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ESSAYS IN FISCAL DECENTRALISATION EFFECTS ON ECONOMIC GROWTH, HEALTH AND EDUCATION

by

IFTIKHAR AHMAD

Thesis submitted in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

School of Economics
University of Kent
Canterbury
United Kingdom

August, 2013

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I dedicate this thesis to

My Parents and Family

Thank you for your everlasting prayers and unconditional love

ACKNOWLEDGEMENT

To be able to complete this piece of research bowed my head to the Almighty Allah, the Compassionate and the Merciful, Who conferred upon me the determination, potential and ability. And countless salutations be upon the Holy Prophet Muhammad (Peace be upon Him and His Progeny) whose life is a candle for us in the darkness. This work further confirms my belief that every effort is rewarded by Almighty Allah according to the devotions for the work.

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Iftikhar Ahmad

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ABSTRACT

The first essay discusses the effects of fiscal decentralisation on economic growth in Pakistan, where the resource distribution formula was based on single-criterion (i.e. population only). Following the cointegration approach, this is the first ever study to disentangle the short run effects of fiscal decentralisation from its long run implications on the economic growth in Pakistan. The automated general-to-specific (*Gets*) modelling technique was adopted to find a representative parsimonious model, for a relatively short time series dataset. The study identified that in Pakistan, the focus mainly remained on partial fiscal decentralisation, where the provinces remained dependent upon federal transfers. Evidence suggests a long run cointegrating relationship between fiscal decentralisation and economic growth, making us aware of the immediate consequences of a resource shift policy, in addition to its long-run effects. Analysis suggests that in order to stimulate economic growth, emphasis should be shifted towards entrusting provinces with higher taxation powers. In addition, the diversification of the resource distribution formula, with the inclusion of efficiency enhancing measures, might also help in achieving higher economic efficiency.

Education and health sectors are known to have massive impact on the quality of human life. In this context, health sector is discussed in the second essay to analyse the impact of fiscal decentralisation on various health sector indicators in Pakistan. Two datasets were used for the separate analysis of the national (1974-2009) and provincial (1980-2001) health indicators. It was learnt that health sector remained neglected both at the national and provincial level. To a surprise, negative long run cointegrating relationship was found for the effects of federal transfers on health expenditures at the national level. The provincial analysis however suggests that federal transfers improved hospital beds availability in the economically active provinces, which were presumably more efficient. Provincial autonomy failed to play a role in the improvement of the health sector. The analysis highlights the social implications of federal transfers. Differences in results for economically distinct provinces hint towards the efficiency aspect of resource utilisation.

The third essay estimates the effects of fiscal decentralisation on education sector. A rich panel data from 59 countries were used that covers period from 1972-2010. This essay provides empirical evidence on the effects of fiscal decentralisation policies for OECD and Non-OECD countries. It was found that different sources of subnational revenues have distinct effects for education expenditures and education quality. The most

important finding was that when subnational governments are financed through own tax revenues, they increase the education funding. Subnational governments seemed relatively less sensitive towards maintaining the teaching quality. Thus this study provides evidence that decentralised set up reflects upon and cater with the local social needs. Hence, in order to achieve Millennium Development Goals, government can use fiscal decentralisation as an important policy instrument. Especially, fiscal decentralisation is of importance to the relatively less developed countries, which are still lagging behind on major Millennium Development Goals.

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CHAPTER 1 INTRODUCTION

Localization-the growing economic and political power of cities, provinces, and other sub-national entities will be one of the most important new trends in the 21st century

(World Development Report 1999-2000)

1.1 INTRODUCTION

This thesis comprises of three essays to analyse the important dimensions of fiscal decentralisation. Keeping in view the importance of sustainable economic growth, the first essay analyses fiscal decentralisation as a determinant of economic growth and separately looks at the effects of different fiscal decentralisation policies. The following two essays concern the service provision aspects of fiscal decentralisation, and investigate its link to health and education sectors, as their importance for better quality of life is well-known. Thus, fiscal decentralisation as a policy instrument is of great importance because it has the potential to simultaneously affect all the three important dimensions of human development. The empirical analyses for the first two essays are based on evidence from Pakistan, while the third essay presents cross-country panel data analysis to quantify the effects of fiscal decentralisation on education sector.

Analysis of the determinants of economic growth has always remained an important field in the empirical research. It is mainly because of the fact that sustained economic growth provides the national governments with much needed financial resources for development. Hence, in the earlier period of empirical analyses in fiscal decentralisation, researchers focused more on the quantification of the direct effects of fiscal decentralisation on economic growth. Though evidence was found for the assumed direct effects, however, some of the studies came up with different results. These findings raised questions about the direct link between fiscal decentralisation and economic growth and later on broadened the research spectrum to the analysis of certain indirect channels through which fiscal decentralisation can have an impact on the quality of human life.

As we are aware that in 1980's, human capital emerged as one of the important determinants[1] of economic growth (Romer, 1986; Lucas, 1988), opening up another area of research to identify the determinants of human capital itself. Clearly, human capital directly depends upon the education and health systems that are in place in a country;

[1] It was stated that healthy minds and productive labour force endogenously accumulate knowledge and are involved in "learning by doing" practices, which increases the overall productivity

hence it further increased the importance[2] of these given sectors, apart from their traditional social role. Under these circumstances, how to improve the education and health sectors in a society are important research questions. The pertinence of these questions is enhanced by the fact that we live in a world where targets for the universal enrolment, completion of primary education and similarly reduction in child and maternal mortality are still considered part of the unfinished agenda (MDGs report, 2012). In this scenario, fiscal decentralisation as a policy can play a key role in the improvement of these two sectors, along with having an indirect effect on economic performance (via these).

Theoretically, Tiebout (1956), Oates (1972) and recent contribution has argued that fiscal decentralisation warrants efficiency and improves services. The major argument that flows from the theory is that localisation results in people-focused policy making. Fiscal decentralisation is also said to be cost effective and has the ability to cater diverse needs of the people by accommodating indigenous geographical and societal needs. Nevertheless, how diverse societies are, the need for better health and education services always remains the first priority and cannot be ignored. In fact, fiscal decentralisation is believed to provide the basic fiscal and administrative ability to the lower tiers of the government to devise policies, which are fed from local input and are framed to accommodate local conditions. Similar arrangements are difficult to realise under centralised policy making where the formulation and implementation is carried out by relatively non-motivated, unanswerable[3] civil servants. On the other hand, local politician has a stake in the whole process and by accommodating local demands they seek their re-election and thus have an incentive to be efficient and attractive than their competitors. These competitors can be thought of as both the rival politicians and the other competing local jurisdictions (which are trying to attract the well-off tax payers by offering better services).

Nevertheless, it is obvious that the localised setup is not free from risk and errors. In the real world, local governments are reported to have suffered from; lack of administrative capacity (which hampers their ability to serve the people), corruption, self-centred leviathan government and are also vulnerable to become victims of elite capture. Nevertheless, if we set aside the well-developed democracies, similar problems prevail even at the central government level, and clearly the situation is much worse in the third world countries. Given that the issues summarised above basically relate to governance, these hence fall in the domain of institutions, which needs to be improved both at the

[2] Because of their role in determining human capital
[3] To the local people

central as well as local level. Even though the issues are not necessarily because of the decentralisation but these can however reduce its benefits.

To sum up, in the recent literature on fiscal decentralisation, the major focus of research is to empirically test the theoretical claims relating to fiscal decentralisation. Hence in line with recent research, this study analyses the three important dimensions of fiscal decentralisation. In the first two essays concerning the economic growth and health sector, analysis is based on the time series data evidence from a single country i.e. Pakistan. Due to the incomplete data availability for the education sector, however, we present a cross country panel data analysis for education sector in the third essay. Furthermore, for the essay related to the health sector, data from both the national and provincial level is used to arrive at better results. Thus, this exercise contributes to the existing literature by improving evidence related to fiscal decentralisation by using a single country as well as cross country data analysis. This effort presents a combination of time series and panel data analysis[4] and benefits from a mix of suitable econometric techniques. Lastly, this study opens up ways for future research as well, by identifying areas of concern and potential for new research.

1.2 BACKGROUND

During the second half of the twentieth century, nations shifted their focus to decentralisation to improve local service provision (Oates, 1999). History of advocacy for decentralisation goes back to Tiebout (1956), Musgrave (1959) and Oates (1972). They lead the way by arguing in favour of decentralisation when the rest of the world was not paying enough attention to the matter. Earlier researchers assumed a welfare maximising local government and basic theme of decentralisation was envisaged as empowering the local people to ensure efficiency which ultimately enhances productivity and brings higher economic and social gains.

Broadly, fiscal decentralisation deals with the empowerment of lower tiers of the government so as to enable them to carry out local service provision. Under fiscal decentralisation, lower tiers of government are given appropriate financial resources and are entrusted with spending responsibilities at the local level. This process helps the subnational governments (SNGs) to be more innovative, responsible and efficient. Fiscal decentralisation is consequently assumed to enhance economic growth due to efficient

[4] Two different types of panel data was used i.e. the provincial analysis where we have small "N" and large "T" while a vice versa situation was dealt with in the case of cross country analysis

resource allocation[5], engaging SNGs in positive competition, increasing accountability and transparency[6] and by avoiding rent seeking behaviour[7]. Hence, the proponents of fiscal decentralisation argue that allocation of spending responsibilities to the local authorities helps in efficient and effective use of scarce resources while at the same time the delegation of taxation powers increases competence, innovation and responsibility aspects at the local level. Thus, a well-designed system of fiscal decentralisation is assumed to achieve economic efficiency and will positively contribute to the economic and social indicators.

1.2.1 Theoretical Background

Discussing the basic theory of Fiscal Federalism, Oates (1972, 1999) elaborated the basic framework where government assignments are carried out by the appropriate level of government that is equipped with proper fiscal instruments. Assigning responsibilities along with resources leads to the achievement of higher degree of efficiency and finally to the provision of public goods in accordance with public preferences. Oates reduces the role of central government to the responsibility of macroeconomic stability and income redistribution along with provision of certain national public good like national defence. On the other hand, local governments are assumed to provide basic local public goods like health, education, water and sanitation, streets and roads. Basic argument is that as local government representatives are located near to the people, they are better informed about local circumstances. Therefore, local representatives are better positioned to accommodate heterogeneous preferences which result in efficient allocation of scarce resources. In addition, local representatives also know the local cost conditions which guide them towards better allocation. Efficient allocation of resources thus ensures maximum return on public spending and helps in enhancing economic growth (Oates, 1999).

With the development of theoretical foundation of a presumed positive relationship between fiscal decentralisation and economic growth, economists worked out models to empirically quantify the relationship between the two. The seminal work of Aschauer (1989) and Barro (1990) provided basis for modelling the link between fiscal decentralisation and economic growth. These researchers were among the first ones to pin down the effects of aggregate government spending on economic growth and productivity.

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[5] Because local representatives are better informed about local preferences, needs and circumstances
[6] By making local government answerable to public who will elect the local politicians
[7] Reducing the local government's ability to externalise their costs to other SNGs; without putting-in due effort. Fiscal decentralisation ensures this through a suitable, multi-criteria resource distribution mechanism

These studies disaggregated government spending into public consumption and public investment and analysed their impact on economic growth. Following their guidance, Davoodi and Zou (1998), Zhang and Zou (1998) and Xie *et al.* (1999) expanded the Barro's endogenous growth model and looked into the effects of public spending that is carried out by different levels of the government. The above stated studies worked out theoretical models to find growth maximising optimum shares for different tiers of government. Development of the appropriate theoretical models helped in the empirical quantification of the assumed relationship between fiscal decentralisation and economic growth. These studies agreed that as long as government spending at different tiers is not in line with their growth maximising shares, country can achieve higher economic growth via switching to optimal shares, without even changing the total expenditure share in GDP at the national level.

