by increasing the growth rates, better human capital for the economy, reducing poverty levels and income inequality in the country (Baldacci, Clements, Gupta, & Cui, 2008; Barro, 1991; Chu et al., 1995; Gillani, Shafiq, Bhatti, & Ahmad, 2022; Lucas, 1988; Romer, 1986; Tanzi & Chu, 1998). In this context, decentralization, the process which transfers resources and power of decision-making to sub-national government from the federal, is critical to providing better PSD. The present study aims to examine the impact of FD on the efficiency of the PSD in the education sector of the province of Punjab, Pakistan.

Pakistan is a federally administrated country. Types of taxes levied on the public are mostly collected by the federal government, and these revenues are distributed among federal, provincial, and administrative states vertically and horizontally. The share provinces receive from the federal government is then distributed among lower tiers using the revenue-sharing formula under Provincial Finance Commission (Khawaja & ud Din, 2013; Mustafa, 2011).

According to the 1973 constitution of Pakistan, Article 160 made it obligatory to distribute revenues among federal and provinces corresponding to the National Finance Commission (NFC) award. The NFC award has four components: population, poverty, revenue collection, and area. Higher weights are given to the population and lower to the area. According to the 7thNFC award, the province that receives the highest share (51.47%) from the NFC award is Punjab, and the lowest share (9.09%) is received by Baluchistan.

Before the 18thamendment, education was a national subject, and the federal governments made overall policy plans for the education sector in Pakistan. However, after the 18thamendment, education became a provincial subject (still, the federal government makes the policies, and provincial governments make the implementation, execution, and operationalization of these policies). The primary reason for having more FD in the education sector is to increase education provision and bring greater efficiency.

The debate on FD started in the 1970s when the researchers argued about fiscal decentralization's theoretical and empirical impacts but couldn't reach a specific direction of the FD. Researchers point out that FD is crucial because it is greatly linked with resource use and PSD. It is argued that FD can affect an economy's political, social, and economic system (Martínez-Vázquez, Lago-Peñas, & Sacchi, 2017). FD brings about opportunities that help to organize the public sector and accelerate economic growth. The decentralization theorem of Oates describes that the welfare of citizens will increase when the structure of government is decentralized (Oates, 1993). This view is supported by Manor (1999). According to them, FD can be used as a powerful policy tool to address the issues like income and regional inequality, rising poverty levels, and political instability. The proponents of FD see it as a tool to increase the quantity and quality of social services, including health and education (T. I. Ahmad, Shafiq, & Gillani, 2019; Ahmed & Lodhi, 2016b). However, on the contrary, researchers also point out that FD may promote economic inefficiency, social inequality, and distort social services provision (Blair, 2000; Katsiaouni, 2003; Samoff, 1990; Tanzi, 1996). Critics believe that decentralization distorts the economies of scale, promotes corruption, and encourages the culture of supporting the elite class at the local level. Opponents fear that with more fiscal decentralization, the provision of public services such as health and education deteriorate.

Advocates of FD suggest that since the local governments are well-aware of the domestic needs and demands of the masses, they help the efficient allocation of resources (Vo, 2010). In this regard, FD is increasingly linked to the education sector. This sector has been a central theme for policymakers due to the increasing demand for knowledge and innovation in the modern world. Therefore, the sub-national governments heavily rely on the FD to provide quality education services to the masses. With this background, the present study investigates the impact of FD on the efficiency of the PSD in the education sector of the province of Punjab, Pakistan, from the year1982 to 2017.

2. Literature Review

Since the 1980s, a vast amount of literature has been available that links FD with economies' growth rates. But still, there is a dearth of literature investigating the relationship between FD and the efficiency of PSD. Moreover, the findings of the existing research are also polarized, where some studies (Adam, Delis, & Kammas, 2014; Fredriksen, 2013; Kaufmann, Kraay, & Zoido-Lobatón, 2013) find a positive effect of FD on the efficiency of PSD while others (De Mello Jr, 2004; Zhang & Zou, 1998) find the negative influence of FD on the efficiency of PSD. The authors report that there must be strong accountability, good governance, and no corruption at the sub-national level to influence FD on PSD positively. However,since the literature on this topic is divided, a definite conclusion cannot be drawn about the relationship between FD and efficiency in PSD. Therefore, systematic research is required to strengthen and support the debate on the relationship between FD and the efficient provision of public services.

