The Impact of Devolution on Government Size and Provision of Social Services: Evidence from Pakistan

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Abstract

This paper provides empirical evidence on the association between post-2001 devolution reform policy, government size, and specific components of government expenditures based on a sample of panel data of provincial units in Pakistan from 1990 to 2015. The results demonstrate that devolution is associated with a larger government size, which provides empirical support for the common-pool hypothesis, implying that the decentralization that matters for the size of the general government depends on how sub-national governments finance their expenditures. Moreover, the findings suggest a significant increase in the magnitude of Health and education facilities at the local level following the devolution reforms.

Keywords: Devolution reforms, size of government, Social service delivery, common-pool hypothesis, Leviathan hypothesis.

JEL Classification: H50, I10, I20, I30.

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1. Introduction

Fiscal decentralization enhances government efficiency by providing public goods in terms of Education, Health and water supply and sanitation to residents, according to their needs and preferences (Brennan and Buchanan, 1980; Oates, 1972; Tiebout, 1956). However, whether the benefits associated with decentralization materialize and reach the local citizens depends on the institutional environment of the country (Rodden *et al.*, 2003). On one hand, the literature argues that delegation increases the size of the government when the responsibilities of revenue and expenditures are not properly allotted, which is called the common-pool hypothesis in the literature (Ehdaie, 1994; Stein, 1999; and Rodden, 2003). Along with the overall effect, how different components of government expenditures (expenditures on education, health and water supply and sanitation) react to decentralization is another important and underexplored area. Focusing on the specific components of government expenditures enables us to understand the preferences of local governments when they become more autonomous. Generally, it is suggested that local governments mostly invest in projects that attract mobile factors and neglect provisions that benefit immobile factors (Keen and Marchand, 1997). Whether the above assumption holds true is of particular interest both at the academic and policy level.

The existing literature on the association between decentralization and government expenditures in the provision of social services is mostly based on information at the state level and across the country (Rodden *et al.*, 2003; Fiva, 2006; Jin and Zou, 2002). However, it is important to note that each country has its own cultural, social, political and institutional backgrounds that effect their methods of decentralization and expenditure policies. Therefore, with unawareness of the institutional background and setup of the country, it is not possible to create perfect proxies for the estimation of decentralization and expenditure policies. Keeping in mind the aforementioned theoretical concepts, this paper studies the effect of devolution on government size and its composition of various components of government expenditures by using comprehensive data for the provinces of Pakistan from 1990-2015. To this end, the fiscal relationship between the upper tier government and province in Pakistan is well-studied, but relevant empirical examinations remain scarce (Cheema and Mohmand, 2003; Manning *et al.*, 2003; Cheema *et al.*, 2006). The study contributes in various aspects, and its main motivation is the fact that the enactment of devolution among the provincial government is important to assess the effectiveness of the present structure of governance and for the guidance of future administration reforms in Pakistan. Specifically, our principal research is focused on testing the common pool hypothesis to determine whether the intergovernmental transfers from the federal to lower tiers of the government lead to a larger government size, or if there is truth to the Leviathan hypotheses, where devolution leads to a smaller size of government. We, moreover, study how the specific components of government expenditures (in the form of social service provisions) react to fiscal devolution. This study empirically examines devolution reform policy post-2001 in Pakistan, which provides fiscal and administrative powers for the local government to yield improved social service provisions to the local citizens, are highlighted and regress government expenditures and the specific components of government expenditures (education, health and water supply and sanitation) on fiscal devolution while controlling for various social economic factors. Additionally, compared to most democratic countries that have joint political and fiscal decentralization, Pakistan is a country with a decentralized re-

gime that emerged under military rule (Cheema and Ali, 2005). Such drastic reforms anticipate widespread changes in the nature and magnitude of social service provisions to the general public and specifically to those who are unable to access public goods and services. This particular governance structure provides interesting and unique relevance for the examination of decentralization theories. Meanwhile, the use of provincial-level panel data from 1990 to 2015 controls time-invariant provincial heterogeneity in the empirical analysis. This period includes the periods both before and after 2001 to better reflect the period of devolution reforms.

By employing a Feasible generalized least square model to explain provincial heterogeneity and persistence in service provision expenditures on various components of government expenditures, the authors find that the devolution reforms in Pakistan increase the amount of the provincial government's total expenditures, as well as the public service provisions for spending on health, education and water supply and sanitation. The above findings suggest that the common-pool hypothesis is active in Pakistan's fiscal system. In Pakistan, the 2001 devolution reform initiated a series of fiscal reforms that devolved expenditure responsibilities to the lower tiers of governments. In this type of fiscal regime, provincial governments do not have a great enough revenue capacity to finance the public goods and services that they are assigned and have to resort to transfers from the upper levels governments or to other common-pool resources to finance their expenditures (Rodden *et al.*, 2003). In the case of Pakistan, according to Shah (2005) an inter-governmental structure forum is better than a self-governing agency model. In most cases, revenue is collected by the central government and is then redistributed to the local government through a special mechanism (Ehdaie, 1994; Grossman, 1989). Shah (2005) explains the structure of Pakistan's NFC as an inter-governmental forum model and explains their advantages, including the fact that transaction costs (such as executive and legislative decision-making expenditures, participation and monitoring costs, uncertainty costs, and agency costs) in the intergovernmental setting model are low compared to those under a self-governing agency model. This vertical fiscal imbalance shows a positive effect on the provincial government's expenditure size and raises the share of Education and health spending in the total provincial government's expenditures.

The rest of the paper is structured as follows. Section 2 recaps the empirical and theoretical literature that debates the associations between devolution and social service provisions (this study uses devolution, decentralization, and fiscal decentralization interchangeably for the post devolution reforms). Section 3 discusses the institutional background of the fiscal and political system in Pakistan and explains several fiscal reforms during the study period. Section 4 defines the data, the estimation strategy, and the description of the variables used in the study. The regression outcomes are presented in Section 5. Section 6 presents a robust analysis, and the final section offers conclusions.

2. Literature review

According to Oates (1972), the local government is better informed about the needs and preferences of the local citizens than the central government. Thus, devolving responsibilities to the lower tiers of government will enable them to meet local needs in a better and

more efficient way. However, the relationship of decentralization with government size and expenditures is not clear from this part of literature. Moreover, the role of the political and fiscal incentives created by the intergovernmental system has been the central focus of the second generation of fiscal federalism theory (Oates, 2005).

On the other hand, a Leviathan government focuses on the maximization of revenue instead of social welfare. According to Brennan and Buchanan (1980), appealing mobile factors in the local jurisdiction limits the taxation power of the government. Decentralization can be used as a corrective device in reducing agency problems through an increase in fiscal competition and making local governments accountable in their jurisdiction. Thus, according to the Leviathan model, decentralization induces lower governments.

In spite of its theoretical demand, the Leviathan model may not be well-suited to reality. Indeed, local and central governments usually conspire to evade such competition by allowing the federal governments to accumulate the majority of their revenues and then reallocate the money to lower tiers of governments for their financial expenditures. In this regard, as suggested by Rodden (2003), decentralization in most countries seems to have occurred almost exclusively through increased intergovernmental grants and shared revenues. Rodden (2003) argues that grants and shared revenues undermine intergovernmental tax competition and increase both the supply and the demand for public goods and services. This outcome has been described as the common-pool hypothesis in the literature Rodden *et al*. (2003), Stein (1999) and Fiva (2006).

Starting with the work of Oates (1972), many studies have been conducted to find the relationship between decentralization and government expenditures in different contexts, specifically focusing on the Leviathan hypothesis that decentralization reduces the expenditures of the government. However, Oates fail to empirically determine that decentralization reduces government size. Much empirical research has subsequently been conducted using multi-country and single-country studies with different econometric techniques, but the results remain inconclusive (Feld *et al*., 2010; Marlow, 1988) and limited. For example, Marlow (1988) and Nelson (1986) using the sample from the US empirically estimated that devolution decreases government size. However, Oates (1985) and Wallis and Oates (1988) did not find any evidence that decentralization reduces government size. Further, Feld *et al*. (2010) using a sample of Swiss cantons empirically determined that fiscal decentralization reduces the size of the government. According to Faguet and Jean-Paul (2004), in Bolivia, decentralization boosted government responses to local needs and increased investment in elements of the public sector, like education, health and other public services that benefit the local people.