Overtime, research in the field of fiscal decentralisation can be divided into two phases. The first generation fiscal federalism (FGFF) is basically a normative representation of government functions where local representatives are assumed to work for the maximisation of local people welfare. It explains the rules, principles, mechanism and rationale for the better fulfilment of local preferences and equilibrium among the upper and lower tiers of government. However, with the passage of time, theory of fiscal decentralisation was enriched with the addition of new dimensions and certain potential discrepancies were identified and analysed. This was later called the second generation fiscal federalism (SGFF) that discusses the required political, economic and institutional preconditions which are necessary to make welfare maximising rules work properly. Thus, one can say that the SGFF discusses the limitations of FGFF theory.

As higher level of fiscal decentralisation can be either achieved via higher taxation powers at the SNG level or by transferring more funds from the centre, this topic earned significant attention. Boadway (2001) pointed out the importance of federal transfers as these shape fiscal relation among the given levels of government. He argued that federal transfers from national government come with distinct objectives. First of all, provision of local public goods is the prime priority for the government and local authorities often suffer from the limited resources and thus normally need federal transfers to complete the given tasks. Secondly, upper tier of the government advance conditional grants to drive the local authorities towards certain national and international goals. Lastly, federal transfers are aimed to achieve equalisation among the constituent parts of the country. Moreover, Boadway (2001) discussed certain negative externalities related to revenue delegation

aspects of fiscal decentralisation. It was elaborated that different jurisdictions have varying taxable capacity and face different cost conditions for service provision. Consequently, delegation of revenue assignments at lower levels might adversely affect equity and efficiency at the national level and it will only help the jurisdictions that have favourable conditions. Hence, it was concluded that if not designed properly, decentralisation can possibly lead to greater regional disparities within a nation. Study suggests a structure for the fiscal grants and transfers between the upper and lower tiers of government, so as to limit its negative externalities and to gain the benefits of decentralisation.

During the same time, another strand of literature looked at the trade-off between centralisation and decentralisation. The work of Besley and Coate (2003) and Lockwood (2002) analysed relative merits of the two. Both the studies agree that benefits of decentralisation depend upon the extent of externalities, spill overs and differences in tastes among jurisdiction. Using the political economy approach, Besley and Coate (2003) managed to confirm what is found in the standard approach i.e. policy making under centralisation suffers from the inability to accommodate heterogeneous preferences, which is possible under decentralisation. Lockwood (2002) terms the suboptimal choice of projects as a source of inefficiency in centralisation instead of policy uniformity. Lockwood (2005) further strengthens the discussion by providing a comprehensive review of related literature that discussed various influences which can shape outcomes under centralisation and decentralisation. Hence instances were highlighted where decentralisation can fail to bring benefits, as suggested.

During that time when economists were trying to find empirical evidence for the direct relationship between fiscal decentralisation and economic growth, Martinez-Vazquez and McNab (2003) added new directions to this debate. They pointed out certain channels through which fiscal decentralisation can indirectly influence economic growth. The potential channels which can positively or negatively influence economic growth were identified as: consumer efficiency[8], producer efficiency, income distribution, macroeconomic stability, corruption and role of elites. This study discussed both the direct as well as the indirect effects of fiscal decentralisation on economic growth and pointed out several shortcomings and potential threats which might lead to the misunderstanding of results.

[8] Increase in consumer welfare, by providing goods and services that match local preferences

Although, there were remarkable efforts by researchers to quantify the presumed positive effects of fiscal decentralisation and economic growth however, studies came up with different results. Weingast (2009) asserted that there are basic institutional differences across countries and these cause differing results for different studies. Basing his argument on second generation fiscal federalism (SGFF) theory, he discussed various preconditions for the success of fiscal decentralisation policy. It was stated that the political and economic circumstances of a country determines its degree of fiscal decentralisation. As discussed earlier, first generation fiscal federalism (FGFF) explains the benefits of fiscal federalism while SGFF spells out the preconditions[9] and necessary arrangements for fiscal federalism to deliver desired results. SGFF also discusses the incentives that fiscal decentralisation bring to local representative including local revenue generation that makes local government financially independent, responsible as well as responsive to local choices. It also reduces corruption and provides incentives for market enhancing public goods provision. Thus, Weingast (2009) argued that if fiscal decentralisation policy lacks in these properties, it will remain incapable of enhancing economic growth.

Local government in developing and transitional countries often fail to match their expenditure needs from their local tax resources[10]. Brueckner (2009), presented this departure from 'Tiebout tradition' as 'partial fiscal decentralisation' where SNG are responsible for spending at the local level while the central government collect revenues and provide funds to the local levels. Brueckner (2009) developed a model for the stated situation and analysed alternative scenarios including 'full decentralisation', 'full central control' and 'partial decentralisation'. Author concluded that if transfers under partial fiscal decentralisation are provided optimally, it is still superior to full central control because local governments can take decisions according to local preferences. The paper deliberated that under partial fiscal decentralisation, public will not be able to have full variety of public goods (presumed to be available under full decentralisation) but the incidence is reduced when SNGs collect certain amount of revenue from local taxes.

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[9] SGFF delineate the properties of an ideal federalism where deviation from these properties impedes the fiscal decentralisation gains. First of all, political authority of each level of government needs to be clearly and efficiently demarcated. Secondly, SNGs should be able to adopt such policies which suit their local demands and circumstances. The third important pre-requisite for an ideal market preserving federalism is to ensure a common market where products and factors of production can move freely across jurisdictions. The forth condition for an efficient federalism is to observe hard budget constraint, which hold SNGs answerable for their actions. Lastly, Federal government should not intervene in local affairs so that regional governments are free to devise endogenous policies which address local demands and their consistency is ensured (Weingast, 2009).

[10] The reason lies within the fact that even though local authorities are given taxation powers, the resources they have to tax are more often inadequate and exhausted. In addition, the tax bases are not uniform for different jurisdictions. Thus they have to rely on transfers from the federal government.

Qiao *et al.* (2008) touched upon an important dimension of fiscal decentralisation and studied the effects of fiscal decentralisation on regional inequality. Authors presented comprehensive theoretical debate and developed a model where government has to decide about a trade-off between economic growth and (reduction in) regional inequality. Different scenarios were systematically discussed where the central government's prime objective is (i) growth only; (ii) achievement of given level of equity; and (iii) equity only. Fiscal decentralisation was considered the policy instrument for switching across the given alternatives. It was theoretically shown that for perfect or given equity, central government will be the one to spend more while its revenue will mainly be contributed by the richer provinces. On the contrary, if the policy maker has more emphasis on growth, central expenditure should be lower and richer jurisdiction will be contributing the smallest share to the central pool. Hence, this study was also in favour of the positive effects of fiscal decentralisation on economic growth.

1.2.2 Insights from the Empirical Analysis

Along with the theoretical literature, many researchers focussed on the empirical quantification of the effects of fiscal decentralisation. Most of the studies presented in the previous section had also carried out empirical estimation to test their theoretical models. The detailed discussion will be presented in the relevant chapters; however, few studies that explored the effects of fiscal decentralisation on important social dimensions are presented in this sub-section.

Faguet and Sànchez (2008) looked into the effects of fiscal decentralisation on public investment in Bolivia and Colombia. In both the countries, evidence was found that decentralisation has led to greater investment in social services (like health and education) instead of infrastructure that was given more attention under the centralised set up. They found that fiscal decentralisation has improved school enrolment in Colombia. In the case of Bolivia, evidence suggested that decentralisation has resulted in disproportionate increases in public investment in areas that were previously neglected and decentralisation hence seemed to be responsive to immediate local needs.

Jiménez-Rubio (2011) showed for OECD countries that fiscal decentralisation helps in reducing infant mortality, provided that subnational governments enjoy substantial autonomy in revenue collection. Similarly, Khaleghian (2004) analysed data from 140 countries and found that fiscal decentralisation helps in higher immunisation coverage in low-income countries. Uchimura and Jütting (2009) also found that decentralisation in

China has helped in achieving lower infant mortality. Authors emphasised that local government effectiveness increases when local spending responsibilities are matched with their local revenue raising capacity.

In the similar way, Falch and Fischer (2012) analysed OECD panel data on student test scores and found that fiscal decentralisation helps in improving student performance. Importantly, authors argued that this improvement can be achieved even without increasing the education spending and hence this study provides evidence for efficiency gains under decentralised set up. Galiani *et al.* (2008) however, pointed out that if poor communities lack the ability to raise their voice and faces elite capture in local governments, they will not be among those which ultimately benefits from the positive effects of school decentralisation. Evidence was based on the situation in Argentina where authors found that although school decentralisation has resulted in higher student's test scores, poor were left out.

Aslam and Yilmaz (2011) analysed the effects of localisation on the provision of various local services including street paving, construction of water canals, sanitation, and school facilities in Pakistan. They found that decentralisation had a positive impact on the local service provision. Authors found that improvement in services was evenly distributed across different villages without any favouritism. Thus, decentralisation was considered responsible and responsive to local needs. Similarly, Bjørnskov *et al.* (2008) analysed the effects of decentralisation on the overall life satisfaction of the people in a cross sectional study for 66 countries[11]. They also came up with the results that fiscal decentralisation increases subjective well-being of the people and on average people were more satisfied with decentralised provision of services.

Thus the given discussion makes different channels clear which can have an impact on the effectiveness of fiscal decentralisation policy. With the passage of time, theory of fiscal decentralisation has evolved and certain indirect influences are also identified. It seems clear that despite having different analysis, researchers have agreed that fiscal decentralisation can play an important role in determining the economic and social indicators. Important features of fiscal decentralisation were outlined as; the efficient provision of local public goods, responsiveness to local needs and higher degree of responsibility, accountability and innovativeness. Thus, fiscal decentralisation was

[11] The dependent variable was measuring the subjective well-being and was based upon the direct question asked during the World Values Survey, 1997–2001 i.e. "How satisfied are you with your life these days?"

envisaged to have the potential to affect economic and social indicators, however, its magnitude and sign depends upon the institutional factors that differ across countries.

Summary

This review provided broad guidelines and pointed out various stages in the development of literature that relates fiscal decentralisation to economic and social sectors. It started with the FGFF where the basic sketch of growth enhancing intergovernmental fiscal relationships was developed. Provision of public service by local decision makers, in accordance with local preferences, was considered as growth enhancing. Although related empirical literature for each essay will be discussed later, number of efforts has been made to empirically quantify the theoretical relationship between fiscal decentralisation and different economic and social indicators. For empirical analysis, fiscal decentralisation mainly was defined as the revenue collection ability and/or spending responsibility at the sub-national governments level. However, several researchers showed their discomfort and objected to the use of these indicators as proxy for fiscal decentralisation. They were of the view that these measures are not representative of the local authority in decision making. However, due to the absence of adequate measures, which can fully take into account the autonomy of SNGs, researchers had to resort back to the given measures. Another important finding was that revenue decentralisation and expenditure decentralisation suits different kinds of political economies and the effects of decentralisation depend upon the political and geographical structures of the economy.

Researchers that considered the empirical estimation of the given relationship came up with a number of issues that are worth considering. One important issue was of heterogeneity in the cross country studies. It was pointed out that there are cultural, institutional and historical differences across the countries and if different countries are pooled together, it can lead to the distorted results. Similarly, the fear of endogeneity was shown in the case of single countries studies. Moreover, available literature has discussed different strands of fiscal decentralisation theory. There are studies that analysed the departure from the actual theory fiscal decentralisation and analysed the partial fiscal decentralisation policy where the centre provides funding and local governments provide services in accordance with local preferences. Similarly, the SGFF theory discussed the pre-requisites for the fiscal decentralisation policy to come up with positive outcome. It discussed the incentives that a local government enjoys after the implementation of fiscal

decentralisation policy and pointed out the bottlenecks which could hinder the assumed gains.