Sow and Razafimahefa (2015) studied the impact of FD on the efficiency of PSD in the education and health sectors. The authors reported that FD enhances the efficiency of PSD only when the sub-national governments have autonomy in decision making, are free of corruption, have strong accountability, and have efficient governance. Brosio (2014) also drew a similar conclusion, who analyzed the contribution of FD towards improving the PSD in Asia and found greater accountability as a key ingredient for achieving efficiency in PSD through decentralization.

Specifically considering the efficiency of the education sector, a comprehensive study was conducted by I. Ahmad (2016). Using a panel of 62 OECD countries, I. Ahmad (2016) examined the impact of FD on the education sector of the selected countries. Two models were used for analysis. To capture the short-run effect of decentralization, the study uses educational expenditure as an outcome variable because, in the short-run, the focus is normally on generating funds to carry out administrative reforms. On the contrary, the focus is on the outcome of policy reforms in the long run. Therefore, the study has used the teacher-student ratio (an indicator of educational quality) as a dependent variable for the long run. The study pointed out that different source of FD has different effects on the expenditures allocated to education and educational quality. Furthermore, it was highlighted that sub-national governments allocate more funds to the education sector if these funds are financed by their tax revenues, and more attention is given to quality teaching. Local governments focus more on increasing student enrollment ignoring the student-teacher ratio in the education institutions. This study supports the stance that since local governments can better assess and cater to local needs, FD is, therefore, an important policy instrument for achieving social goals. A similar conclusion was also drawn by Faguet (2004), who argued that, since local governments have better insight into the education requirements of the people, FD help them to enhance the efficiency of the education sector.

Similarly, Busemeyer (2008) empirically examined the impact of FD on educational expenditures in 21 OECD countries from 1980 to 2001. Results of the study show a positive association between FD and education expenditures. A similar conclusion was also drawn by Salman and Iqbal (2011). They also argued that FD positively impacts social capital that is broadly measured by health and education (Gillani, Shafiq, & Ahmad, 2019). Galiani, Gertler, and Schargrodsky (2008) also reviewed the literature related to education decentralization and concluded that there is a positive relationship between decentralization and the education sector's performance.

Hanif and Chaudhry (2015) examined the impact of FD in Pakistan on public investment by taking data from 1972 to 2013. This study finds a significant relationship between FD and public investment and argues that the more autonomy the provincial government has, the more investment in public sectors. The authors of the study suggest that FD can prove to be very important for developing the public sector. Furthermore, Rauf (2017) analyzed the impact of FD on PSD, proxied by gross primary school enrollment, in Pakistan from 1972 to 2009. The results of the study show that decentralization helps in increasing school enrollment.

Using ARDL model, Usman (2021) explored the effect of fiscal decentralization on the quality of education in Pakistan from the year 1970-2019. The study uses teacher-student

ratio as an indicator of the quality of education while the expenditure decentralization and revenue decentralization are taken as proxies of decentralization. The study concludes that although expenditure decentralization does not enhance the quality of education, revenue decentralization is useful for raising the quality of education in Pakistan.

Fredriksen (2013) studied the effect of FD on the structure of public expenditures, including the ones related to the education sector. The results of the study show that FD increases both physical and human capital spending. Furthermore, the study found that a 10% point increase in decentralization increased approximately 3% to 4% in the share of public investment in total government spending. A significant part of this increased spending is due to the increase in the spending on education. The study results show that these educational expenditures positively contribute to the student's performance.

Apart from the studies that highlight the contribution of FD towards enhancing the efficiency of PSD, some studies point out the negative influence of FD on PSD. In this regard, De Mello Jr (2004) suggested that decentralization brings inefficiency because, as a result of decentralization, economies cannot benefit from the economies of scale, and irregularities in various sectors hinder the efficient PSD. Zhang and Zou (1998) criticized decentralization and considered it responsible for economic inefficiency.

While conducting a detailed study Xie, Zou, and Davoodi (1999), checked the effects of FD on the United States (USA). The results of the study highlighted that FD does not contribute to efficient PSD. The author pointed out that in developed countries, such as the USA, FD is already optimal, so further decentralization may not benefit the economy. On the other hand, for developing countries, decentralization negatively contributes to the public sector's efficiency.