Further, many studies have investigated the role of decentralization in determining the size of the government using multiple countries as a sample. For instance, Grossman (1989), focusing on the effect of intergovernmental transfers in increasing government size, argued that the accumulation of taxation power at the central level reduces fiscal discipline and the tax competition of the local government. Ehdaie (1994) empirically estimated that the spending power of the federal government and tax decentralization reduces government size, while taxation decisions and the sharing of revenue in the hands of the federal government eradicates constraining decentralization effects. Raff and Wilson (1997) and Bucovetsky *et al*.

(1998) argued that decentralization improves information asymmetry because of the immediacy of the principal-agent relationship and improves social service provisions through better accountability and efficient delivery of local needs. Similarly, Jin and Zou (2002) found that Vertical Fiscal Imbalance (VFI) increases the government size at all levels, while revenue decentralization is associated with a decrease in government size at the aggregate level.

Using OECD revenue decentralization measures, Ebel and Yilmaz (2002) found a negative relationship between local tax autonomy and government size. Moreover, Rodden (2003) showed that devolution has a different relationship with government size, depending on where the local expenditures are funded from (i. e., whether they are funded from shared revenue and intergovernmental transfers or from their own-source revenue). Fiva (2006) studied the relationship between the size of the government and fiscal decentralization and empirically showed that expenditure decentralization is associated with a larger public sector, while the opposite is true for revenue decentralization. Fung (2004) explained that citizen participation at the local level generates innovative problem-solving. On the other hand, Charlick (2001) argues that local government involvement results in decision-making processes only under specific situations. However, administrative academics have found a positive association between devolution and social and political variables, which has nothing to do with service delivery to local citizens.

Among the recent development in the literature, Smoke (2003) and Mehr-un-Nisa *et al*. (2018) argued that the outcome of decentralization, through the participation of residents in governance and decision-making practice, is improved service delivery. However, Prohl and Schneider (2009) noted that the autonomous local government, in terms of its administrative and fiscal level, slows public sector growth. Martínez-Vázquez and Yao (2009) showed an increase in the size of the government with an increase in fiscal decentralization. Baskaran (2011), in his study, found that devolution under right-wing parties leads to a reduction in government size. Cassette and Paty (2010), using a sample from EU 15 countries, analyzed the effect of devolution on subnational, national and aggregate level government sizes. Their study found that, in the long run, tax autonomy increases subnational expenditures and reduces federal government expenditures, leading to increases in aggregate expenditures. Further, the VFI increases the subnational, national and aggregate government sizes. Ashworth *et al*. (2013) investigated the relationship both in the short- and long-term. In the short-term, local tax revenue and grants increase government spending. In the long-term, revenue decentralization reduces the government's size, while inter-government grants have the opposite effect. Liberati and Sacchi (2013) found a negative association between tax decentralization and government size. Baskaran *et al*. (2016) conducted an empirical study on the relationship between devolution and growth, while Golem (2010) and Martínez-Vázquez *et al*. (2017) offer a widespread survey on the social, economic, and political effects of decentralization. However, the motivation behind decentralization differs across countries. Shah and Thompson (2004) and Díaz-Serrano and Meix-Llop (2019) discuss the various reasons for decentralization in countries that include economic and political alterations of their economies, responses towards ethical conflict or democratic transition. The motive behind the reasons mentioned above for decentralization is always to meet local needs and effectively provide public administration. Along with theoretical considerations, the benefits associated with decentralization regarding service delivery are often discussed in political debates (Sumara 2008).

Makreshanska-Mladenovska and Petrevski (2019), using a sample of 28 European countries from 1990-2016, concluded that expenditure decentralization reduces the size of the government, while revenue decentralization is negatively associated with government size.

Nevertheless, as Jin and Zou (2002) point out, there is no reason to believe that the findings at the provincial level also hold true at the lower levels of government. With special interest in Pakistani provincial governments, this paper explores the relationships between devolution and both the size and various components of government expenditures. By using comprehensive fiscal data at the provincial level in Pakistan from 1990 to 2015, our study provides evidence for the practice of fiscal decentralization at the provincial level in Pakistan.

3. Institutional background

In Pakistan, poor development outcomes have resulted from the structure of bureaucracy that has weakened the answerability of officials to citizens (Keefer *et al*., 2006 and Easterly, 2003). Particularly, centralization and bureaucratization have been found to be features of the old governance structure that hinder the process of accountability. Shortly after a military intervention in the government by Pervaiz Musharraf, Chief of Army staff, the new local governance structure called the Devolution plan was introduced in 2000-2001 through the Local Government Ordinance (LGO). Although the 2001 Devolution reforms were third in the decentralization process in the 72 years history of independence, they were much more inclusive and ambitious in the meaningful transfer of power at the grassroots level. Under the 2001 devolution reforms, the third tier of the governance structure was made under the name of the local government. Thus, in total, there are three level of government structure. The federal, provincial and the third tier of the government level has a council with a Nazim (a council head), Naib Nazim (deputy council), who was elected within the council on a joint ticket (Fig. 1).

Table 1
FUNCTIONS ALLOCATION BETWEEN DIFFERENT TIERS OF GOVERNMENTS

Central government	Central/provincial government	Provincial government	Local/provincial government	Local government
Nuclear energy	Social Welfare	Land Reclamation	Water supply, sewerage system	Play grounds/ Parks
Defense	Tourism**	Law and order	Primary education	Street lighting
Currency/Foreign exchange/Stock exchange	Population planning**	Higher and secondary education	Primary health*	Fire Fighting
Foreign aid	Historical Monument and Sites	Justice	Land development*	Link Roads
Radio/TV/Telephones/ Post and telegraph	Technical/Vocational training	Agriculture Extension	Dispensary/preventive health	Solid waste management
External affairs	Centers of excellence**	High ways	Farm to market road	Intra Urban Roads

(*Continued.*)

Research Institutes	Curriculum development**	Irrigation	—	—
National High-Ways/ Shipping/Air services	Syllabus planning**	Urban transport	—	—
Industries/Natural gas/ Mineral oil	Electricity(except KESE)**	—	—	—
Metrological /Geological surveys/Censuses	—	—	—	—

** Federal government.
 * Provincial government.
Source: Author summary from the 1973 constitution.

Figure 1
DECENTRALIZED GOVERNANCE STRUCTURE IN PAKISTAN
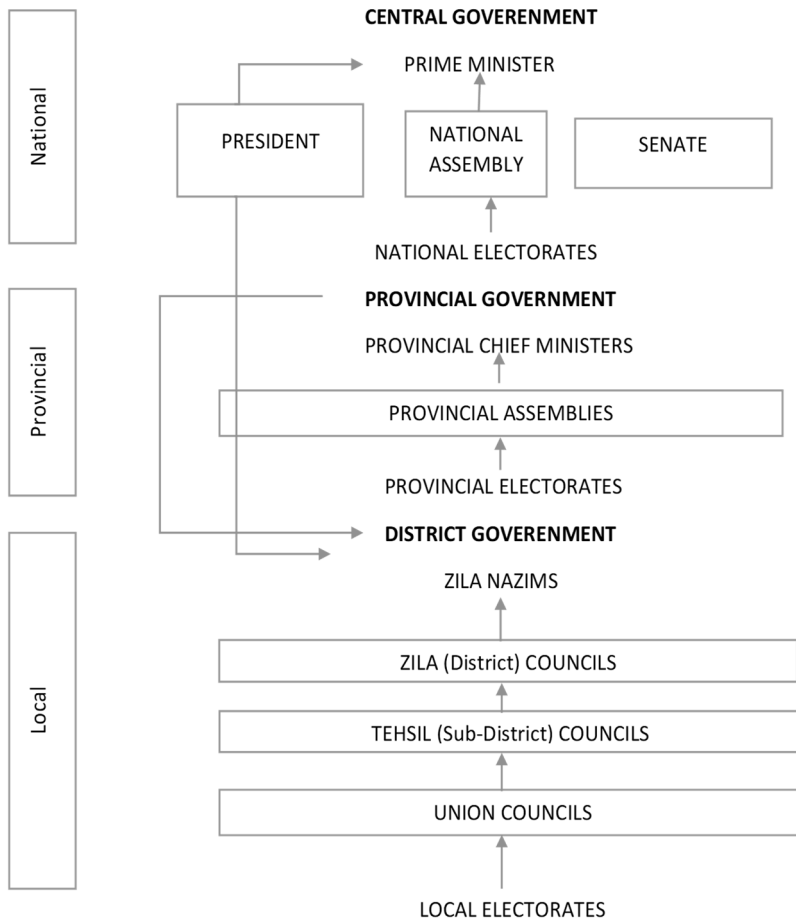
The sub-tiers of government have the discrete power to levy certain taxes on immovable property and services (Table 2). However, according to Bahl (2009), in practice, the provincial governments have control over certain expenditures, mostly those that were undertaken through conditional transfers.