The availability of huge literature on this topic thus reflects its importance. However, there are other important issues which can directly as well as indirectly affect the outcome of the policy. Fiscal decentralisation can only work if it is implemented with its true spirit. Institutions play an important role in the final implications of fiscal decentralisation policy whereas the quality of institutions directly relates to the stage of country's development. Difference in institutional quality is one of the strong reasons for causing different results across different countries. Hence, in order to get reliable estimates, country's characteristics needs to be thoroughly looked at and appropriate variables should be used to isolate important dimension. Finally, this section improves our understanding of the concept and identified issues which need to be considered during estimation.

1.3 SYNOPSIS OF THE THESIS

Having discussed the background of fiscal decentralisation, it would be interesting to look into its effects for Pakistan, which is a developing country. The basic motivation for this study is to analyse the effects of fiscal decentralisation on economic growth, health and education sector. Thus, this study investigates the human face of fiscal decentralisation along with its effects on the economic growth. The first two essays on economic growth and health sector are exclusively based on data from Pakistan and separate the immediate and long run effects of resource distribution policies on the economic growth and health sector in Pakistan.

However, for the third essay, data scarcity left us with no chance to analyse the education sector indicators in the particular case of Pakistan. Yet, the improved and up-to-date data availability across countries provided us with an opportunity to benefit from international panel evidence for our topic of interest. The third essay thus re-examines the effects of fiscal decentralisation on education sector, using an updated version of World Bank's Fiscal Decentralisation Indicators data (which was recently released in October, 2012). Thus, for the analysis of education sector, panel data from 59 countries was used for the analysis. Although, fiscal decentralisation data for Pakistan was not available in the World Bank's data, it was incorporated into the dataset using the available national data for

Pakistan. Unfortunately, as Pakistan had only 16 observations[12] available for the education indicators therefore, it was not possible to have a separate analysis for Pakistan in the case of third essay.

This effort contributes to the existing pool of knowledge by analysing Pakistan, which was exceptional in its use of single-criterion fiscal resource distribution mechanism. The single criterion of population, though brings simplicity into the resource distribution, it lacks in incentives for the federating units, which hampers their efficiency. The said exercise will bring to light whether the National Finance Commission awards[13], despite its troubled history, brought any benefits to the people of Pakistan. The analysis will broadly identify the areas of focus for Pakistan to consider.

Moreover, another important contribution of this study is to distinguish between the effects of different fiscal decentralisation policies. Using the revenue approach (to measure fiscal decentralisation) this study tries to separate out the effects of two distinct policies i.e. provincial autonomy factor and the factor of partial fiscal decentralisation. Similar analysis is not possible with the expenditure approach. The section below will discuss the measurement of fiscal decentralisation in greater detail.

1.3.1 How to Measure Fiscal Decentralisation

Decentralisation is a complex theoretical concept that is related to the decision making ability of the lower tiers of the government and determines the level of service availability to local people. Decentralisation thus covers a range of issues including revenue raising capability, the administrative capacity to make decisions as well as the spending responsibilities at the subnational[14] governments. Collectively these factors determine the effectiveness and efficiency of the lower tiers of government. Therefore, it is not easy to find a precise measure that can gauge the exact degree of decentralisation. Bossert and Mitchell (2011) elegantly discussed that even within the same country the effects of decentralisation can differ because of the difference in the executive's commitment and willingness to practice the *'de jure'* decision making powers.

Nevertheless, over the time researchers have tried different ways to proxy the decision making ability of the local governments and literature guides us to certain

[12] For education sector indicators i.e. from 1974-1990 while the values for 1988 was missing
[13] Meant for amicable fiscal resource distribution in Pakistan
[14] During this discussion the provincial, state and local levels will be used interchangeably to refer to the subnational levels of government

measures that can be used to proxy the level of decentralisation. In this connection, the use of fiscal instruments has dominated. Studies linked the decision making ability of the SNGs to their fiscal abilities to measure the extent of fiscal decentralisation. This was done either directly or through the use of dichotomous variables to capture the revenue raising abilities of the SNGs. In addition to the revenue approach, the expenditure incurred at the local level is also used in various studies to scale the degree of fiscal decentralisation. For this study, we thoroughly considered both the revenue and expenditure approach to quantify fiscal decentralisation. However, as this study concerns Pakistan for the first two essays, the available national data makes it difficult to exclusively discriminate between the federal and provincial expenditures in Pakistan. Provincial expenditures include development spending that are partly financed by federal government[15] or funded under foreign project assistance. Moreover, no clear demarcation is available to separate federal and provincial spending for the whole period of analysis. Therefore, in case of Pakistan it is hard to capture the true degree of fiscal decentralisation using the expenditure approach.

On the contrary, the revenue approach (i.e. revenue raised by the lower levels of governments) provides us with the required diversity for the analysis in this study. The revenue approach not only makes it possible to identify the resource generation potential of the provinces but it also enables us to capture the effects of federal transfers that are used to cover vertical fiscal imbalance. Analysis of federal transfers is important as although these helps in bridging the gaps due to the cost disabilities, these at the same time illustrates provincial dependence on federal resources to carry out its functions. Revenue approach thus helps in identifying the effects on provincial resources flow and their revenue raising capacities, which resulted from various NFC awards overtime. While on the other hand, analysing federal transfers would help us to separate its effects on the SNGs efficiency to serve the people. Hence, in this study the revenue approach is used to proxy fiscal decentralisation. Any increase in the revenue of the provincial government would indicate the higher degree of fiscal decentralisation (although the alternative sources of provincial revenue are supposed to have different implication on the efficiency of the local governments).

As we know, provincial revenues consist of domestic tax revenues, domestic non-tax revenues and the federal transfers to provinces. In the literature, it is a common practice to use more than one measure of fiscal decentralisation due to the complex nature of the

[15] Under the central government initiatives like Khushhaal Pakistan Programme, Social Action Program or projects financed through parliamentarians' development funds (that are funded by the federal government but projects are executed by the local authorities)

topic as discussed earlier. Therefore, depending on the essay, this study used four different measures of fiscal decentralisation to cover all the dimension of provincial revenues and hence to capture a broader picture. This exercise will help in identifying the distinct effects of different sources of provincial revenues on the efficiency of provincial governments and would make us able to critically evaluate the effectiveness of different fiscal decentralisation policies. The four measures of fiscal decentralisation are outlined here as below:

1) Revenue Autonomy: is defined by the provincial domestic tax revenues. Domestic taxes are the ones that are collected and retained by the provinces and provinces have the mandate to fix the rates and bases for these taxes. This indicator measures the revenue raising authority of SNG and represents the autonomy factor as SNGs have full discretion over the use of these funds. If SNGs have higher own source revenues, it shows higher fiscal autonomy and would indicate higher degree of fiscal decentralisation. Moreover, to capture the degree of fiscal decentralisation overtime and to make provincial autonomy measure economically meaningful, the share of provincial tax revenues will be expressed as ratio to total government revenues.

2) SNG's Local Revenues: is an additional measure of local autonomy and takes into account the domestically generated revenues within provinces. Provincial local revenues consist of the domestic tax revenues and non-tax revenues. Non tax revenues comprise of user charges, prices, fines and profits from autonomous bodies as well as interest, dividends, international grants and assistance at the provincial level. This measure presents the SNG's local revenue generation capacity and would be indicative of local autonomy in decision making. To be used as a measure for fiscal decentralisation, provincial local revenues will be used as a ratio to total government revenues.

3) Federal Transfers: are decided out of the total divisible pool and present provincial shares in the revenues collected at the federal level. In both the developed as well as developing countries, federal transfers to provinces play an important role in shaping local budgets. Although, federal transfers increase funds availability to provinces, at the same time these indicate fiscal dependency of SNGs on the centre. Intergovernmental transfers depict the vertical fiscal imbalance in the country. Higher the share of federal transfers in the local revenues, higher would be the

influence of federal government in local decision making, which will be a deviation from the basic theory of fiscal decentralisation. Nevertheless, it also carries the benefits as described under partial fiscal decentralisation analysis by Brueckner (2009). Hence, it is important to thoroughly assess the impact of fiscal transfers on the overall efficiency of the SNGs. Federal transfers would thus be analysed as a third measure of fiscal decentralisation to find out its overall impact on economic growth, health and education. This measure is also expressed as ratio to total government revenues to capture its economic effects.

4) Total Provincial Revenue: Lastly, total provincial revenue is used to represent total budgetary strength of the SNG. This measure takes into account the total availability of financial resources to the province. Total provincial revenue hence is the sum of the second and third measures explained above and consists of the domestic tax and non-tax collections as well as revenues from federal tax sharing (i.e. federal transfers). Thus, it indicates the total funds availability to SNGs which provinces can use for the provision of local public goods within their jurisdictions. Importantly, although we are not using the expenditure approach, this measure would provide a mirror image for it (as in the presence of federal transfers, provinces are expected not to generate substantial fiscal deficits). As we assume that in accordance with fiscal decentralisation theory, local representatives are aiming at local welfare maximisation and they have better information of local needs and preferences therefore this measure would capture the effects of spending ability of local representatives. Total provincial revenues will indicate the SNG's share in total government revenues and therefore would be presented as ratio, to capture the degree of fiscal decentralisation overtime.

Lastly, it is also important to mention that this study uses both the national and provincial level data; therefore different denominators were used for fiscal decentralisation measures in the two cases. For the sections of the study which uses the national data, fiscal decentralisation measures were expressed as ratio to total government revenues (i.e. sum of federal and provincial government revenues). On the other hand, for sections involving the provincial data analysis, the fiscal decentralisation measures are expressed as ratio to the respective provincial total revenues.

Hence, with this scheme of measures for fiscal decentralisation, this study tried to minimise the shortcomings related to empirical assessment as identified by the existing literature. It would reduce the limitations of using a single measure and will enable us to quantify the potential impact of fiscal decentralisation on the given economic and social indicators. Moreover, in addition to looking at the total provincial resources (depicting the ability of the SNGs to serve its people), this study tries to capture other important aspects of provincial revenues as well i.e. the provincial autonomy (including provincial tax and local revenues-that were considered net of intergovernmental transfers) and the federal transfers. Thus this study separates the effects of these important aspects of provincial revenue which were assessed separately in the regression so as to analyse their individual effects.

1.3.2 The Hypothesis

In this study the focus is to examine the hypotheses given below which rest on the assumption that fiscal decentralisation improves allocative efficiency and will results in better economic, health and educational outcomes. Main hypothesis regarding the effects of fiscal decentralisation in this study are given below:

Hypotheses

1. **Fiscal decentralisation positively affects the economic and social outcomes:** Increased level of fiscal decentralisation helps in efficient resource allocation and translates public demand into required actions. The coefficients for fiscal decentralisation measures will identify whether or not fiscal decentralisation has produced significant effects and whether those effects improved the indicators in question.

2. **Different fiscal decentralisation policies results in distinct outcome:** The analysis will help us to analyse whether it is only the resource availability at local level that matters or different sources of local revenues can in fact produce different results. During the analysis, the pattern of the different measures of fiscal decentralisation i.e. SNGs autonomy and federal transfers to SNGs would be observed to examine whether these produce similar results or they differ in effects

for the indicators in question. This comparison will highlight the effectiveness of different sources of subnational revenues.

The given hypotheses will not only help in examining the effects of fiscal decentralisation but it will also make a clear distinction among the available fiscal decentralisation policies, if any. The comparison of the effects of local tax revenues and federal transfers at the subnational level will potentially help us in comparing the effects of local autonomy versus that of partial fiscal decentralisation. Increased provincial autonomy is expected to result in independence in local decisions making while federal transfers ensure that the provincial government has the financial capability to do what is necessary for the locality.