Naeem, Farid, Ferrer, and Shahzad (2021) took the analys is of the relationship between FD and efficiency in PSD one step ahead and explored that how fiscal decentralization affects gender parity in education in Pakistan. Using ARDL bounds test approach for cointegration testing, the study concludes that fiscal decentralization contributes towards improving gender equality in education in Pakistan. A similar conclusion was also drawn by Naeem and Khan (2021) for 29 developing economies.

The literature review on FD and the efficiency of PSD suggests that little conclusive evidence exists on the impact of FD on the efficiency of the education sector of Pakistan. However, the study of the existing research suggests that for developing countries, FD can enhance the efficiency of PSD in education and accelerate growth if there are good institutions, better control over corruption, good governance, and strong accountability at the sub-national level.

3. Data Description and Model Specification

In order to examine the impact of fiscal decentralization (FD) on efficiency in PSD in the education sector, efficiency coefficients are estimated in the first step of analysis using the stochastic frontier technique. In this regard, the following model is used:

$$SSE = \beta_0 + \beta_1 PE + \beta_2 GDPPC + \beta_3 POP + \beta_4 POPD + \varepsilon \text{ ---------- (1)}$$

Where SSE is the total enrollment (in millions) at the secondary level, PE is the public expenditure on education (% of GDP). GDP per capita (GDPPC), annual growth of population (POP), and population density per square kilometer (POPD) are the input variables. The data for all these variables is taken from various issues of the Economic Survey of Pakistan.

In the second step of the analysis, FD is examined on the efficiency coefficients of secondary school enrollment. To do so, the following model is estimated:

$$\eta_{t\,(enroll)} = \alpha_0 + \beta_0 FISD + \Phi_1 IN + \Phi_2 UNEMP + \varepsilon \text{ ---------- (2)}$$

Where η shows the efficiency, coefficient estimated in the first step, FISD represents fiscal decentralization. Since FD is not directly measurable, based on the past literature, two proxies, namely revenue decentralization (REVD) and expenditure decentralization (EXPD) are

used to measure FD. EXPD is taken as a ratio of sub-national expenditures to total national expenditures.

$$EXPD = \frac{PROE}{PROE + FEDE}$$

Where PROE is provincial expenditure and FEDE is federal expenditure. REVD is taken as a ratio of sub-national revenue to total national revenues.

$$REVD = \frac{PROR}{PROR + FEDR}$$

Where PROR is provincial revenue and FEDR is federal revenue. The control variables are inflation (IN) and unemployment rate (UNEMP). Inflation is measured using the consumer price index, reflecting the annual change in the basket of goods and services consumed by households. The unemployment rate is the total number of unemployed expressed as a percentage of the total labor force.

4. Methodology

4.1 Stochastic Frontier Analysis (SFA)

SFA is used to estimate the efficiency coefficients in model 1 of the study. SFA is a parametric approach to estimating or measuring the (in) efficiency scores of an economic variable. This method takes some variables in the form of input and gives results in the form of output that shows the (in) efficiency scores. The present study has used SFA to estimate the efficiency scores of the school enrolment, whereas some variables are taken as input stated in model 1. Frontier version 4.1 is used to obtain the efficiency scores.

4.2 Unit Root Tests

In the second phase, regression analysis is conducted. The time-series data has been used for the analysis. Time series data usually has unit root issues causing spurious results. Therefore, it is considered a prerequisite to checking the order of integration or unit root (Alamdar, Ahmed, & Jadoon, 2022). The present study has used Augmented Dickey-Fuller (ADF) test to check the unit root property of the data.

4.3 Auto Regressive Distributed Lag (ARDL) Bound Testing Approach

The present study has used the ARDL bound testing approach developed by Pesaran, Shin, and Smith (2001) to estimate the short-run and long-run relationship between variables of the study. ARDL approach has several advantages over Engel Granger and Johnson's cointegration approaches (Alamdar et al., 2022). ARDL approach of cointegration can be applied if the variables of the study are integrated of order zero or one. Moreover, once the order of integration is determined, the results can be obtained by simply applying ordinary least square regression. According to Laurenceson and Chai (2003), the ARDL approach is quite suitable for analysis as it takes the maximum number of lags necessary to limit the data generating process within the general-to-specific framework.