Table 2
ASSIGNMENT OF TAX AT CENTRAL AND SUB-CENTRAL LEVEL

Different types of Tax Functions	Tax types	Central	Provincial
Income	Direct	Tax on Personal incomes	Tax on Agriculture income
Corporate	Direct	Tax on Corporate tax	—
Property	Direct	Tax on the Capital value	Tax on Property stamp duty
Natural Resources	Direct	Surcharges and royalties on gas and oil	—
Excises	Indirect	Tax on cement sugar, tobacco, industrial output	Industry, contraband item items and Liquor
Custom duties (exports and imports)	Indirect	—	—
Fees	Indirect	Tax on Fees and licenses	Tax on Fees and licenses
Sales	Indirect	Tax of GST on goods	Tax of GST on services
Others	Indirect/Direct	Tax on Foreign travel/ Capital value	Tax on Motor vehicle/ land revenue

Sources: Author summary from 1973.

In most cases, in Pakistan, revenue is collected by the central government and is then redistributed to the local government through a special mechanism (Ehdaie, 1994 and Grossman, 1989). Table 3 explains the intergovernmental resource transfer mechanism in Pakistan.

Table 3
MECHANISM OF INTERGOVERNMENTAL RESOURCE TRANSFER

Distribution mechanism	Sindh	Punjab	Baluchistan	KPK
Provincial government share in divisible pool (%)	40	39.80	31	40
Factors weights (%)	100	100	100	100
Tax collection (%)	7.50	5		
Population (%)	50	75	50	50
Backwardness (%)	17.50	10		25
District deficit transfers (%)	25			
Development deficiency of an area (%)		5		25
Fiscal austerity (%)		5		

Source: Sindh (2004), Shah (2005).

The main source of revenue to the provincial and local government is intergovernmental transfers. The federal government transfers resources under the NFC (National Finance Commission) Awards (Table 4) to the provincial government, and the provinces transfer resources through the PFC (Provincial Finance Commission) under a specific formula.

Table 4
RESOURCE DISTRIBUTION MECHANISM TO PROVINCES UNDER NFC

Factors involved in divisible pool resource distribution	NFC 1990	NFC 1996	DRGO 2006*	NFC 2010
Population (%)	100	100	100	82
Resource generation (%)				5
Backwardness/poverty (%)				10.3
Inverse population density (%)				2.7

* further 1/6th tax on goods is distributed in Zilla /Octori tax

*Source:* National Finance Commission Ministry of Finance Pakistan.

The Distribution of resources under the PFC (formed in 2001) is different in each province, and each province has presented its own criteria for distribution depending on their local, political, and socio-economic needs (Manning *et al.*, 2003). In addition, there are other sources available to the local government that are directly transferred from the federal to the local government, including different schemes like the federal sector reform program for education, the Kaushal Pakistan program, and the President Package for the enhancement of water resources (Jaffery and Sadaqat, 2006). The provincial government has also made a direct transfer to the local government in the form of conditional transfers specifically for health, education, and water sanitation. Social infrastructure funds have also been reassigned to the local government on an ad-hoc basis under different schemes. The PFC has both recurring and development funds that are distributed to local governments under the PAA (Provincial Allocable amount) and PCF (Provincial consolidated funds). The amount distributed to the local government under the PAA is similar to that under the PCF, the criteria for which is mentioned in Table 3, while the PCF head of accounts is not defined (Cheema and Mohmand, 2003).

As shown in tables 3 and 4, the major resource distribution criterion for the provincial and local government is population. However, the NFC awards 2010 precipitated numerous changes by including multiple criteria in the resource distribution mechanism (as shown in table 4) and increased the provincial vertical share to almost 57.7%. As defined in the 2002 local government budget rules, the local government can formulate their expenditures and budget allocation without consent from the provincial government. The local government formulates its budget once it is informed by the provincial government and once it has set its budget allocation under the PFC. Local governments must set both development and non-development expenditures as per the rules. Once non-development expenses are budgeted, then funds for development budgets are allocated.

Along with expenditure decentralization and revenue centralization in the Pakistani fiscal system, the fiscal gap in the country government budgets continues to increase. Transfers from

upper-level governments and other common-pool resources mainly fill this fiscal gap. The values of vertical fiscal imbalances range between 60.40% and 96.95%. These values shows that provincial governments are more dependent on grants from the upper levels of governments, as their own sources of revenue are not sufficient to meet their expenditure needs (Fig. 2).

Figure 2
EXPENDITURE DECENTRALIZATION AND VFI AT THE PROVINCIAL LEVEL, 1990-2015
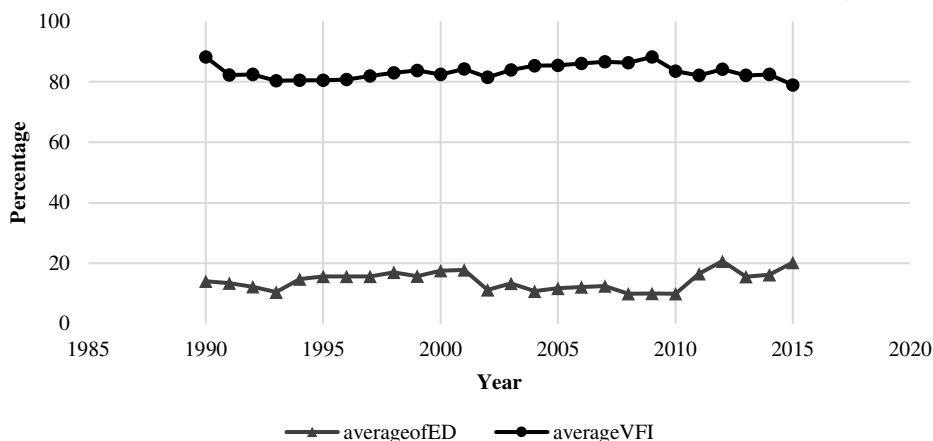
Expenditure decentralization is calculated as a ratio of per capita expenditure of the provincial government to total per capita expenditure of (a) of its own expenditure (b) the capital government under which provincial government are subordinated. Vertical fiscal imbalance refers to one minus ratio of own-source revenue to the total expenditure of the province.

Countries like Pakistan, with widespread and protracted poverty, pervasive fertility rates, and increasing unemployment, need many steps for the efficient and effective delivery of social service provisions. Although the steps in the form of social service devolution are allocated to the lower level of government (post-devolution reforms 2001) (Yilmaz *et al.*, 2010), many social programs like the WUC (water usage committee), the SMC (School management committee), the Zila account committee for local level fiscal functions, and the CCB (community citizens board) for the involvement of citizens in the decision making process at a lower level are important steps taken by the government to ensure a sustainable community and a better provision of social service delivery to all citizens.

4. Data and variables

4.1. Data

The data used in this paper are primarily taken from PRSP, the Pakistan economic survey (Ministry of Pakistan, 1990-2015), the Pakistan Statistical Yearbooks (Pakistan Bureau of Statistics), the State Bank of Pakistan, and the Development statistics of Pakistan that

include comprehensive data on Public Finance in Pakistan (details of the variables used and their explanations are provided in the annex). These data cover the provincial administrative units and contain detailed information on provincial expenditures, revenues, transfers from the central government, and information on some basic socio-economic variables. The data on PGDP have been estimated and disaggregated by Bengali and Sadaqat (2005) in the *Regional Accounts of Pakistan, Methodology, and Estimates 1973-2001* from 1972 to 2000. Using the same methodology, PGDP was calculated by Shaheen Malik (Research Analyst at unit SASEP) for the World Bank and Regional Accounts of Pakistan, Methodology, and Estimates from 1999 to 2015. The data are limited between 1990 and 2015. This period is used for two reasons. First, the long-time period covers the pre- and post-decentralization reforms that occurred in different periods. Secondly, data after 2015 are unavailable. The data are taken from four federation units (named provinces) of Pakistan, while Azad Jammu and Kashmir (AJK) and Gilgit Baltistan are excluded from the study for two reasons: (1) The local governance structure needs to be functional in other areas, and (2) data limitations do not allow us to exceed the federating units. The provincial population is taken from the Population Census 1998 (Pakistan Bureau of Statistics). Finally, the sample consists of four federating units from 1990 to 2015 and features balanced panels because no new province was formed during this period.