Proper information regarding the effects of resource distribution arrangements is believed to result in better policy formulation and thus would ultimately help the country to catch the development path faster. Thus the study segregates various economic concepts related to fiscal decentralisation and helps in clearing ambiguity among various closely related concepts in the study of resource distribution. Present study will also bring to light the strengths and weaknesses of the fiscal resource distribution mechanism in Pakistan and will connect it to the broader picture of the effects of fiscal decentralisation. The next section presents a brief history of fiscal resource distribution in Pakistan.

1.4 BRIEF HISTORY OF THE FISCAL RESOURCE DISTRIBUTION MECHANISM IN PAKISTAN[16]

Pakistan is a federal country and is administratively divided into four provinces which constitute the second tier of the government[17]. Due to the turbulent political history, Pakistan always had a strong federal government at the centre whereas provinces remained politically and economically dependent upon the central government; despite the fact that the lower tiers of government had the constitutional mandate to devise local policies. To fulfil the expenditure needs of different tiers of the government, various taxes and duties collected by the federal government are included in the divisible pool and are then redistributed among the federal and provincial governments in two stages. In the first stage, vertical resource sharing takes place between federal and provincial governments

[16] This section is based on the work done during the MPhil degree which has also been published as a working paper i.e. Ahmed et al., 2007

[17] In addition, there are areas which are directly administered by the federal government and these include the tribal areas, northern areas and Islamabad (the Capital of Pakistan)

and once the provincial share is decided, the horizontal resource sharing takes place among the provinces in the second stage.

In Pakistan, due to prolonged autocratic regimes, federal government has overstretched itself with issues which could be better performed at the lower levels of government (Shah, 1998). The distribution of responsibilities and revenue assignments among different tiers of the government are sub-optimal. According to Khan (2006), during 2004 federal government collected about 93 percent of the total tax revenues while its expenditure stood at 72 percent. Hence, the lower tiers were left with exhausted resources of only 7 percent while it accounted for 28 percent of total expenditures. This situation resulted in the provincial dependency on the federal government to fulfil their obligations.

In Pakistan, resource transfers between the federal and provincial governments are determined in the form of revenue shares, grants, straight transfers and ability to take loans. The divisible resource pool comprise of various taxes including sales tax, income tax, custom duties, and excise duties (Jaffery and Sadaqat, 2006). In addition, provinces also collect certain minor taxes like agriculture tax, property tax, motor vehicle tax, stamp duty etc. Moreover, provinces receive straight transfers which though collected by the centre, are paid back to provinces on the basis of origin of collection. Straight transfers comprise of royalties for oil and gas extraction, profits from hydroelectric projects and sales tax on services. Lastly, special grants are extended to the economically backward provinces to cover for their development needs as well as to bridge their cost disabilities. Finally, it is worth mentioning that the total revenues at centre as well as at the provinces also includes the non-tax revenues (including interest, dividends, user charges, fees, prices, fines and profits) that are levied, collected and retained by both tiers of the governments according to their constitutional jurisdiction.

1.4.1 National Finance Commission (NFC)

Before discussing the effects of resource distribution in greater detail, it was considered useful to describe the constitutional arrangement which elaborates the fiscal decentralisation mechanism in Pakistan. For judicious resource distribution in Pakistan, the National Finance Commission is constituted and given mandate to ensure amicable resource distribution. The 1973 constitution of Pakistan, under the Article 160(1), states that for judicious resource distribution, National Finance Commission (NFC) should be formed at an interval of five years. The commission consists of finance ministers from

federal and provincial governments as well as other experts (appointed by the President of the country). The commission is headed by the federal finance minister and the same acts as its Chairman. NFC has the mandate to look into the matter and give recommendation regarding the following financial matters (G.o.P., 2006, b):

1. To decide and disaggregate the pool of resources (taxes and duties) between federal and provincial governments.

2. To decide upon the total amounts of grants to be distributed among the provinces.

3. To determine the limits to which the federal and provincial governments can borrow from different sources.

4. To recommend on any other financial matter that is referred to it for consideration.

Hence, the 1973 Constitution of Pakistan outlines NFC as a forum to achieve mutually acceptable resource distribution mechanism in Pakistan. The commission is required to develop such an apparatus which can ensure amicable resource distribution between the centre and its constituent parts. Nevertheless, in a political economy like Pakistan, various hurdles barred the development of this set up and at times this mechanism failed to achieve optimum solution to deadlocks. Therefore, there is need to review, analyse and find out effects of NFC awards over time. In brief, this section will provide the background to understand the empirical results in better way and will help us to come up with plausible recommendations.

1.4.2 Financial Arrangements in 1973 Constitution

As discussed earlier, the 1973 Constitution of Pakistan provided the country with a forum to make the resource distribution mechanism smooth and acceptable to all the stakeholders. The National finance commission (NFC) was designated to suggest and review the resource distribution mechanism in Pakistan. Under the given statutes, several attempts were made to reach at an amicable resource distribution and the section below will highlight the important developments over the time.

The first NFC was constituted in 1974, where the commission was required to decide upon and distribute the divisible pool. Divisible pool consisted of limited resource pool, including sales tax, income tax and export duty on cotton, collected at the federal level. Out of the given resource pie, federal government was allotted 20 percent share

while the remaining 80 percent of the resources were distributed among the four provinces. Due to the provincial reservations over different criteria for distribution, the commission finally resorted to population as the only criterion for horizontal resource distribution. However, the adoption of population as the single criterion for resource distribution only favoured provinces with greater population and there was no incentive available to promote efficiency and competition among the provinces. The commission also decided to support the financially weak provinces i.e. KPK[18] and Balochistan by extending grants. The overtime development relating to the resource distribution mechanism can be summarised as presented in Table 1.1.

With an autocratic government in control, political issues were not of great concern during the 1977-1985. Therefore, the 1979 NFC never held any meeting throughout its constitutional term and consequently made no improvement to the resource distribution mechanism. The only change was the expansion of divisible pool which now included excise duty on tobacco as well while the divisible pool was apportioned according to the recommendation of the 1974 award. In addition, on July 1st, 1983, provincial shares were considered for revision in accordance with the new population census of 1981.

Table 1.1: Vertical and horizontal resource distribution during 1974-2010 (percent)

Distribution	**Vertical share**		**Horizontal share**			
NFC Award	Federal share	Provincial share	Punjab	Sindh	KPK	Balochistan
1974*	20	80	60.25	22.50	13.39	3.86
1979**	20	80	57.97	23.34	13.39	5.30
1985**	20	80	57.97	23.34	13.39	5.30
1991*	20	80	57.88	23.28	13.54	5.30
1997#	62.5	37.5	57.88	23.28	13.54	5.30
2001*	62.5	37.5	57.36	23.71	13.82	5.11
2006##	55[1]	45[1]	57.36	23.71	13.82	5.11

* G.o.P., 1991, ** G.o.P., 2006 (b), # G.o.P., 1997, ## G.o.P., 2006,(a)

[1] To annually adjust one percent and achieve 50% mark by the end of 5th year

Note: The huge change in vertical resource sharing in 1997 was accompanied with phenomenal expansion in resource pie, when all the federal taxes were included in the resource pool for the first time

[18] Khyber Pakhtunkhwa, formerly known as North West Frontier Province (NWFP)

Upon the completion of the constitutional term of the 1979 award, the third NFC was constituted in 1985. The commission was headed by the then Federal Finance Minister and renowned economist, Dr. Mahbubul Haq. The commission held nine meetings however due to lack of consensus, the commission could not decide the optimal resource allocation mechanism. In fact, the political scenario within as well as outside the country (Afghan war) left this issue with little importance. Consequently, this NFC too could not recommend any improvement in distribution mechanism as population still remained to be the sole criterion for resource distribution. The resources continued to be distributed in the light of the 1974 NFC award with the amended provincial population figures and some ad hoc changes overtime.

With the full restoration of democracy in the country, the fourth NFC award for 1990 finalised its recommendations in April, 1991. This award achieved consensus after a gap of almost 12 years and came up with a number of positive recommendations. Most importantly the resource pool was expanded with the inclusion of more taxes in the divisible pool. The expanded divisible pool now consisted of the major taxes and duties which increased the size of the pie. Custom duty was the only buoyant tax which was retained by the federal government. Although the expansion of the divisible pool was a positive step nevertheless, the commission once again failed to reach any agreement on the diversification of the resource distribution formula. Both the vertical and horizontal resource distribution still had to take place according to the 1974 NFC award and population size served as the only criterion to decide the provincial resource shares. Grants were extended to the provinces according to their budget deficits.

However, this award significantly increased total transfers to provinces as compared to the 1974 NFC award. Under the new arrangements, with the expansion of the divisible pool provincial share was raised by 18 percent. Provinces were not only able to get more resources but their right on net hydel profits, gas development surcharge and excise duty was also acknowledged. Resultantly, straight transfers to the provinces were on the increase as well. According to the 1991 NFC award, the horizontal resource share of the provinces registered an increase from 28 percent to 45 percent of federal tax revenues (Ghaus and Pasha, 1994). Another positive measure of the 1991 NFC award was a move to capacitate the provinces for the first time as they were asked to generate more revenues from their own resources. However, during the implementation stage, the federal government failed to announce proper incentives while the required motivation for revenue generation at the provincial level was also lacking (Jaffery and Sadaqat, 2006).

In December 1996, the new NFC was nominated and it holds an important position in the resource distribution history of Pakistan. The 1997 award continued the reform process and caused significant changes in the resource allocation of the provinces. For the first time all the federal taxes and duties were included in the divisible pool and the new resource pool comprised of sales tax, income tax, wealth tax, capital value tax, custom duties, export duties, excise duties, and any other taxes that were levied or collected by federal government at that time. Similarly, royalties on crude oil and net development surcharges on natural gas were extended to the provinces in the form of straight transfers. In addition, to improve the efficiency at the provincial level, this commission also announced an incentive of matching grants[19] for the provinces (G.o.P., 1996). However, to contain the risk of excessive fiscal burden, limits were specified for each province, up to which they could claim amounts under the matching grants scheme.

Despite these positive steps this award also took some decisions which proved critical for the provinces. Contrary to the earlier arrangements for vertical distribution, this award allocated 62.5 percent of the divisible pool to the federal government while the rest of 37.5 percent was spared for the horizontal distribution among the provinces (Table 1.1). This abrupt change, coupled with the poor economic situation caused by political instability, ultimately hampered the financial situation of the provinces. Figure 1.1 presents the 5 years before and after situation associated with the 1997 NFC award. Given changes were suggested on the basis of optimistic expectations of the economy during the implementation period. Nevertheless, the economic situation of Pakistan remained poor and provinces actually suffered under the new award. According to Sabir (2001), provinces might have not suffered to the extent, if the previous NFC award of 1991 was followed instead of the new one, which is also clear from Figure 1.1. With population still being the single resource distribution criterion, the provincial share did not change. However, special grants were allocated to only two financially weak provinces i.e. KPK and Balochistan.