The advantages of the ARDL approach over above stated other approaches compelled the researchers to use this approach to carry out results. As suggested in the ARDL approach, F-test is applied to check the long-run relationship between the variables of the study. The absence of a long-run relationship among variables is the null hypothesis of the F-test. The estimated value of the F-test is compared with the tabulated values given by Pesaran et al. (2001). If the estimated values are greater than the upper bound (UB) and less than the lower bound (LB), it can be said that there exists a long-run relationship among variables (the null hypothesis is rejected). Furthermore, if the estimated value lies between the LB and UB, it can be said that the results are inconclusive. The next step is the selection of the maximum lag length that is used to obtain the long-run results. Schwartz Bayesian Criteria (SBC) is used to select the maximum lag length for the study.

Afterward, various post estimation diagnostic tests, including the Ramsey RESET test, Lagrange Multiplier test, and White test, are applied to check the model specification, serial correlation, and heteroskedasticity issues. Finally, the cumulative sum (CUSUM) and CUSUM square tests are applied to check the stability of the relationship of the model.

5. Results and Discussion

5.1 Stochastic Frontier Analysis Results for the Efficiency Coefficients of Secondary School Enrollment

Using SFA, model 1 (given below) is estimated to determine the efficiency coefficients for secondary school enrollment.

$$SSE = \beta_0 + \beta_1 PE + \beta_2 GDPPC + \beta_3 POP + \beta_4 POPD + \varepsilon$$

The results are presented in Table 1 below:

Table 1: Efficiency Coefficients of SSE

Variable	Coefficient	Standard error	Probability value
Constant	0.131	0.10	0.003
PE	0.192	0.059	0.019
GDPPC	0.446	0.211	0.045
POP	0.514	0.016	0.052
POPD	0.133	0.80	0.013
Log likelihood function= -0.52995			

The results show that public expenditure (PE) on education has a positive and significant impact on secondary school enrolment. A 1% increase in public expenditure on education is causing a 19.2% increase in secondary school enrolments. A similar positive association is also found between GDP per capita and secondary school enrolment, where a 1% increase in GDP per capita contributes 44.6% increase in secondary enrolment. Population growth and population density are also found to affect secondary school enrolments positively; however, the effect of population is significant at 6 %.

The results also show the yearly efficiency coefficient of secondary school enrolment from 1982 to 2017 (refer to Table 2) is 84%. The mean secondary efficiency is around 84%, which shows Pakistan has the potential to improve its educational efficiency by 16%. The public expenditures on education are used efficiently to increase educational efficiency. These results are in line with the ones provided by Sow and Razafimahefa (2015).

Table 2: Efficiency Estimates of SSE

Years	Efficiency Coefficients	Years	Efficiency Coefficients
1982	0.731	2000	0.914
1983	0.707	2001	0.842
1984	0.732	2002	0.836
1985	0.712	2003	0.819
1986	0.658	2004	0.875
1987	0.638	2005	0.883
1988	0.61	2006	0.927
1989	0.672	2007	0.899
1990	0.729	2008	0.898
1991	0.809	2009	0.872
1992	0.815	2010	0.883
1993	0.789	2011	0.889
1994	0.869	2012	0.866
1995	0.954	2013	0.889
1996	0.829	2014	0.913
1997	0.844	2015	1
1998	0.882	2016	0.985
1999	0.909	2017	0.953
Mean Efficiency		0.834	

After computing the efficiency coefficient, ADF test is applied on the variables under consideration. The results of the ADF test are presented in Table 3 below:

Table 3: ADF Test Results

Variables	Level	Results	First Difference	Results
REVD	-21.02	Stationary		-
EXPD	-2.93	Not Stationary	-8.1	Stationary at First Difference
GDPPC	4.19	Stationary		-
UNEMP	-2.01	Not Stationary	-5.82	Stationary at First Difference
IN	-2.69	Not Stationary	-7.4	Stationary at First Difference
SSE	-2.56	Not Stationary	-5.63	Stationary at First Difference

The results of the ADF test show that REVD and GDPPC are stationary at "level" while the other four variables used in the study are stationary at first difference. The dependent variable SSE is also stationary at first difference. Furthermore, the results also highlighted that not a single variable is stationary at level 2, which fulfils the prerequisite of the ARDL estimation method (Pesaran et al., 2001).