The data are limited to the provincial level, as the data limitations for major social-economic variables at the district level do not allow us to extend the data beyond that limit. However, local expenditures are accumulated at the provincial level. Therefore, the expenditures acquired at the provincial level reflect district-level expenditures. Moreover, the expenditures and financial level details at the provincial level provide same details as those at the district level for both pre- and post-devolution reforms, so the provincial level data will enable us to detect the impact of devolution at the local level.

In Pakistan, provincial price indices are not available; therefore, a GDP deflator is used to convert the nominal values to real values. The ratio of the nominal to real GDP of Pakistan during the base year of 2005-2006 is used to compute the GDP deflator. To obtain the real term values of the social service expenditures and other variables, their nominal values are deflated with a GDP deflator for the base year of 2005-2006.

4.2. Estimation approach

Considering the composition of various forms of expenditures on social service provisions, we used a feasible generalized least square model to investigate the effect of decentralization and devolution plans on social service provisions:

$$SS_{i,t} = \alpha_{i,t} + D_{i,t}\beta + X_{i,t}\delta + \varepsilon_{i,t} + u_t \tag{1}$$

$$SS_{i,t} = \alpha_{i,t} + D_{i,t}\beta + ED_{i,t}\theta + (ED*D)_{i,t}\varphi + X_{i,t}\delta + \varepsilon_{i,t} + u_t \tag{2}$$

Where $SS_{i,t}$ refers to various components of social service expenditures i.e. the government expenditures on each component of service provisions in province i and year t. This

includes (1) education expenditures, (2) health expenditures, and (3) water supply and sanitation. In Equation (1), $D_{i,t}$ represents the devolution reforms that take the value of 0 before 2001 and the value of 1 after the devolution reforms of 2001. $(ED*D)_{i,t}$ in (equation 2) includes the interaction between expenditure decentralization and the devolution policy, which captures the effect of expenditure decentralization after following the relevant literature (Stein, 1999; Fiva, 2006; Jin and Zou, 2002; and Wu and Lin, 2012) after devolution. β stands for the coefficient of the corresponding decentralization indicators. $X_{i,t}$ represents a set of control variables that are included in shaping the local expenditures. δ refers to the vector coefficient used for control variables. To control for the time year fixed effect, u_t is included in the model, as it will capture the time array of an outcome variable that might be different in different provinces, and $\varepsilon_{i,t}$ refers to an idiosyncratic error term in the model.

Given the contradictory theoretical arguments, we do not have strong prior expectations regarding the association between devolution policies and social service provisions. Based on the empirical suggestions linking devolution and social service provisions for education, health, and water supply and sanitation, in equation 1 and 2, positive coefficients of $D_{i,t}\beta$ and $(ED*D)_{i,t}\varphi$ suggest that devolution increases the size of the government, and the specific service provisions also increase compare to the pre-devolution reforms, ceteris paribus. This leads us to conclude that devolution is effective in terms of education, health, and water supply and sanitation provisions. On the other hand, negative coefficients propose a contrary impact.

We work with a balanced panel large T dimension relative to the number of provinces (the N dimension of the panel). For this reason, the use of dynamic panel like system and the difference General Method of Moments (GMM) bias the estimators. Thus, approximating with a dynamic model does not seem to be a good empirical strategy. Moreover, according to Greene (2012), Davidson and MacKinnon (1993), and Maddala and Lahiri (2006), with many cross-sections relative to the time period, fixed and random effects can produce similar interpretations but do not allow cross-sectional correlations. However, here we have a larger T relative to N because the panels must be balanced (and $T \geq m$ for valid results). Thus, we decided to use a cross-sectional time-series FGLS (Feld *et al.*, 2010; Lessmann, 2006). Another main danger to the legitimacy of our results could be the time-variant factors that, at the same time, correlate devolution indicators with public service provisions, which might create an endogeneity problem. This would happen if the provincial and central governments' adoptions of the devolution plan were deliberately grounded based on the quantity and quality of the economic and social indicators of localities. As devolution for Pakistan is a nation-wide policy applied to all local administrations, endogeneity should not be a major problem.

4.3. Variables

This section will explain the key variables used in the model, whose descriptive statistics are presented in Table 5.

The composition of the provincial government's expenditures is used as a local expenditure policy. The expenditure size is measured as provincial government expenditures compared

to their GDPs. Table 5 shows the value of government expenditures, with an average value of 8.89%, ranging from 3.74% to 20.009%. Following Hsiao *et al*. (2005), we plot the ratio of provincial government expenditures to GDP over time in Fig. 3. The graph shows that, on average, the provincial government expenditures to GDP vary substantially and are persistent over time.

4.4. Social service provisions

As with the composition of the government, expenditures are important. We study three major categories. Following Faguet and Sánchez (2008), Yilmaz and Venugopal (2011), and Granado *et al*. (2018), we identified the various components of social services that are recorded in our data. These include expenditures on education, health, and water supply and sanitation, which impact the living standards of the local community in general and the marginalized and poor in particular (Granado *et al*., 2018; Antonis Adam *et al*., 2014; and Faguet and Sánchez, 2014). The provincial and local governments take the major responsibility of providing local education and health, with around 24.19% and 7.41% of the provincial government's expenditures spent on education and health on average. The average government expenditures on social services over the years is represented in Fig. 4. The devolution process was expected to strengthen the policies that respond more quickly to the beneficiaries needs. Table 2 shows the detailed allocation of different functions across different tiers of government. The computation of the various components of government expenditures used in this study as dependent variables are explained as follows.

4.4.1. *Education expenditures*

The central and provincial governments are developing and executing an education sector plan to attain their education SDGs (Granado *et al.*, 2018; Faguet and Sánchez, 2014; Díaz-Serrano and Rodríguez-Pose, 2015). To achieve these sustainable development goals, Pakistan has made a significant improvement in the education sector. Following devolution, the subject of education has been devolved to provinces. The education expenditure as a percentage of total expenditures in this paper is constructed following both current and development expenditures for primary, secondary, general universities, colleges, and institutes, professional and technical universities, teacher and vocational training, and others compared to the total provincial expenditures.

$$\text{Education Sector Expenditures} = \frac{\begin{array}{c}\text{Current + Development Exp(Primary edu + secoundry}\\ \text{edu + College and institutes + general uni + Vocational and}\\ \text{teacher training + Technical and Professional uni)}\end{array}}{\text{Total provincial Expenditure}} \quad (3)$$

4.4.2. *Health expenditures*

The central and provincial governments are developing, executing, and monitoring the health sector's tactical agenda to attain their health-related SDGs (Faguet and Sánchez, 2014; Díaz-Serrano; and Rodríguez-Pose, 2015). The health delivery system in Pakistan consists of

private and public health facilities. Public diseases covered under the tertiary/priority category include road traffic accidents, diabetes, cardiovascular disease, burns, HIV/Aids complications and cancer. Health expenditures taken as a percentage of total expenditures in this paper are constructed following both current and development expenditures for general clinics and hospitals, health facilities and preventive measures, mother and child health, and others compared to the total provincial expenditures.

$$\text{Health Sector Expenditures} = \frac{\text{Current + Development Exp(General clinins and hospitals + Health Facilities and preventive measure + Mother and child health + Others)}}{\text{Total provincial Expenditure}} \quad (4)$$

4.4.3. *Water supply and sanitation expenditures*

Increasing accessibility to drinking water and safe water and sanitation in urban and rural areas is an important factor that needs to be considered by the government to attain sustainable human development goals. This paper uses both the current and development expenditures taken by the provincial government compared to the total provincial expenditures to construct a variable for water supply and sanitation.