[19] Provided that they exceed the target of 14.2 percent growth in revenue generation

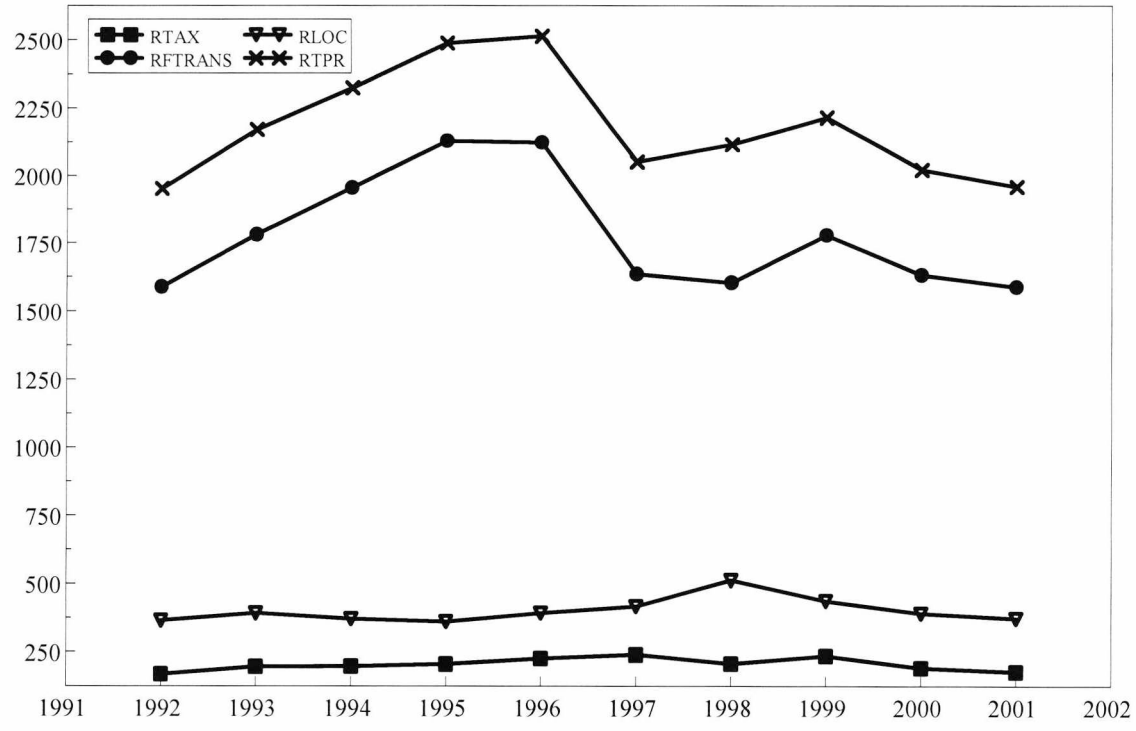

Figure 1.1: Effects of the 1997 NFC award on Provincial resource flows (Rs. Million)

Note 1: Variables are presented in real (deflated) values by using GDP deflator (base year 2000)

Note 2: RTAX: refers to Provincial tax revenues,

RLOC: refers to Provincial local revenue (i.e. Provincial tax + Provincial non-tax revenues)

RFTRANS: refers to Federal transfers to provinces

RTPR: refers to the Total provincial revenues (i.e. Provincial local revenues + federal transfers)

Source: SBP, 2005 & 2010

Despite having problems at the implementation stage, the two NFC awards of 1991 and 1997 remained successful in experimenting and bringing improvements to the resource distribution mechanism. However, the 6th NFC for year 2001 was once again held in jeopardy when the commission held eleven meetings but remained unsuccessful in finalising any recommendations. Provinces were not only demanding for higher share out of the divisible pool but were also lobbying for the inclusion of different criteria in the resource distribution formula which could favour their distinct situation. Concluding unsuccessfully, the commission could not achieve consensus on the resource distribution mechanism. On July 1st, 2002, provincial shares were adjusted according to the new population census, held in year 1998.

After the unproductive ending of the 6th NFC, the final National Finance Commission constituted during the period considered for this study (i.e. 1974-2009) was nominated on 21st July, 2005. However, due the uncompromising situation among the

members, as a last resort all the provincial chief ministers vested the authority to the President to declare an amicable and justified fiscal resource sharing formula. Hence, the President amended the "Distribution of Revenues and Grants-in-Aid Order, 1997" by issuing Ordinance No. 1 of 2006. Thus finally after a delay of six years, the resource distribution mechanism for the period 1997-2001 was amended with effect from 1st July, 2006 (G.o.P., 2006, a).

Considering the provinces' demands, the provincial share was increased against the federal share and they were given gradual increase in their shares under the 2006 NFC award. Sufficient financial space was provided to the provinces as it was decided that total provincial share including tax revenue and grants (for first financial year of the award) would make 45 percent of total divisible pool. The provincial share was subsequently subject to one percent increase each year till it reaches 50 percent of total federal revenues (G.o.P., 2006, a). Although the provincial demand for the expansion in their share out of the divisible pool was entertained, the diversification of the distributional criteria was not touched upon to avoid controversy. Population remained to be the single criterion for resource distribution and the respective shares out of the allotted provincial share remained the same as depicted in Table 1.1. During this period, the provincial shares were on the rise not only because of the increase in provincial allocation against the federal but also due to the sharp increase in the total revenue collection at the centre. In addition, as a result of the devolution plan in year 2002, 1/6th of the net proceeds of the sales tax were allocated to the local governments and cantonment boards, which also resulted in higher share for the lower tiers of the government (G.o.P., 2006, a).

1.4.3 Critical Review of the NFC Awards

Judicious resource sharing is considered an important goal for the balanced economic development of the country. Equitable and efficient resource distribution ensures balanced growth in all regions of the country. From the previous discussion, it is clear that fiscal federalism has yet to achieve its optimal level in Pakistan. Since 1974, seven commissions were formed out of which only three could come up with noticeable recommendations. Till the 1997 NFC award, no effort was made to capacitate and encourage the provinces for resource generation as provinces lacked proper incentives. This barred the overall development and negatively affected the provincial government's ability to raise revenues and also made it transfer dependent. Federal government collected huge tax revenues in comparison to the provincial governments. It can be noticed that the buoyant taxes like

income tax, sales tax, excise duty and surcharges were collected by the federal government; leaving inappropriate and exhausted tax assignments for the provinces. Table 1.2 summarises the situation for the period under analysis in this study (i.e.1974-2009).

Another important element of resource distribution in Pakistan was the criterion of population which was the only parameter for determining provincial shares out of the total allocation. Despite repeated demands for the diversification of formula, all the NFC awards stuck to this single criterion, which is not observed anywhere else in the world. Due to the stagnancy of the resource distribution formula, the overtime distribution of resources among the provinces remained almost the same as is shown in Table 1.1.

Table 1.2: Major Revenue Assignments at the Federal and Provincial Governments

Governments	Direct Taxes	Indirect Taxes
Federal Government	Income Tax Worker's welfare tax Wealth Tax Capital Value Tax	General Sales Tax Federal Excise Duty Custom duty Import Duty Export Duty Gas & Petroleum Surcharge Foreign Travel Tax
Provincial Government	Land Revenue Urban Immovable property tax Tax on transfer of property Agricultural income tax Tax on professions and trades	Provincial Excise Duty Stamp duty Motor vehicle tax Entertainment tax Electricity duty

Source: SBP, 2010; G.o.P. 2006(b), Provincial Budgets

Note: These are the taxes for which rates and bases are determined by the respective level of government

Analysing the expenditure assignments in Pakistan, Table 1.3 presents the major spending heads at the federal and provincial levels. Federal government spending is mainly concentrated at the macro level; however there were sectors where spending overlap occurred, especially in health, education and social protection. Over the period, the noticeable burden[20] on federal budgets was recorded as the repayment of loans (under the spending head for 'Economic affairs') and the defence spending. Basically federal government assumed the role of; policy making and guidance, taking macroeconomic

[20] Where these two spending heads accounted for 34.5 percent of the total government spending in year 2009, dropping from 53 percent in year 2000

decision and spending on new initiatives (for which regional governments were not interested), while the provincial government remained focussed on the administration and to reach out to the people in public goods provision.

Figure 1.2 presents the overtime trends in government spending at the federal and provincial levels. Over the period, a slight increase in the share of provincial expenditures can be noticed, as in 1978, provincial spending stood at the 21 percent of the total government spending while it touched its maximum point (32%) during 2005. Hence, total government spending is dominated by the federal government; which as mentioned earlier, includes the huge expenditures on loans (and interests) repayments and defence.

Table 1.3: Major Expenditure Assignments at the Federal and Provincial Government level

	Federal Government		**Provincial Governments**
A	**Current Expenditures**	**A**	**Current Expenditures**
	General public services		Governance
	Defence affairs and services		Security
	Public order and safety		Education (primary, secondary, elementary and technical education)
	Economic affairs		
	Environmental protection		Health
	Housing and community amenities		Social protection
	Health affairs and services		Local development
	Recreational, culture and Religion		Access and roads
	Education affairs and services-(mainly higher education)		Irrigation
	Social protection		
B	**Development Expenditures**	**B**	**Development Expenditures**
	Public Sector Development Programme (PSDP)		Provincial Annual Development Programme (ADP)
	Other Development expenditures		District Annual Development Programme (ADP)

Source: SBP, 2010; G.o.P. 2006(b), Provincial Budgets

Note: Over the period of the study, there was overlap in spending where some of the sectors were financed both by the federal as well as the provincial governments

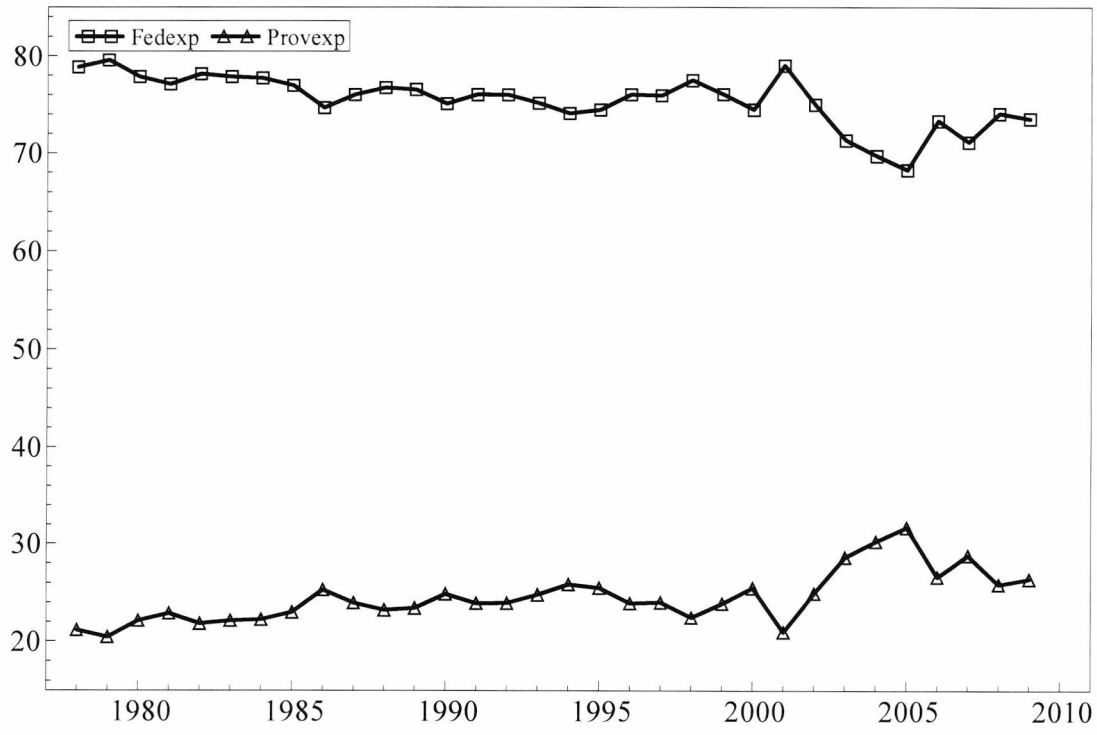

Figure 1.2: Trends in Federal and Provincial Government Expenditures

Note 1: Both the series are expressed as percentage of Total government expenditures, therefore are collectively equal to 100
Note 2: Total expenditure consists of current and development expenditures at the two levels
Note 3: *Fedexp* refers to Total Federal expenditure
Provexp refers to Total Provincial expenditure (consolidated, for all the provinces)
Source: SBP, 2010

The federal government generally defended its decision for higher tax collection by floating the argument of higher efficiency, equity and economy in collection. Moreover, as compared to the provincial governments, federal government has the ability to levy and collect taxes more efficiently (Kardar, 2006). This is important excuse for the less-developed countries that suffer from a number of socio-political as well as capacity issues at the lower tiers of the government. However, once collected various criteria are followed around the world to ensure efficient resource allocation among the regions. These criteria include revenue generation, geographical area, backwardness, income distribution, tax collection efficiency and sector specific requirements (like health and education). However, due to non-availability of reliable data and political economy issues, all the finance commissions have retreated to the single-criterion formula for resource distribution.