After checking the unit root in the data, the bound test is applied to check the long-run relationship between the variables of the study. The results of SBC show that the optimal lag length is 2. The results of the bound test are reported in Table 4:

Table 4: Bound Test Results

F-stat value	95% Confidence Level		90% Confidence Level	
	LB	**UB**	**LB**	**UB**
10.78	2.86	4.10	2.45	3.52

The result of the Bound test shows that the value of F-stat is 10.78, which is higher than the UB at both 90% and 95 % confidence levels. On the bases of this result, the null hypothesis that the absence of a long-run relationship is rejected. After confirming the long-run relationship among variables through the bound test, the short-run and long-run estimates are presented in Table 5 and Table 6, respectively.

Table 5: Short-run Estimates, ARDL (1,1,2,1,1,1), Dependent Variable: SSE

Variables	Coefficients	Standard Errors	t-ratios	Probability values
SSE (-1)	0.512	0.196	2.6	0.017
REVD	-0.114	0.011	-10.4	0.009
REVD (-1)	-0.028	0.012	-2.3	0.019
EXPD	-0.512	0.042	-12.2	0.023
EXPD (-1)	-0.258	0.049	-5.26	0.019
EXPD (-2)	-0.34	0.046	-7.4	0.022
GDPPC	-1.91	0.12	-15.92	0.076
GDPPC (-1)	0.3	0.09	3.3	0.012
UNEMP	-0.165	0.067	-2.5	0.02
UNEMP (-1)	0.066	0.071	0.93	0.389
IN	-0.026	0.032	-0.81	0.04
IN (-1)	-0.06	0.03	-2	0.05
Constant	0.036	0.025	1.44	0.11
CointEq(-1)	-0.488	0.196	-2.48	0.022
R^2 =	0.908			
Adjusted R^2 =	0.8571			

The results show that the two measures of fiscal decentralization, REVD, and EXPD, have a negative impact on the efficiency of the education sector. A 1% increase in REVD causes an 11.4% decrease in the SSE. In contrast, the EXPD coefficient shows that a 1% increase in EXPD results in a 51.2% decrease in the efficiency coefficient of secondary education. These results are in-line with the ones presented by Sow and Razafimahefa (2015). This negative impact is due to the challenges and obstacles faced in the operationalization of

the process of FD and PSD in developing countries like Pakistan. The sub-national government's lack of accountability and corruption can lead to inefficient outcomes. In this regard, Ahmed and Lodhi (2016a) highlighted that FD can promote corruption, so good governance is important to achieve efficient outcomes in the education sector.

The results also show that the unemployment rate has a negative effect on the SSE. A 1% increase in unemployment leads to an approximately 16.5% decrease in the efficiency coefficient in education. A similar negative effect on the efficiency of secondary school enrollment is also posed by the inflation rate, where a 1% increase in inflation results in a 2.6% decline in the efficiency of the education sector. The results further show that GDPPC has a significant effect on secondary school enrollment efficiency. The values of R^2 and adjusted R^2 show that the model is well fitted. The long-run ARDL estimates are given in Table 6.

Table 6: Long-run Estimates, ARDL (1,1,2,1,1,1), Dependent Variable: SSE

Regressors	Coefficients	Standard error	t-ratio	p-value
REVD	0.44	0.71	0.62	0.199
EXPD	-0.56	0.21	-2.66	0.022
GDPPC	0.22	0.02	11	0.000
UNEMP	-0.095	0.013	-7.30	0.005
IN	-0.012	0.011	-1.09	0.281

The long-run estimates show that EXPD has a negative effect on the efficiency of secondary school enrolment in the long run, indicating that EXPD causes a decrease in the efficiency of PSD in the education sector. A 1 % increase in EXPD causes a 56% decrease in secondary school enrollment efficiency coefficient. On the other hand, REVD has a positive contribution to secondary school enrolment efficiency. A 1% increase in REVD increases the efficiency of the secondary school enrolment rate by 43.9%. These results are in line with the ones presented by Kaufmann et al. (2013); Usman (2021) and Sow and Razafimahefa (2015).