$$\text{Water supply and sanitation Expenditures} = \frac{\text{Current + development exp(Water supply and sanitation)}}{\text{Total provincial Expenditure}} \quad (5)$$

Table 5
DESCRIPTIVE STATISTICS

Variables	Observations	Mean values	Std. values	Min values	Max values	Total Variance	Within Variance	Between Variance
TE (%age of GDP)	104	8.899	4.264	3.744	20.009	18.182	4.439	18.149
Education Exp (%age of gov exp)	104	24.19	6.757	6.632	44.73	45.67	27.974	23.368
Health Exp (%age of gov exp)	104	7.415	2.186	4.091	13.075	4.78	4.529	0.332
OSR (%age of GDP)	104	8.413	3.792	3.957	19.16	14.382	4.525	13.016
Log GDP per capita	104	3.643	0.327	3.045	4.240	0.107	0.0759	0.0409
Log DPPSQ	104	5.054	1.161	2.767	6.240	1.348	0.0462	1.719
Devolution policy	104	0.538	0.501	0	1	0.251	0.251	0
Expenditure decentralization (%)	104	14.27	7.78	3.51	33.15	60.54	11.243	65.100
Vertical fiscal imbalance (VFI) (%age of gov exp)	104	84.26	9.779	62.33	96.04	95.63	4.548	120.27
Democratic dummy	104	0.692	0.464	0	1	0.215	0.215	0

Note: Provincial government expenditures to its GDPs shows total expenditure size. The other variables, including education, health, water supply and sanitation expenditures, refer to their share of the corresponding variables in the provincial government expenditures. Expenditure decentralization is measured as a ratio of per capita expenditure of the provincial government in the total per capita expenditure of (a) of its own expenditure (b) the capital government under which provincial government are subordinated. Another variable used for devolution is a dummy that takes the value of zero before devolution in 2001 and takes the value of one after devolution. Vertical fiscal imbalance refers to one minus ratio of own-source revenue to the total provincial expenditure. Democratic dummy refers to values of one

if devolution practices are exercise in democratic government and take the value of zero if the devolution practice are exercised in the military government. Real GDP per capita is deflated by GDP deflator at the base year of 2005-06, and its unit is 10,000 Pakistani rupee. The unit of population density is $1/KM^2$ and is measured by dividing the population to its area. The variable own-source revenue is constructed by dividing own-source revenue to their provincial GDPs.

4.4.4. *Decentralization indicators*

Following the pertinent research on fiscal decentralization, as well as Fiva (2006) and Wu and Lin (2012), two measures are used in this study as decentralization indicators.

The construction of the first indicator is based on the devolution policy of 2001. We use a dummy variable to designate the presence or absence of devolution reforms. Since devolution occurred in 2001, the value of the devolution indicator is 1 for years 2002-2015 and 0 for years 1990-2001. The construction of the other variable, i.e., expenditure decentralization, is very complicated because of the hierarchal structure of Pakistan, as shown in Fig. 1. In general, the district and municipal governments are directly subordinated to the provincial governments, and the provincial governments are subordinate to the central governments for both the administrative and fiscal governments.

Figure 3
COMPOSITION AND SIZE OF PROVINCIAL GOVERNMENT EXPENDITURES TO THEIR GDPs, 1990-2015

Following the differences in vertical fiscal management, as well as Zhang and Zou (1998), we constructed the expenditure decentralization index as

$$\text{Expenditure Decentralization} = \frac{\text{PExp}}{\text{PExp} + \text{CExp} - (\text{Defence} + \text{interest payments})} \quad (6)$$

where Pexp and Cexp refer to the per capita expenditures of the provincial and central governments, respectively. Defense and interest payments are subtracted from the total expenditures, as they are treated as centralized expenditures. Moreover, the total expenditures of the provincial governments include both the current and development expenditures.

To capture the difference between available financial resources and expenditure decentralization confronted by provincial governments, we created another variable named vertical fiscal imbalance following the literature. In Pakistani fiscal transfers systems, provincial governments receive funding in the form of NFC awards (Table 4), and the local governments get the funding under the PFC. The difference between own-source revenue and expenditures cannot be completely offset by grants and, hence, the provincial governments have considered them a budget deficit (Bird and Smart, 2002). Under these considerations for the Fiscal system of Pakistan, we created the Vertical Fiscal balance, which is 1 minus the ratio of own-source revenue to total expenditures. The values of vertical fiscal imbalances range between 60.40% and 96.95%. These values show that provincial governments are more dependent on grants from the upper levels of governments, and their own-source revenues are not sufficient to meet expenditure needs. "Fig. 2".

4.4.5. *Control variables*

Along with dependent and devolution indicators, we identified other control variables that affect expenditure devolution policy in regression. One of these variables above is the democratic dummy that captures the mechanism through which a fiscal arrangement can affect devolution policy other than through decentralization. The democratic dummy takes a value of 1 if there is democratic system of government and takes a value of zero if the system is governed under military regimes.

Numerous other probable elements of governmental expenditures are incorporated in the regression model. Per capita Real GDP deflated by the GDP deflator in the base year 2005-2006 is considered to capture diminishing marginal welfare by growing individual income. Population density captures the probable measured effects in the service provisions for the public. We use log values of per capita real GDP and population density in the regression models. Following Baicker *et al.* (2012), we include own-source revenue, which is measured as the provincial governments own-source revenue, compared to GDP.

In this research work, we use a cross-sectional time-series FGLS (Lessmann, 2006; Sacchi and Salotti, 2014; and Reed and Webb, 2010) to evaluate the influence of devolution policy on local government expenditure policy and social service provisions including education, health, and water supply and sanitation. The robust analysis is conducted with another method named seemly unrelated regression (Lessmann, 2006), while a simultaneous quantile regression is used to visualize the baseline results at the 75%, 50%, and 25% quantiles as a robust measure.

5. Results

5.1. Effects of devolution policy on social service provisions

Table 6 shows the regression outcomes for the effects of Devolution policy on the size of the government and social service provisions. Column (1) shows the size of government

expenditures, while columns (2) to (4) show the different categories of government expenditures for social service provisions. As for the effects of devolution, as presented in column (1) of Table 6, devolution policy has a positive and significant impact on government expenditures, with statistical significance at a 1% level, as suggested by the common pool hypothesis.

Table 6
EFFECTS OF DEVOLUTION POLICY ON SOCIAL SERVICE PROVISIONS

Dependent variable	Estimation method: Feasible Generalized least square			
	Gov size	Social Services		
	TE (%age of GDP)	Education (%age of Gov exp)	Health (%age of Gov exp)	Water supply and sanitation (%age of Gov exp)
	(1)	(2)	(3)	(4)
Devolution policy	0.82***	3.59***	1.54***	0.227
	(0.332)	(1.23)	(0.43)	(0.39)
Log GDP per capita	-2.27***	-1.72	2.30***	-1.20**
	(0.49)	(1.89)	(0.77)	(0.66)
Log DPPSQ	-1.39***	4.65***	0.56***	-1.38***
	(0.19)	(0.55)	(0.21)	(0.314)
OSR (%age of GDP)	0.64***	0.56***	0.16***	0.058
	(0.071)	(0.21)	(0.076)	(0.075)
Democratic dummy	0.065	2.51***	2.27***	1.41***
	(0.24)	(1.03)	(0.38)	(0.322)
Constant	18.28***	-1.21	-7.59***	13.67***
	(2.84)	(9.08)	(3.52)	(3.29)
Wald chi square (p value)	1249.77	219.50	106.45	151.57
	(0.000)	(0.000)	(0.00)	(0.000)
Num of obs	104	104	104	104

a. Clustered Standard errors are mentioned in parenthesis. Wald chi-square and their P-value are reported and mentioned in their own rows.