Analysing the resource distribution situation thoroughly, it can be noticed that the reform process for increased fiscal decentralisation started with the 1991 NFC award. There was expansion in the divisible pool and more buoyant taxes were included in the

resource pool. The situation further improved with the 1997 award, when all the taxes were included in the divisible pool. This resulted in increased transparency, simplicity and predictability in resource allocation. In addition, provinces were pushed for higher revenue generation with the introduction of matching grants incentive. Nevertheless, the abrupt change in resource allocation among the federal and provincial governments (i.e. from 20:80 to 62.5:37.5) negatively affected the provinces performance. Similarly, the adverse economic situation, droughts, huge debt servicing requirements and unstable political situation of the country, contributed to the miseries of the provinces.

The NFC award for year 2006, although was enforced through a presidential ordinance, it made significant changes. It resolved the provinces grievances over the vertical resource sharing. It is encouraging to note that upon the conclusion of this NFC award, provinces were having 50 percent share out of the divisible pool, which is a bold decision in a country like Pakistan that has the lowest tax-to-GDP ratio in the region (Sherani, 2006, G.o.P., 2009). The single-criterion formula for resource allocation among the provinces had always caused friction and resulted in deadlocks, despite the fact that the inclusion of additional parameters in the resource distribution formula could have ensured efficient and equitable horizontal resource distribution. It is important to note that except two awards of 1974 and 1991, the rest were announced by the non-democratic governments which has less consideration for public demands. The other two awards which came up with recommendations were those of year 1997 and 2006. The 1997 award was announced by a caretaker government while the one for year 2006 was implemented through a presidential ordinance.

History of NFC indicates that the resource distribution in Pakistan by and large has the shades of failure although certain achievements cannot be overlooked. On its positive achievements, NFC has a best system to ensure amicable resource distribution as it takes all the decision makers on board and decides over resource distribution with their consent. In addition, with the passage of time more financial resources were delegated to the provinces and there is greater realisation of fiscal decentralisation especially in two NFC awards of 1997 and 2006. Onwards from 1991 NFC award, resource allocation for the provinces increased either due to inclusion of taxes in the divisible pool or due to the higher provincial share against that of federal. In addition, increased grants and straight transfers were channelized to the provinces over time. Similarly, the incentive of matching grants was aimed to motivate the provinces, inviting them to enhance efficiency, have their own resource generation and obtain financial autonomy.

However, on its negative side, NFC has experienced various deadlocks too, mainly due to the non-agreement among the provinces. In a political economy like Pakistan, all the provinces have differing characteristics and thus offer different economic opportunities to its people. Varying interests of the provinces resulted in stringent claims and barred their bargaining power. Over the time, provinces have demanded for inclusion of different criteria in the resource distribution formula. For example, Sindh has emphasised on the revenue generation criteria, KPK demanded for inclusion of backwardness as a criterion, Balochistan advocated for area while Punjab insisted for taking the agriculture produce as a criterion to be considered while distributing the resources. Thus, due to the failure in bargaining and absence of consensus, provinces retreat to the adoption of a single criterion, which is sub optimal. The institutional set up of NFC has failed in amicably progressing and tackling the problem of fiscal decentralisation. Lack of consensus had given way to interim awards & grants which needs to be assessed for its impact. Furthermore, provinces remained under capacitated due to the dependence on federal transfers instead of exploring their own potential. This situation capped the province's ability to come up with innovative and distinctive development plans based on their potential resources and local preferences.

1.5 THE MAIN RESULTS

This research study comprises of five chapters. Following this introduction, the second chapter discusses the effects of fiscal decentralisation on the economic growth in Pakistan. The second chapter provides detailed discussion of the basic economic environment and the pattern of different determinants of economic growth in Pakistan. Results exhibit that different fiscal decentralisation policies not only bring differing results but also differ in their short run and long run impact. Provincial autonomy emerged to have long run cointegrating positive relationship with economic growth.

The third chapter contains the essay relating the effects of fiscal decentralisation and the health sector indicators in Pakistan. This essay discussed the health sector in Pakistan and elaborated the role of different stakeholders in greater details. Both the national and provincial data was used for the analysis and the short run and long run effects of different fiscal decentralisation policies are segregated using the cointegration technique under a data scarce situation. Results obtained using the national aggregate data suggested that health sector has not received the desired attention from the SNGs. However, the provincial analysis identified the fundamental differences among provinces which

determined the effectiveness of federal transfers in achieving better health services. The analysis also identifies certain area for future research.

Chapter four uses a rich cross-country panel data to analyse the effects of fiscal decentralisation on education sector indicators. This essay uses the recent data set that was released in October, 2012, thus presumably this will be the first study to make use of this data and contribute to the literature. Three sets of result are presented using 'full-sample', 'OECD countries' and 'Non-OECD countries' data to rigorously analyse the effects of fiscal decentralisation on education sector. It was found that fiscal decentralisation policies differ in effectiveness under different economic setups. This once again highlighted the need for a balanced resource distribution formula that can ensure simultaneous use of alternative fiscal decentralisation policies. This chapter concludes with the identification of areas of concern which opens ways for future research.

Lastly, chapter five finally concludes the study and presents key policy recommendations. It contains recommendations that are deduced from the empirical analysis. In addition, certain specific recommendations are presented to address the given issues in the particular case of Pakistan. Hence, this study presents a decent blend of concepts, literature, methodologies and data to analyse the effects of fiscal decentralisation in the special case of Pakistan as well as using the international data evidence.

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CHAPTER 2 FISCAL DECENTRALISATION AND ECONOMIC GROWTH

2.1 INTRODUCTION

At the doorstep of new century, comparison of localisation to globalisation by the World Bank[21] highlights the potential of decentralisation for development. Oates (1999) assessed that in order to improve the performance of public sector, both the industrialised and developing countries are turning to devolution. In fact, theory of fiscal federalism identifies the basic framework that deals with the issue of aligning responsibilities and fiscal instruments to the appropriate levels of government. It thus specifies the appropriate fiscal mechanism that is required for carrying out the assigned functions. Hence, fiscal federalism determines the administrative and financial boundaries of different tiers of the government through the distribution of responsibilities as well as resources. In this connection, fiscal decentralisation is an important part of fiscal federalism that facilitates the mechanism of devolving fiscal powers/resources to match the responsibilities of lower tiers of government. Appropriation of regional revenue raising powers and intergovernmental fiscal transfers helps in ensuring amicable regional resource allocation. The resource distribution mechanism is designed in a manner such that the lower levels of government get entrusted with adequate finances and suitable taxation powers. Hence, fiscal decentralisation seeks to internalise the efficiency gains from justified resource allocation.

The importance of the discussion is evident from the availability of the literature associated with fiscal decentralisation and it goes back as far as Tiebout (1956) and Musgrave (1959). To start with, Musgrave (1959) identified three major functions of government including macroeconomic stability, judicious income distribution and amicable resource distribution. In this connection, Oates (1972) emphasised that in order to ensure efficient resource distribution among jurisdictions, *"public service should be provided by the jurisdiction having control over the minimum geographic area that would internalize benefits and costs of such provision"*. This paves the road to decentralisation so as to achieve better resource management through competition among the local governments (Ebel and Yilmaz, 2002). Hence, this is now widely accepted that effective government will require a well-chosen mix of local and central decision making (Inman & Rubinfiled, 1997).

[21] "Entering the 21st Century", the World Development Report, 1999-2000

Generally, fiscal imbalances do exist among different tiers of government because of the mismatch between revenues and expenditures at any particular level of government. In developing countries, federal government often have more resources than the responsibilities. This is mainly due to two reasons, firstly, it is more efficient to collect major taxes at the centre and secondly, as major taxes are more buoyant so central government try to keep these under its control. Shah (2004) pointed out that in developing countries there are large dominant central governments, that are mainly relying on indirect taxes and local governments have limited own source revenues; this ultimately limits the subnational autonomy. On the other hand, fiscal imbalances might also arise across the provinces due to differences not only in their fiscal capacity but also due to the cost disabilities in quest for providing comparable services to its people (Ma, 1997). In this situation, fiscal decentralisation provides the required mechanism of local revenues and fiscal transfers from centre that can solve the issue. Thus, fiscal transfers help to achieve equity and efficiency as well as ensure stability and predictability in provincial budgets. Judicious resource distribution within the federation enhances the efficiency as well as effectiveness of different tiers of government. It encourages the provinces to contribute towards the development of the country by streamlining their capabilities through having a better voice, innovation, experimentation of policies as well as ensuring better accountability.

Keeping the basic theory of fiscal federalism in mind, this study concerns the structure and effects of fiscal decentralisation in Pakistan. Pakistan was selected for the analysis because of its unmatched resource distribution mechanism. It remained a unique country in the world that adopted single criterion (i.e. population) for horizontal fiscal resource distribution. Hence, there is need to assess whether such simplicity[22] of resource distribution mechanism contains the required incentives for the federating units to grow? Therefore, it would be interesting to know that whether or not this special fiscal resource distribution stance of Pakistan has contributed to its economic performance over the time? In the given context, this paper would isolate the effects of single resource distribution stance whereas most of the countries are concerned about additional criteria to ensure amicable and effective resource distribution.

In brief, present study aims to identify the economic effects of the fiscal resource distribution mechanism in Pakistan; that was exercised during the period 1974-2009.

[22] That ensures predictability and provinces can have better idea about the future stream of resources, that presumably results in stability of the policies at regional level.

Proper information regarding the given resource distribution arrangement would provide basis for future policy formulation. This study would use different fiscal decentralisation measures to identify the financial autonomy as well as fiscal dependence of the sub national governments and resultantly quantify their long run returns towards economic growth. Hence, the analysis would eventually lead us to decide about the economic outcome of fiscal decentralisation and will also provide an insight to evaluate the consequences of using a uni-criterion formula for resource distribution, which will help in finding the way forward.

This study comprises of five subsections which are explained as below. Following the introduction, the second section discusses the basic theoretical link between fiscal decentralisation and economic growth. It also discusses the fiscal decentralisation mechanism in Pakistan, elaborates the approaches used and explains the one that is adopted for the estimation of fiscal decentralisation stance in this study. Section three encompasses the data and methodology part where the theoretical model for the study and data over the time were thoroughly commented upon. Third section also elaborates the variables used for the empirical estimation as well as presents these graphically. Section four presents the estimation results and interpretation, while the last section concludes the study.

2.2 BACKGROUND

This section gives an overview of the theoretical and empirical background concerning fiscal decentralisation and economic growth. Existing proxies for fiscal decentralisation, related criticism, the decentralisation mechanism in Pakistan and lastly, the suggested measures of fiscal decentralisation for this study are elaborated in this section.