Our findings also suggest that GDPPC has a positive and significant impact on the efficiency of secondary school enrolment, while the effect of unemployment is negative and significant. The effect of the inflation rate on the efficiency of the education sector is insignificant in the long run. Various diagnostic tests are applied to check the robustness of the results. The results of the diagnostic tests are presented in Table 7 below:

Table 7: **Diagnostic Test Results**

Tests	χ^2 value	Probability value	Results
Ramsey RESET	13.35	0.194	Correct Specification of the model
Lagrange Multiplier	3.008	0.095	Absence of serial correlation
White	0.003	0.075	Absence of Heteroskedasticity

The results presented in Table 7 show that the model is correctly specified, and there is no problem of serial correlation in the data. As indicated by the white test, the error terms have constant variance, i.e., there is an absence of heteroskedasticity. In the last step, CUSUM and CUSUM square tests are applied to check the stability of the model. The results are presented in Figure 1 and Figure 2.

Figure 1: Plot of CUSUM

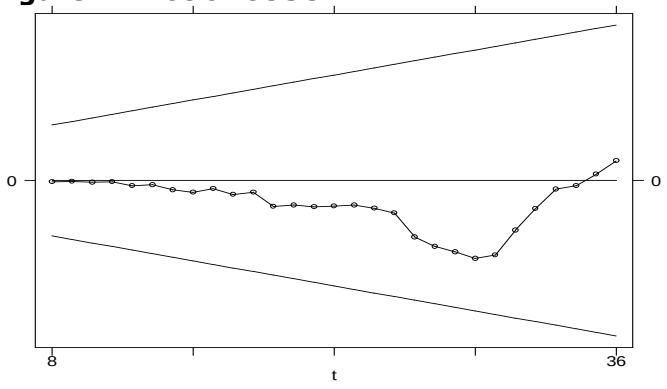
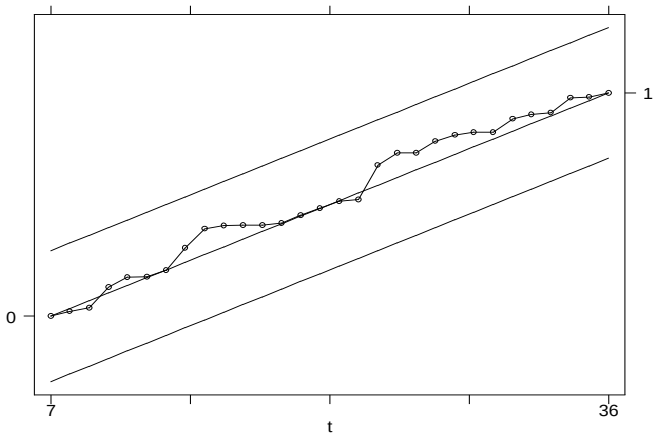


Figure 2: Plot of CUSUMSQ



The results of CUSUM and CUSUM square tests show that model is stable as lines representing the test stay within the critical bounds (shown with the help of parallel straight lines. So, the results confirm the structural stability of our model.

6. Conclusion and Policy Recommendations

Using SFA and ARDL estimation techniques, the present study has examined the effects of fiscal decentralization (FD) on efficiency coefficients of public service delivery (PSD) outcomes in the education sector of Pakistan over the period 1982 to 2017. Since FD is not directly measurable, two proxies, EXPD and REVD, are used to measure it. The findings suggest that REVD positively enhances PSD efficiency in the education sector. At the same time, the effect of EXPD is negative on the efficiency of the education sector.

Based on the results of the present study, it is suggested that the sub-national governments should increase the tax base to generate more revenues. The increased volume of tax revenue will create room to achieve long-term efficiency in the PSD in the education sector. Efforts should motivate people to pay taxes and take action against the defaulters. In addition, the number of goods and chattels that are not taxed should be reduced. Moreover, to benefit from EXPD, there should be strict control over corruption and better institutions' accountability to prevent the misuse of public resources.

References

Adam, A., Delis, M. D., & Kammas, P. (2014). Fiscal decentralization and public sector efficiency: evidence from OECD countries. *Economics of Governance, 15*(1), 17-49. doi:https://doi.org/10.1007/s10101-013-0131-4

Ahmad, I. (2016). Assessing the effects of fiscal decentralization on the education sector: A cross-country analysis. *The Lahore Journal of Economics, 21*(2), 53-96.

Ahmad, T. I., Shafiq, M. N., & Gillani, S. (2019). Foreign Remittances and Human Resource Development in Developing Countries. *IUB Journal of Social Sciences, 1*(1), 43-60.