***, **, * Represents significance at 1, 5 and 10 percent.

These findings remained when the devolution policy interacted with expenditure decentralization in Table 7. The regression outcomes of the asymmetric effects of expenditures in the regression results are in accordance with those of studies in other countries, such as Rodden *et al*. (2003), Fiva (2006), Jin and Zou (2002), Martínez-Vázquez and Yao (2009), Ashworth *et al*. (2013), and Wu and Lin (2012). In a multi-level government, the centralized tax structure at the sub-national level usually leads to low own tax revenues, which is generally inadequate to meet legitimate expenditure responsibilities. This phenomenon is denoted as a (VFI) vertical fiscal imbalance. According to Bird and Smart (2002), the VIF provides economic reasoning for the attainment of intergovernmental transfers. As seen in Table 5, an average of 83.33% of provincial government's expenditures are financed through common resources and intergovernmental grants (Fig. 2 and Table 4). NFC, as an inter-governmental

structure forum, is better than the self-governing agency model (Shah, 2005). Shah (2005) explains the structure of Pakistan's National Finance Commission with an inter-governmental forum model and explain its advantages. For example, transaction costs (e. g., executive and legislative decision-making costs, participation, and monitoring costs, uncertainty costs, and agency costs) in the intergovernmental setting model are low compared to those under a self-governing agency model. This fiscal arrangement encourages the local government to spend more of the revenue that comes from common resources and intergovernmental transfers, which are collected from the taxes of the citizens outside that jurisdiction, than they would if this revenue was fully collected from their own jurisdiction.

Table 7
EFFECTS OF DECENTRALIZATION ON SOCIAL SERVICE PROVISIONS

|	Estimation method: Feasible Generalized least square			
	Gov size	Social Services		
Dependent variable	TE (%age of GDP)	Education (%age of Gov exp)	Health (%age of Gov exp)	Water supply and sanitation (%age of Gov exp)
	(1)	(2)	(3)	(4)
Devolution policy	0.834	1.434	0.355	-0.513
	(0.456)	(1.538)	(0.395)	(0.640)
ED (%)	-0.015	-0.051	0.014	-0.0112
	(0.016)	(0.071)	(0.017)	(0.026)
ED (%)*DP	-0.005	0.161***	0.137***	0.053**
	(0.018)	(0.066)	(0.015)	(0.0322)
Log GDP per capita	-2.16***	-3.33	1.25**	-1.905***
	(0.5119)	(2.099)	(0.651)	(0.714)
Log DPPSQ	-1.221***	4.67***	0.137	-1.164***
	(0.231)	(0.663)	(0.215)	(0.325)
OSR (%age of GDP)	0.653***	0.571***	0.125**	-0.038
	(0.071)	(0.212)	(0.072)	(0.0922)
Democratic dummy	0.038	2.082**	2.08***	1.284***
	(0.240)	(1.044)	(0.331)	(0.273)
Constant	17.20***	5.357	-1.72	15.45***
	(2.94)	(9.78)	(3.213)	(4.055)
Wald chi square (p value)	1264.43	266.19	350.56	135.00
	(0.000)	(0.000)	(0.000)	(0.000)
Num of obs	104	104	104	104

a. ED*DP is the interaction term between expenditure decentralization and devolution policy. Additional control variables are the similar as table 5.

b. Clustered Standard errors are mentioned in parenthesis. Wald chi-square and their P-value are reported and mentioned in their own rows.

Concerning the definite components of government expenditures, in both Tables 6 and 7, devolution policy was specifically designed to make the public services accessible to the local

citizens in a timely and efficient manner. For the improvement of social conditions for local people, services are broadly divided into three categories: (1) health, (2) education, and (3) water supply and sanitation. The government expenditures on health and education are statistically significant and positive with devolution policy at 1% (Table 6). An important point to be noted here is that the results remain consistent, even if we replace the devolution dummy with the interaction of expenditure decentralization with the devolution dummy (Table 7) and with the use of a different model (Table 9 and 10). In other words, the significance of the decentralization reforms lets us determine that the magnitude of public service provisions in the form of education and health increased following the decentralization developments in Pakistan in 2001. The government expenditures on water supply and sanitation are insignificant, with a positive coefficient alongside the devolution policy (Table 6), but with the introduction of interaction terms of expenditure decentralization with devolution policy, the results gain significance (Table 7). Again, the results remain consistent and robust with the use of a different model (a seemingly unrelated regression) (Table 9 and 10). The results are consistent with the asymmetric information theory of Oates (1972), according to which local governments are better informed by the local people's needs. Interestingly, these results are in harmony with theoretical expectations, according to which the local governments are more responsive to the local citizen's needs compared to those of the central government (Faguet and Jean-Paul, 2004; Yilmaz *et al*., 2010; Yilmaz and Venugopal, 2011;and Watson and Khan, 2010). These results suggest that the devolution plan implemented in 2001 giving more autonomy to the local government was successful in providing social service provisions to the local people. In the same manner, our results are aligned with the empirical work of Faguet and Jean-Paul (2004), Watson and Khan (2010), and Afaq (2007), where local governments are more effective in providing social services because they have a better understanding of local needs.

Figure 4
THE SHARES OF EDUCATION EXPENDITURE, HEALTH EXPENDITURE, AND WATER SUPPLY AND SANITATION, REFER TO THE SHARES OF THE RESULTANT ITEMS IN THE PROVINCIAL GOVERNMENT'S EXPENDITURES

Social Service Provisions
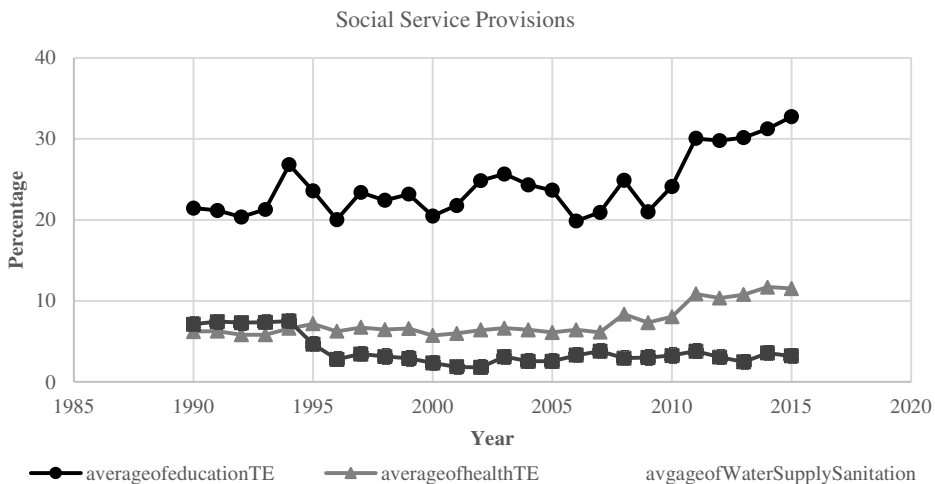
Among the control variables, the results of the democratic dummy, where 1 represents a democratic form of government and 0 otherwise, are positively associated with the composition of various components of government in the form of social service provisions. It is inversely related only in the case of rural development. This positively highlights the democratic form of government, where local representatives elected by the local people in a democratic system better match the needs of their people. The log of the per capita real GDP and log population density provide mixed results (Bengali and Sadaqat, 2006). The real GDP per capita is negative and significant relative to total government expenditures and water supply and sanitation indicators. This shows that, as the level of GDP per capita goes down, provincial governments allocate their funds for water supply and sanitation because of increasing income inequality (Roman Arjona *et al.*, 2002). The real per capita GDP is positive and significant with health, while with education, it is insignificant. Population density is also an important feature in determining the possible scale effects in the service provisions for education and health. Henceforth, the government expenditure allocations for public service provisions do not follow a similar trend. The size of own-source revenue has a statistically significant and positive effect on the majority components of government expenditures. For some variables, the results are statistically insignificant (Table 6 and 7).