2.2.1 Fiscal Decentralisation in Literature

Fundamental presumption in literature favouring fiscal decentralisation exhibits that a decentralised system is conducive to influence political outcomes in accordance with public desires and increases political participation. The political decentralisation having features of local decision making could consequently sustain a productive and growing economy (Oates, 1999). Main idea is that policies related to local public service provision are better undertaken by local governments. Being located near to the people, local representatives have better access to information regarding local preferences and needs. Hence, for services like basic infrastructure and education, which are sensitive to local and

regional conditions, indigenous decisions will prove more effective, hence will help in enhancing economic growth, as compared to policies designed by central authorities (Oates, 1993). Empirical studies have found statistically significant positive relationship between decentralisation and national performance (both in political or economic terms). Decentralisation leads to increased inter-jurisdictional competition, hence, act as discipline force that restraint the tendencies in public sector toward excessive spending and unproductive use of resources. In this context, the study by Hatfield and Kosec (2013) discuss that inter-jurisdictional competition among local governments result in higher efforts to raise more taxes and consequently spend more under decentralisation. This competition also bars the local government's ability to obtain additional federal transfers. They argue that as local governments has to compete for investment and better residents, therefore, decentralisation increases productivity and hence, enhances economic growth.

Fiscal decentralisation can help in better targeting and eliminate unnecessary engagements of the central government. Focusing on federal transfers, Bird and Smart (2002), explained that "*for services to be effectively provided, those receiving transfers need a clear mandate, adequate resources and sufficient flexibility to make decisions*". Thus, by decentralisation, central government empower the sub national[23] governments (SNGs) in such a manner that can help in better use of resources, improve general public living standards and at the same time share the work load (Gordin, 2005). Nevertheless, from financial point of view, decentralisation may pose danger if it is weakly designed so that provinces are able to externalise their costs to others, without putting in their due effort (Rodden and Eskeland, 2003; Von Hagen *et al.* 2000). Similarly, Koethenbuerger and Lockwood (2010) presents a situation where tax levels under decentralisation can be even higher than the centralized level and authors thus presents situations where fiscal decentralisation can also result cause lower economic growth. Rodden (2002) theoretically proved that though local autonomy (i.e. domestic revenue raising powers) restricts the size of the government, intergovernmental transfers on the other hand result in higher spending behaviour on the part of SNGs. Similarly, the inferior administrative capacity of local authorities, corruption and leviathan government are also counted as the potential threats linked with fiscal decentralisation.

In brief, theory of fiscal decentralisation predicts that resource appropriation improves efficiency and thus promotes economic growth. Basic aim behind the process of

[23] In this discussion the provincial, state, regional and sub national level of governments will be used interchangeably.

decentralisation is the provision of public services by local administrators who can help in the allocation of scarce resources in accordance with local needs and territorial requirements. This mechanism is thus assumed to enhance economic efficiency, ensure accountability (through local elections) and results in better resource allocation. Thus, appropriate resource distribution is assumed to produce favourable effects towards economic growth, provided that SNGs frame local spending in accordance with local preferences and development needs of the local people.

Having discussed the theoretical link between fiscal decentralisation and economic growth we will now provide a glimpse of the literature on the empirical quantification. A number of empirical studies can be found which quantified the potential contribution that channelizes from fiscal decentralisation towards economic growth. As compiled in Table 2.1, it can be noticed that researchers have analysed different datasets to explore the link between fiscal decentralisation and economic growth. However, empirical results were not conclusive in the sense that there are studies which found negative or insignificant effects of fiscal decentralisation on economic growth. Most of the studies pointed out that finding an appropriate measure for the quantification of fiscal decentralisation is the most important and delicate issue for its analysis. Literature suggests that fiscal decentralisation measure should be designed in a way that can smartly capture the local autonomy factor which will help in quantification of the resulting efficiency gains.

Authority of SNGs regarding revenues and expenditures decisions in their jurisdictions determines the degree of fiscal decentralisation in the country. According to Akai and Sakata (2002), to correctly identify the effects of fiscal decentralisation on economic growth one should be able to know the degree of decision making authority at local level. Nevertheless, it is very difficult to empirically quantify the inherently constitutional authority of different tiers of the government and we are left with the financial measures only. These financial measures consist of local revenues and expenditure assignments, which though are suboptimal measures in this case. Researchers criticised the ability of these measures to capture the true degree of fiscal decentralisation. It is indicated that revenues or expenditures at the local level may not necessarily represent local government's decision making autonomy. It is also argued that these measures merely show the revenue collection or spending responsibilities which may or may not be according to local needs and does not necessarily indicate the decision making authority.

Table 2.1: Empirical evidence relating fiscal decentralisation and economic growth

Study	Countries	Period	Method	Effects of fiscal decentralisation
Lin and Liu (2000)	Chinese Provinces	1973-1993	Fixed Effects Model	Positive
Yilmaz (1999)	17 Unitary states and 13 Federal Countries	1971-1990	Fixed Effects Model, GLS	Positive, Not significant
Akai and Sakata (2002)	50 US States	1992-1996	Maximum Likelihood estimation	Positive
Zhang and Zou (2001)	Indian States	1970-1994	OLS	Positive
Thieben (2003)	21 OECD countries	1975-1998	OLS	Positive
Zhang and Zou (2001)	Chinese Provinces	1978-1992	Fixed Effects Model	Negative
Zhang and Zou (1998)	Chinese Provinces	1987-1993	Fixed Effects Model	Negative
Davoodi and Zou (1998)	46 Developing and Developed countries	1970-1989	Fixed Effects Model	Negative, Not significant
Woller and Phillips (1998)	23 Developing countries	1974-1991	Fixed Effects Model, OLS	Not significant
Xie *et al* (1999)	USA	1951-1992	OLS	Not significant

The most crucial disapproval regarding the two approaches is that local governments receive federal transfers as well as grants from the central government. Transfers are aimed at fulfilling the local budgetary needs while grants help to compensate for cost disabilities and address equity issues. Thus, it was pointed out that SNG often has revenues for which it has no authority to determine its rates and bases (i.e. SNG lacks decision making authority over these funds from centre). In addition these federal transfers might actually originate in the other jurisdiction and this can encourage externalizing costs to others. Similarly, from the expenditure side it is argued that federal transfers might move SNG's spending away from local preferences. Transfers from the centre possibly may carry certain guideline for its spending which will influence decision making authority of SNG. Hence, the use of local expenditure shares as a measure of fiscal decentralisation would be an over estimation of local autonomy factor.

Despite this strong criticism, the fact remains that no alternative measure was pointed out which can accurately quantify the decision making authority of SNGs so as to

identify the exact degree of fiscal decentralisation. On the contrary, it can be argued that local revenue availability/spending decisions are influenced by local preferences. One can assume that the share of domestic revenues in the total revenues of the province, represent the autonomy factor in resources over which provincial government have full discretion. Similarly, as the total provincial budget consists of local revenues and federal transfers, therefore, total revenues of SNG will indicate the pool of funds which is available to provincial government to address local needs. From the expenditure side, as the local representatives would like to be re-elected therefore, local expenditures will be influenced by local needs and preferences. Similarly, federal transfers to SNGs present the case of partial fiscal decentralisation in the economy where funds are collected by federal government while it is spent by the SNGs (Brueckner, 2009). Hence, one can conclude that although these measures are not perfect, still they provide somewhat good approximation of fiscal decentralisation trends in the country. Thus, provincial data on revenues/expenditure is assumed to provide fair basis to decide the direction of decentralisation and is widely used to approximate fiscal decentralisation.

2.2.2 Fiscal Decentralisation Mechanism in Pakistan

Decentralisation is a complex phenomenon and it covers a range of issues including revenue raising capability, the administrative capacity to take decisions as well as the spending responsibilities of the subnational governments. Hence, as discussed previously it is very difficult to precisely measure the exact degree of decentralisation. Nevertheless, literature guides us to certain measures which can be used to proxy the level of fiscal decentralisation. In this connection, both the revenue and expenditure approaches were thoroughly considered to measure fiscal decentralisation for this study. With the later approach, the expenditure incurred at the sub national level of government is generally used for measuring the degree of fiscal decentralisation. However, with the available national data it is difficult to exclusively discriminate between the federal and provincial expenditures in Pakistan. Provincial expenditures include development spending that were partly financed by federal government or funded under foreign project assistance. However, no clear demarcation is available to separate federal and provincial spending for the whole period of analysis. Therefore, in case of Pakistan, it is hard to capture the true degree of fiscal decentralisation using the expenditure approach.

Contrary to it, the revenue approach (i.e. revenue raised by different levels of governments) fits properly in our instance. Revenue approach to measure fiscal

decentralisation provides the required diversity for analysis. Using this approach, it is possible to identify the resource generation potential of the provinces while at the same time it enables us to capture vertical fiscal imbalance that illustrates provincial dependence on federal transfers in the case of Pakistan. Revenue approach helps in identifying the effects on provincial resource flow and their revenue raising capacities that resulted from various NFC awards overtime. Hence, in this study the revenue approach was used to proxy fiscal decentralisation. Any increase in the revenue[24] of the provincial government would indicate the higher degree of fiscal decentralisation (although the alternative sources of provincial revenue are supposed to have different implication for the economy).

To understand the variables of interest that were actually used in the analysis, it would be helpful to properly elaborate the nature of federal and provincial revenues in Pakistan. Overtime several changes were made to the definitions of federal and provincial resource pool which has made it quite cumbersome to disaggregate the national fiscal data. Therefore, serious attempt is made to avoid measurement errors and to accurately disentangle federal and provincial revenues data, keeping special attention at intergovernmental transfers between the two tiers. It is important to note that in Pakistan, provinces were never able to finance their expenditures that is why federal transfers always constituted a lion share of provincial revenues.

In financial terms, total provincial revenues consist of domestic own tax revenues, non-tax revenues and share in federal taxes (i.e. the federal transfers to provinces). Provincial taxes represent resources which were collected and retained by the provinces. These include minor taxes that are the provincial subject and provinces were allowed to fix rates and bases for these taxes. On the other hand, federal transfers to provinces were decided out of the total divisible pool at the centre and these present provincial shares in the federally collected taxes (see Ahmed *et al.* for details). Thus, there appears to be two important aspects of provincial revenues in Pakistan; one is provincial domestic revenue potential (including tax as well as non-tax revenues, that were considered net of intergovernmental transfers) while the other is the federal transfers. This study separates the effects of these important aspects of provincial revenue, which were assessed separately in the regression so as to analyse their respective effects on economic growth of Pakistan.

[24] Either through its own sources or through federal transfers (both decided through National Finance Commission awards)

2.2.2.a Measures of fiscal decentralisation

As discussed previously, for the estimation of the degree of fiscal decentralisation in a country and its impact on economic growth, the authority of SNG needs to be assessed. Keeping in view the theoretical and empirical discussion in the literature, more than one measures of fiscal decentralisation were used to capture the potentially distinct implication associated with different aspects of fiscal decentralisation. Provincial consolidated data on local revenue raising capacity, federal transfers to provinces and total provincial revenues were used (relative to total government revenues) to gauge fiscal decentralisation variable. Hence, four measures were used to precisely evaluate different dimensions of fiscal decentralisation and to assess their implications on economic growth in Pakistan. These measures of fiscal decentralisation are explained as below;

1) Revenue Autonomy: is defined as the provincial own tax revenues[25]. This indicator measures the revenue raising authority of SNG and represents revenues over which provinces has full discretion. If SNGs have higher own source revenues, it shows higher fiscal autonomy and would indicate higher degree of fiscal decentralisation. To capture the degree of fiscal decentralisation overtime and to make provincial autonomy measure economically meaningful, the share of provincial tax revenues will be expressed as ratio to total government revenues.