Ahmed, M., & Lodhi, A. S. (2016a). Impact of fiscal decentralizations on education and healthcare outcomes: Empirical evidence from Pakistan. *Journal of Applied and Emerging Sciences, 4*(2), p122-134.

Ahmed, M., & Lodhi, A. S. (2016b). Impact of fiscal decentralizations on education and healthcare outcomes: Empirical evidence from Pakistan. *Journal of Applied and Emerging Sciences, 4*(2), 122-134. doi:http://dx.doi.org/10.36785/jaes.42149

Alamdar, A., Ahmed, M., & Jadoon, A. K. (2022). Do Migrant Remittances Promote Corruption in Pakistan? *iRASD Journal of Economics, 4*(1), 88-97. doi:https://doi.org/10.52131/joe.2022.0401.0063

Baldacci, E., Clements, B., Gupta, S., & Cui, Q. (2008). Social spending, human capital, and growth in developing countries. *World development, 36*(8), 1317-1341. doi:https://doi.org/10.1016/j.worlddev.2007.08.003

Barro, R. J. (1991). Economic growth in a cross section of countries. *The quarterly journal of economics, 106*(2), 407-443. doi:https://doi.org/10.2307/2937943

Blair, H. (2000). Participation and accountability at the periphery: Democratic local governance in six countries. *World development, 28*(1), 21-39. doi:https://doi.org/10.1016/S0305-750X(99)00109-6

Brosio, G. (2014). Decentralization and public service delivery in Asia. *Asian Development Bank Economics Working Paper Series*(389). doi:http://dx.doi.org/10.2139/ssrn.2479233
Brown, P. (2003). The opportunity trap: Education and employment in a global economy. *European Educational Research Journal, 2*(1), 141-179. doi:https://doi.org/10.2304/eerj.2003.2.1.4
Busemeyer, M. R. (2008). The impact of fiscal decentralisation on education and other types of spending. *Swiss Political Science Review, 14*(3), 451-481. doi:https://doi.org/10.1002/j.1662-6370.2008.tb00109.x
Chu, K.-y., Gupta, S., Clements, B., Hewitt, D., Lugaresi, S., Schiff, J., & Schwantz, G. (1995). Unproductive public expenditures. *IMF Pamphlet Series*(48), 1-45. doi:https://doi.org/10.5089/9781557755414.054
De Mello Jr, L. R. (2004). Can fiscal decentralization strengthen social capital? *Public Finance Review, 32*(1), 4-35. doi:https://doi.org/10.1177/1091142103260699
Faguet, J.-P. (2004). Does decentralization increase government responsiveness to local needs? Evidence from Bolivia. *Journal of Public Economics, 88*, 867-893.
Fredriksen, K. (2013). Decentralisation and economic growth-Part 3: Decentralisation, infrastructure investment and educational performance. *OECD Working Papers on Fiscal Federalism, OECD Publishing, Paris*. doi:https://doi.org/10.1787/22265848
Galiani, S., Gertler, P., & Schargrodsky, E. (2008). School decentralization: Helping the good get better, but leaving the poor behind. *Journal of public economics, 92*(10-11), 2106-2120. doi:https://doi.org/10.1016/j.jpubeco.2008.05.004
Gillani, S., Shafiq, M. N., & Ahmad, T. I. (2019). Military expenditures and health outcomes: a global perspective. *iRASD Journal of Economics, 1*(1), 1-20. doi:https://doi.org/10.52131/joe.2019.0101.0001
Gillani, S., Shafiq, M. N., Bhatti, M. A., & Ahmad, T. I. (2022). Impact of Economic Growth on Child Malnutrition in Pakistan: A Time Series Analysis. *iRASD Journal of Economics, 4*(1), 149-163. doi:https://doi.org/10.52131/joe.2022.0401.0069
Hanif, I., & Chaudhry, I. S. (2015). Interlinks of fiscal decentralization and public investment in Pakistan. *Pakistan Journal of Commerce and Social Sciences (PJCSS), 9*(3), 850-864.
Katsiaouni, O. (2003). *Decentralization and poverty reduction: does it work.* Paper presented at the Paper Submitted to the Workshop on: Linking Decentralized Governance and Human Development (UNDP, UNCDF, WBI and UN-DESA) Mexico City.
Kaufmann, D., Kraay, A., & Zoido-Lobatón, P. (2013). *Governance matters II: updated indicators for 2000-01* (Vol. 2772): World Bank Publications.
Khawaja, I., & ud Din, M. (2013). Intergovernmental transfers: an evaluation of mechanism and design of transfers in Pakistan. *The Pakistan Development Review, 52*(1), 45-68.
Laurenceson, J., & Chai, J. C. (2003). *Financial reform and economic development in China*: Edward Elgar Publishing.
Lucas, R. (1988). On the mechanics of economic development. *Journal of monetary economics, 22*(1), 3-42. doi:https://doi.org/10.1016/0304-3932(88)90168-7
Manor, J. (1999). *The political economy of democratic decentralization*: The World Bank.
Martínez-Vázquez, J., Lago-Peñas, S., & Sacchi, A. (2017). The impact of fiscal decentralization: A survey. *Journal of Economic Surveys, 31*(4), 1095-1129. doi:https://doi.org/10.1111/joes.12182
Mustafa, U. (2011). Fiscal federalism in Pakistan: The 7th National Finance Commission award and its implications.
Naeem, M. A., Farid, S., Ferrer, R., & Shahzad, S. J. H. (2021). Comparative efficiency of green and conventional bonds pre-and during COVID-19: An asymmetric multifractal detrended fluctuation analysis. *Energy Policy, 153*, 112285. doi:https://doi.org/10.1016/j.enpol.2021.112285
Oates, W. E. (1993). Fiscal decentralization and economic development. *National tax journal, 46*(2), 237-243. doi:https://doi.org/10.1086/NTJ41789013
Pearson, C. A., & Daff, S. (2010). Education and employment issues for Indigenous Australians in remote regions: A case study of a mining company initiative. *Journal of Human Values, 16*(1), 21-35. doi:https://doi.org/10.1177/097168581001600103
Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics, 16*(3), 289-326. doi:https://doi.org/10.1002/jae.616