5.2. Vertical fiscal imbalance

In the previous section, we discussed the mismatch between expenditures and revenue decentralization, which leads to VFI at the provincial level in the Pakistani fiscal system. This specific segment discusses how a vertical fiscal imbalance effects local government policy in providing public service provisions in Pakistan. Firstly, we replace the vertical fiscal imbalance with a decentralization policy in regressions, as suggested by Jin and Zou (2002), Martínez-Vázquez and Yao (2009), and Wu and Lin (2012). The results are shown in Table 8. The VFI shows a positive effect on provincial government size following the common pool hypothesis (i. e., intergovernmental grants are associated with a larger government). However, we do not provide any evidence for the Leviathan hypothesis. Moreover, the VFI raises the share of education and health, while the results are insignificant for water supply and sanitation. The mean of the VFI in table 5 is 84.26%, showing a larger dependence of the lower level of government on a higher tier of government. The results show that fiscal transfer to fill in the gap of the VFI through NFC in Pakistan compensates for jurisdictional spillovers. Moreover, transfers realize central public policy through sub tiers of governments in providing greater autonomy to local governments and minimum regulation impositions by central governments. The rationale of filling in the VFI through transfers in providing public provisions achieves both allocative efficiency and equity, as presented in table 8. These results are in line with the inter-governmental forum model. According to Shah (2005), the evaluation criteria in the NFC awards is grounded on new institutional agendas that show the various benefits of the inter-governmental forum model over the self-governing agency model.

<div align="center">

Table 8
RESULTS WITH VERTICAL FISCAL IMBALANCE

</div>

Dependent variable	Estimation method: Feasible Generalized least square			
	Gov size	Social Services		
	TE (%age of GDP)	Education (%age of Gov exp)	Health (%age of Gov exp)	Water supply and sanitation (%age of Gov exp)
	(1)	(2)	(3)	(4)
DP	-1.328	14.53***	7.83	1.406
	(1.033)	(6.192)	(2.27)	(1.756)
VFI	0.004	0.092	0.013	2.002
	(0.015)	(0.075)	(0.021)	(1.533)
VFI(%)*DP	0.027***	0.1435**	0.074***	1.192
	(0.013)	(0.072)	(0.025)	(2.035)
Log GDP per capita	-2.80***	-1.93	2.67***	-1.47***
	(0.60)	(2.29)	(0.774)	(0.703)
Log DPPSQ	-1.54***	5.00***	0.690***	-1.35***
	(0.275)	(0.772)	(0.227)	(0.328)
OSR (%age of GDP)	0.477***	0.551***	0.258***	0.098
	(0.073)	(0.225)	(0.080)	(0.089)
Democratic dummy	0.023	2.41***	2.19***	1.341***
	(0.289)	(0.917)	(0.315)	(0.319)
Constant	21.86***	-9.27	-11.4***	15.86***
	(3.30)	(0.917)	(3.85)	(3.40)
Wald chi square (p value)	608.57	179.49	197.11	171.11
	(0.000)	(0.000)	(0.000)	(0.000)
Num of obs	104	104	104	104

a. VIF*DP is the interaction term between Vertical fiscal imbalance and devolution policy. Additional control variables are the similar as table 5.

b. Clustered Standard errors are mentioned in parenthesis. Wald chi-square and their P-value are reported and mentioned in their own rows.

6. Robust analysis

To check for the robustness of the main results, we conducted two dimensions of sensitivity analysis. First, using a seemingly unrelated regression method, and second, using simultaneous quantile regression for the 75, 50, and 25 percent quantiles. In all the robust analyses, we find complete specifications that agree with those of tables 6 and 7.

6.1. Seemingly unrelated regression

The first round of robustness involves an alternate method of finding the results of devolution policy on social service provisions. This is important because different methods depend

on different approaches for the accumulation of information and lead to different distributions being analyzed. We used seemingly related regression (Cameron and Trivedi, 2010 and Zellner, 1962) to see the effect of devolution policy on social service provisions. Seemingly unrelated regression is used because it uses an asymptotically efficient FGLS algorithm, as described by Greene (2012). The results obtained from the seemingly unrelated regression in (table 9 and 10) are consistent with those obtained from the FGLS model in Tables 6 and 7. The results again confirm that after decentralization in 2001, the local governments are more sensitive to the needs of local citizens.

Table 9
EFFECT OF DEVOLUTION POLICY ON SOCIAL SERVICE PROVISIONS USING SUR

	Estimation method: Seemingly unrelated regression			
	Gov size	Social Services		
Dependent variable	TE (%age of GDP)	Education (%age of Gov exp)	Health (%age of Gov exp)	Water supply and sanitation (%age of Gov exp)
	(1)	(2)	(3)	(4)
DP	1.19***	3.98***	1.37***	-0.233
	(0.344)	(1.48)	(0.430)	(0.615)
Log GDP per capita	-3.59***	-2.27	2.87***	-1.616
	(0.616)	(2.65)	(0.769)	(1.100)
Log DPPSQ	-1.33***	4.44***	0.746***	-1.56***
	(0.171)	(0.74)	(0.214)	(0.306)
OSR (%age of GDP)	0.561***	0.345	0.249***	-0.05
	(0.065)	(0.283)	(0.082)	(0.117)
Democratic dummy	-0.032	2.59**	2.20***	1.43***
	(0.208)	(1.16)	(0.335)	(0.479)
Constant	23.34***	3.17	-11.2***	17.26***
	(2.92)	(12.60)	(3.65)	(5.22)
R-squared	0.93	0.48	0.58	0.53
Num of obs	104	104	104	104

a. Additional control variables are the similar as table 5.

b. Clustered Standard errors are mentioned in parenthesis. R-squared square is reported and mentioned in their own rows.

Table 10
EFFECT OF DECENTRALIZATION ON SOCIAL SERVICE PROVISIONS USING SUR

	Estimation method: Seemingly unrelated regression			
	Gov size	Social Services		
Dependent variable	TE (%age of GDP)	Education (%age of Gov exp)	Health (%age of Gov exp)	Water supply and sanitation (%age of Gov exp)
	(1)	(2)	(3)	(4)
ED*DP	0.035*	0.21***	0.149***	0.075*
	(0.020)	(0.084)	(0.021)	(0.045)

(*Continued.*)

Log GDP per capita	-2.72***	-2.26	1.23**	-2.68**
	(0.630)	(2.47)	(0.648)	(1.215)
Log DPPSQ	-1.23***	4.05***	0.337*	-0.01***
	(0.185)	(0.757)	(0.194)	(0.003)
OSR (%age of GDP)	0.651***	0.356	0.168***	-0.028
	(0.063)	(0.253)	(0.065)	(0.117)
Democratic dummy	-0.314	1.730	1.98***	1.49***
	(0.263)	(1.12)	(0.280)	(0.49)
Constant	19.51***	7.71	-2.64	15.19***
	(3.57)	(11.90)	(3.14)	(5.24)
R-Squared	0.92	0.46	0.67	0.52
Num of obs	104	104	104	104

a. ED*DP is the interaction term between expenditure decentralization and devolution policy. Additional control variables are the similar as in table 5.

b. Clustered Standard errors are mentioned in parenthesis. R-squared are reported and mentioned in their own rows.

6.2. Simultaneous quantile regression

The second round of robustness involves the use of simultaneous quantile regression at the 75, 50, and 25 percent quantiles. Simultaneous quantile regression is used for its robustness because it is more sensitive to non-normal errors and outliers (Wang *et al.*, 2011; Gould and Rogers, 1994; and Angrist and Pischke, 2008). Quantile regression at different percentages allows us to see the richer characterization of data and the effect of covariates over the entire distribution around the dependent variable.

$$Q_{0.75}(SS) = \alpha_{0.75} + \beta_{0.75}FD + \delta_{0.75}X \tag{7}$$

$$Q_{0.50}(SS) = \alpha_{0.50} + \beta_{0.50}FD + \delta_{0.50}X \tag{8}$$

$$Q_{0.25}(SS) = \alpha_{0.25} + \beta_{0.25}FD + \delta_{0.25}X \tag{9}$$

Equations 7, 8, and 9 show the distribution of decentralization and include the covariates around public service provisions at different quantiles. The results again confirm the results obtained in Tables 6 and 7, where the data effect of decentralization on service provisions is distributed at the 75, 50, and 25 percent quantile, while for water supply and sanitation, the distribution of decentralization along with that of other control variables is distributed around the 75% quantile with different coefficients. The significance and signs of the coefficients of decentralization at all the three quantiles are similar, according to the estimated results from the FGLS. Devolution policy shows a positive influence on the share of health and education. For water supply and sanitation, the positive effect remains at the same at the 75 percent quantile.

Table 11
EFFECT OF DEVOLUTION ON SOCIAL SERVICE PROVISIONS USING SQR

Dependent variable	Estimation method: Simultaneous Quantile Regression			
	Gov size	Social Services		
	TE (%age of GDP)	Education (%age of Gov exp)	Health (%age of Gov exp)	Water supply and sanitation (%age of Gov exp)
	(1)	(2)	(3)	(4)
Panel A: Simultaneous quantile regression at 75 percentage (Q75) Baseline results				
DP	1.143***	7.35***	1.17	0.27
	(0.424)	(1.81)	(0.798)	(1.45)
ED*DP	0.091***	0.12	0.121***	0.114***
	(0.027)	(0.14)	(0.025)	(0.041)
Pseudo R2(DP)	0.82	0.33	0.46	0.34
Pseudo R2 (ED*DP)	0.80	0.28	0.51	0.38
Panel B: Simultaneous quantile regression at 50 percentage (Q50) Baseline results				
DP	1.032***	3.05**	1.67***	0.473
	(0.347)	(1.58)	(0.47)	(0.508)
ED*DP	0.020	0.19***	0.127***	0.051
	(0.034)	(0.073)	(0.041)	(0.035)
Pseudo R2(DP)	0.76	0.30	0.37	0.34
Pseudo R2 (ED*DP)	0.74	0.31	0.42	0.34
Panel C: Simultaneous quantile regression at 25 percentage (Q25) Baseline results				
DP	0.782*	0.83	2.36**	-0.10
	(0.435)	(1.32)	(0.98)	(0.427)
ED*DP	0.033	0.29**	0.186***	0.0002
	(0.039)	(0.151)	(0.04)	(0.021)
Pseudo R2(DP)	0.65	0.34	0.16	0.37
Pseudo R2 (ED*DP)	0.64	0.36	0.30	0.37

a. Clustered Standard errors are mentioned in parenthesis. Pseudo R-squared is reported and mentioned in their own rows.

b. Panel A represents Q 75 and shows Quantile regression at 75th percentile, Panel A represents Q50 and shows Quantile regression at 50th percentile, Panel C represents Q25 and shows Quantile regression at 25th percentile.

7. Conclusion

This paper conducted an empirical analysis on the association between devolution on government size and persistence in social service provisions on various components of government expenditures using a panel of provincial data from Pakistan for 1990-2015 concerning two hypotheses, Leviathan and the common pool hypothesis. To this end, we regress Government expenditures and various components of government expenditures (education, health

and water supply and sanitation) on fiscal devolution. By employing a feasible generalized least square model on government size and persistence in service provisions expenditures on various components of government expenditures, the authors find that the devolution reforms in Pakistan increased the government size in the form of amount of the provincial government's total expenditures and increased public service provisions in terms of spending on health and education. The above findings suggest that the common-pool hypothesis is prevalent in Pakistan's fiscal system, but we do not find any evidence of the Leviathan hypothesis. In this fiscal regime, provincial governments do not have enough revenue to finance the public goods and services that they are assigned and have to resort to transfers from upper-level governments or other common-pool resources to finance their expenditures (Rodden *et al.*, 2003). The vertical fiscal imbalance shows a positive effect on the provincial government's expenditure size and raises the share of education and health spending in the total provincial government's expenditures. The rise in the share of education and health spending following devolution is justified by the fact that, in the case of Pakistan (Shah 2005), the inter-governmental structure forum is better than the self-governing agency model. In most cases, revenue is collected by the central government and is then redistributed to the local government through a special mechanism (Ehdaie, 1994; Grossman, 1989). Shah explains the structure of Pakistan's NFC as an inter-governmental forum model and explains their advantages. For example, transaction costs (such as executive and legislative decision-making expenditures, participation and monitoring costs, uncertainty costs, and agency costs) in the intergovernmental setting model are low compared to those in the self-governing agency model. This structure justifies a large government size but also increases the magnitude of social service provisions.

The post-devolution reform of 2001 is one of the solutions controlled by governments that grants the promotion of local resource mobilization to help in attaining the proposed goals. This study has offered an assessable valuation of the effects of devolution reforms on the size of government and the magnitude of social service delivery in the form of education and health. These results provide empirical support to the common-pool hypothesis, implying that devolution matters most for the size of general government, notwithstanding the extent to which local governments expenditures are financed by intergovernmental fiscal transfers. Here, we provide weak evidence in favor of the Leviathan hypothesis. The results specify that the public service provisions by the government in education and health increased significantly following the post devolution reforms. The relationship between the devolution reforms and the social service provisions in the form of education and health variables is insensitive and robust to the use of alternate specification methods, indicating that investment in education and health have significantly increased following the introduction of the devolution reforms in 2001.

The limitations experienced with data at the district level limited this research from analyzing and measuring the quality of these services at the local level in terms of units of output instead of focusing only on the supply of such services measured through public expenditures. Much research at the district level will be essential to examine the efficiency of the devolution plan in improving the quality of 'untargeted services' that possibly affect local societies without any discrepancy. Moreover, future research could compare countries with similar characteristics to perform a cross-country analysis or regional study.

Annex

Variables	Definition	Source
TE (%age of GDP).	Total size of the Expenditure is the ratio of provincial government expenditures to their GDPs.	*Pakistan Economic survey* (Ministry of Finance, 1990-2015); *Pakistan statistical year books* (Pakistan Bureau of statistics, 1990-2015).
Education Exp (%age of gov exp).	Education expenditure is taken as a percentage of Provincial government expenditure.	*PRSP* (Ministry of Finance, 1990-2015).
Health Exp (%age of gov exp)	Health expenditure is taken as a percentage of Provincial government expenditure.	*PRSP* (Ministry of Finance, 1990-2015).
Water supply and sanitation Exp (%age of gov exp).	Water supply and sanitation expenditure is taken as a percentage of Provincial government expenditure.	*PRSP* (Ministry of Finance, 1990-2015).
OSR (%age of GDP).	Own-source revenue is constructed by dividing own-source revenue to their provincial GDPs.	*Pakistan Economic survey* (Ministry of Finance, 1990-2015); *Pakistan statistical year books* (Pakistan Bureau of statistics, 1990-2015).
Log GDP per capita.	Log per capita Gross Domestic product.	*Pakistan Economic survey* (Ministry of Finance, 1990-2015).
Log DPPSQ .	Log per capita density per square KM. Population density is $1/KM^2$ and is measured by dividing the population to its area.	*Pakistan Economic survey* (Ministry of Finance, 1990-2015).
Expenditure decentralization (%).	Expenditure decentralization is measured as a ratio of per capita expenditure of the provincial government in the total per capita expenditure of (a) of its own expenditure (b) the capital government under which provincial government is subordinated.	*Pakistan Economic survey* (Ministry of Finance, 1990-2015); *Pakistan statistical year books* (Pakistan Bureau of statistics, 1990-2015).
Vertical fiscal imbalance (VFI) (%age of gov exp).	Vertical fiscal imbalance refers to one minus ratio of own-source revenue to a total expenditure of the province.	*Pakistan Economic survey* (Ministry of Finance, 1990-2015); *Pakistan statistical year books* (Pakistan Bureau of statistics, 1990-2015).
Devolution dummy.	Devolution is a dummy that takes the value of zero before devolution in 2001 and takes the value of one after devolution.	N/A.

(*Continued.*)

Variables	Definition	Source
Democratic dummy	Democratic dummy refers to values of one if devolution practices are an exercise in democratic government and take the value of zero if the devolution practice is exercised in the military government.	N/A.

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Resumen

En este documento se contrasta la relación entre la reforma de la política de devolución, que se produjo en 2001 en Pakistán, el tamaño del gobierno y su relación con determinados componentes del gasto gubernamental. Se estima un modelo de datos de panel para las provincias de Pakistán para el periodo 1990-2015. Los resultados proporcionan evidencia empírica de la hipótesis de la mancomunidad, es decir a mayor tamaño del gobierno mayor devolución. El efecto de la descentralización, que informa del tamaño del gobierno, depende de la forma en que los gobiernos subcentrales financien sus gastos. Los resultados sugieren que como consecuencia de la reforma de la política de devolución se produce un aumento significativo en la magnitud del gasto en sanidad y en educación a nivel local.

Palabras clave: reformas de devolución, tamaño del gobierno, prestación de servicios sociales, hipótesis de la comunidad, hipótesis del Leviatán.

Clasificación JEL: H50, I10, I20, I30.