Rauf, A. (2017). Erratum to: Rauf, Abdur/Khan, Amara Akram/Ali, Sher/Qureshi, Ghulam Yahya/Ahmad, Dilshad/Anwar, Numera Fiscal Decentralization and Delivery of Public Services: Evidence from Education Sector in Pakistan. *Studies in Business and Economics, 12*(1), 174-184. doi:https://doi.org/10.1515/sbe-2017-0016

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of political economy, 94*(5), 1002-1037. doi:https://doi.org/10.1086/261420

Salman, A., & Iqbal, N. (2011). Social Capital and Fiscal Decentralization. *Pakistan Journal of Social Sciences (PJSS), 31*(2), 407-421.

Samoff, J. (1990). Decentralization: The politics of interventionism. *Development and Change, 21*(3), 513-530. doi:https://doi.org/10.1111/j.1467-7660.1990.tb00387.x

Sow, & Razafimahefa. (2015). *Fiscal Decentralization and the Efficiency of Public Service Delivery*. Retrieved from

Tajvar, M., Arab, M., & Montazeri, A. (2008). Determinants of health-related quality of life in elderly in Tehran, Iran. *BMC public health, 8*(1), 1-8. doi:https://doi.org/10.1186/1471-2458-8-323

Tanzi, V. (1996). *Review of Some Efficiency and Macroeconomic Aspects.* Paper presented at the Annual World Bank Conference on Development Economics 1995.

Tanzi, V., & Chu, K.-y. (1998). *Income distribution and high-quality growth*: Mit Press.

Usman, N. N. S. A. S. (2021). Fiscal Decentralization and Quality of Education in Pakistan. *Journal of Contemporary Macroeconomic Issues, 2*(1), 58-66.

Vo, D. H. (2010). The economics of fiscal decentralization. *Journal of Economic Surveys, 24*(4), 657-679. doi:https://doi.org/10.1111/j.1467-6419.2009.00600.x

Xie, D., Zou, H.-f., & Davoodi, H. (1999). Fiscal Decentralization and Economic Growth in the United States. *Journal of Urban Economics, 45*, 228-239.

Zhang, T., & Zou, H.-f. (1998). Fiscal decentralization, public spending, and economic growth in China. *Journal of public economics, 67*(2), 221-240. doi:https://doi.org/10.1016/S0047-2727(97)00057-1