2) Provincial Local Revenues: is an additional measure of local autonomy and takes into account the domestically generated revenues within provinces. Provincial local revenues consist of the domestic tax revenues and non-tax revenues. Non tax revenues comprise of user charges, prices, fines and profits from autonomous bodies as well as interest, dividends, international grants and assistance at provincial level. This measure presents the SNG's local revenue generation capacity and would be indicative of local autonomy in decision making. To be used as a measure for fiscal decentralisation, provincial local revenues will be used as a ratio to total government revenues.

3) Federal Transfers: In developing countries, federal transfers to provinces play an important role in shaping local budgets. Although, federal transfers to provinces increase funds availability to provinces however at the same time it indicate fiscal dependency of SNG on the centre. Intergovernmental transfers depict the vertical

[25] A tax at provincial level was imagined as 'own tax' revenue source when the provincial government has the authority to determine its rate, base or both.

fiscal imbalance in the country. Higher the share of federal transfers in the local revenues, higher would be the influence of federal government in local decision making, which will be a deviation from the basic theory of fiscal decentralisation. Nevertheless, it also carries the benefits as described under partial fiscal decentralisation analysis by Brueckner (2009). Hence, it is important to thoroughly assess the impact of federal fiscal transfers on the overall economic growth of the country. Federal transfers would thus be analysed as a third measure of fiscal decentralisation to find out its overall impact on the economic growth of Pakistan. This measure is also expressed as ratio to total government revenues to capture its economic effects.

4) Total Provincial Revenue: Total provincial revenue would represent total budgetary strength of the SNG. This measure takes into account the total availability of financial resources at the provincial level. Total provincial revenues hence is the sum of the second and third measures explained above and consist of the domestic tax and non-tax collections as well as revenues from federal tax sharing (i.e. federal transfers). Thus, it indicates the total availability of funds to SNGs which provinces can use for the provision of local public goods within their jurisdictions. Importantly, although we are not using the expenditure approach, this measure would provide a mirror image for it (as in the presence of federal transfers, provinces never generated substantive fiscal deficits). We assume that in accordance with fiscal decentralisation theory, local representatives are aiming at local welfare maximisation and they have better information of local needs and preferences, therefore, this measure would capture the spending ability of local representatives. Total provincial revenues will indicate the SNG's share in total government revenues and therefore would be presented as ratio, to capture the degree of fiscal decentralisation overtime.

Lastly, it is also important to mention that this study uses both the national and provincial level data (as a robustness check); therefore different denominators were used for fiscal decentralisation measures in the two cases. For the sections of the study which uses the national data, fiscal decentralisation measures were expressed as ratio to total government revenues (i.e. sum of federal and provincial government revenues). On the other hand, for sections involving the provincial data analysis, the fiscal decentralisation measures are expressed as ratio to the respective provincial total revenues.

Hence, with this scheme of measures for fiscal decentralisation, we tried to minimise the shortcomings related to empirical assessment as identified by the existing literature. It would reduce the limitations of using a single measure and will enable us to deduce relevant information and quantify the potential impact on economic growth.

2.3 DATA AND METHODOLOGY

This section contains the discussion regarding the basic economic model that relates fiscal decentralisation to economic growth. In addition, the variables used, data properties and the estimation techniques for empirical analysis are also discussed below.

2.3.1 Theoretical Link between Fiscal Decentralisation and Economic Growth

In economics, generally[26] the empirical assessment is preceded by the theoretical claims discussing the link between the variables in question. Economists first try to establish the theoretical link between variables, which is then examined with the help of data analysis to provide empirical support to the theory. For this study, we follow the theoretical model developed by Davoodi and Zou (1998), which provided theoretical link between fiscal decentralisation and economic growth. They extended the endogenous growth model of Barro (1990) which states that production function has two inputs i.e. capital spending and public spending. Davoodi and Zou (1998) based their argument on the assumption that public spending is carried out by different tiers of government and therefore it is important to find out which tier is more efficient in public spending.

Davoodi and Zou (1998) argued that spending by different tiers of the government will have different effects on the overall economic growth. Their model explains that appropriation of public spending[27] among different levels of government can lead to higher economic growth; provided that the prevailing spending pattern is different from the growth enhancing expenditure shares. Hence, Davoodi and Zou (1998), along with Zhang and Zou (1998) and Xie *et al.* (1999), provided theoretical base for the argument that fiscal decentralisation can have an effect on the economic growth. Once the link between fiscal decentralisation and economic growth is explained, researchers later on tried different ways to accurately quantify fiscal decentralisation. This led to the use of different approaches for the quantification of fiscal decentralisation including the expenditure approach, revenue approach, taxation ability at SNG and the use of dichotomous variables.

[26] Though in recent times certain studies have also used the data driven approaches to search for economic relationships (especially for financial markets)

[27] Even without changing the existing budget's share in GDP

This study, as explained earlier, uses the revenue approach to measure fiscal decentralisation.

In the context of this study, we will follow the stated model to determine the effects of fiscal decentralisation on economic growth. The desired regression equation can be written as Eq. (1):

$$\Delta RGDP_t = \alpha_0 + \alpha_1 FD_t + \alpha_2 D_t + \alpha_3 Control_t + \varepsilon_t \quad \text{Eq.(1)}$$

where 't' refers to time, $\Delta RGDP_t$ represents growth rate of real gross domestic product (GDP). FD_t presents the fiscal decentralisation measures for Pakistan. As mentioned above, different proxies would be separately used in the regression to correspond to alternative measures of fiscal decentralisation. D_t is the dummy variable representing years hit by political instability. The inclusion of dummy for politically volatile years is expected to contain the effects of certain events that presumably affected the economic outcomes in Pakistan. Furthermore, literature has identified a number of important variables that affect economic outcome of the country and are therefore included in the regression. $Control_t$ variables[28] like investment, government expenditures, trade openness, inflation (representing macroeconomic situation), labour force and tax to GDP ratio were considered during the estimation to get reliable results (Table 2.2). Lastly, ε_t represents the error term.

[28] Mainly following Levine and Renelt (1992)

Table 2.2: Variables names, definition and data sources

Variable	Name	Definition	Data sources
Economic Growth	Δrgdp	Real GDP growth (at constant prices)	WDI, World Bank
Investment	inv	Investment to GDP ratio	SBP, 2005; G.o.P. 2009, 2010
Government expenditures	ge	Government current expenditures (at constant prices) to GDP ratio	WDI
Trade openness	open	(Export + Import) /GDP	WDI
Macroeconomic stability	inf	Inflation	WDI
Labour force	lf	Labour force participation rate	WDI
Government revenues	taxtgdp	Tax to GDP ratio	WDI
Provincial tax revenue	fd_{tax}	Provincial tax revenue ratio*	SBP, 2005; G.o.P. Various issues
Provincial local revenue	fd_{loc}	Provincial tax + non-tax revenue ratio*	-do-
Federal transfers	fd_{trans}	Federal transfers to provinces ratio*	-do-
Total provincial revenue	fd_{tpr}	Total provincial revenue ratio*	-do-

All series were expressed in log form as indicated by lower case letters

Note: * Fiscal decentralisation measures were expressed as ratio to total government (federal and provincial) revenues

2.3.1.a Coefficient interpretation

While discussing the basic model for the empirical estimation for the effects of fiscal decentralisation on economic growth, it is equally important to present the way coefficients of fiscal decentralisation be interpreted. As we know that fiscal decentralisation represents the resources to facilitate spending according to local preferences and hence it produce better economic outcome. Nevertheless, there are certain assignments for development and sustainability that has to be carried out by the central government and these include defence, currency, foreign policy, immigration and mega development projects at national level. As central government needs resources in order to carry out these functions, therefore, fiscal decentralisation is plausible only up to a certain limit and beyond that fiscal decentralisation will have negative implications for the economy as a whole. Hence, resources should be allocated among the tiers of government in a way that can improve spending efficiency, keeping national cohesion intact. Theory suggests that there is an optimum level of fiscal decentralisation which once achieved will be the maximum possible outcome for fiscal decentralisation to influence economic growth in a desired way. According to Thieben (2003) and Xie *et al.* (1999, pp. 235), fiscal

decentralisation affects economic growth positively at the start and once the optimum level is obtained, it starts to have negative implications for the economy.

Hence, in the analysis of fiscal decentralisation, the sign of coefficients are very important and it carries more information than in the conventional models. Therefore, it is worth mentioning that positive coefficient depicts that higher degree of fiscal decentralisation will improve economic growth and the optimum level is still not achieved. On the other hand, a negative sign of the coefficient will indicate efficiency losses in the economy and that fiscal decentralisation has crossed the growth enhancing optimum level. Therefore, special attention is required while explaining the coefficients in the analysis containing fiscal decentralisation.

2.3.2 Data

As we know from the previous discussion that the major focus of this study is to investigate the empirical relationship between fiscal decentralisation and economic growth in Pakistan. For this purpose we use time series data for 36 years covering the period from year 1974-2009. Although, the length of the data can be considered short for the time series analysis but still there are valid reasons that restrict the availability of meaningful data for this study. The major reasons included; the promulgation of new constitution of Pakistan in 1973 that explicitly elaborated the resource distribution mechanism in the country and following that, data was available in legible form. Another reason is that prior to year 1974, Pakistan was struggling to recover from; adverse economic conditions due to the 1971 war, the end of eleven years of dictatorship and the separation of the then East Pakistan. In addition, during the period 1955-1970, country was declared as one unit and there were no provincial boundaries. Therefore, to have data for relatively normal years, this study is constrained to start with year 1974. On the other hand, we restrict the analysis to year 2009 in order to avoid the worse hit years of terrorism for Pakistan. Furthermore, drastic changes occurred in resource distribution due to the NFC award in year 2010 (where the provincial share in resource pool was increased from 47.5 percent to 57.5 percent) and the rest of the years were not enough to exhibit the long run contribution of such changes.

2.3.2.a Important determinants of economic growth

This section discusses the overtime behaviour of the variables that were used in the analysis. Graphical representation of the series can be seen at Figure 2.1 and 2.2, where the

variables series are presented in log form to give a clear idea of the relative degrees of change overtime. As this study considers fiscal decentralisation a determinant of economic output therefore growth rate of real GDP (Δrgdp[29]) was used as the dependent variable in ECM representation. The GDP series (in level) shows fairly stable positive trend overtime in Pakistan. However, during the 1990's there was a phase of relatively low economic growth and this largely can be attributed to non-stable political environment and frequent change of power.

Among the important control variable on the right hand side, investment is always considered crucial for economic growth. This study uses 'Total Investment' to capture investment behaviour in Pakistan. To benchmark any changes and for ease of explanation, Total Investment was expressed as a ratio to GDP. The Investment to GDP ratio in Pakistan shows a steady behaviour with a downfall during 1990's. The main reason can be found again in the political volatility and 1998 atomic tests followed by a military coup, all being in the same era. Later on, investment in the country showed a sharp increase during 2005-2007.

Government expenditure is considered as another important contributor to economic growth in developing countries. Developing countries often face problems like concentration of power at the centre and therefore bulk of resources pours into the economy in the shape of public spending. Thus, government expenditure[30] was used and expressed as ratio to GDP. Greater volatility can be noticed in government expenditure over the period due to unstable internal politics (during 1990's) and external factors (afghan war, tension with India and terrorism). Government expenditure in its relative perspective peaked during 1989 but then it showed a downturn during 1990's. However, after 2005, due to the deteriorating peace situation and 'War on Terror', there is sharp rise in the expenditures incurred to accordingly equip and train the law enforcing agencies and thus government expenditures once again showed an upward trend.

Another important contributor to economic growth in the globalised world is the international trade, usually represented with trade openness. Measure for trade openness for this study is defined as 'exports plus imports' of goods & services and is expressed as a ratio to GDP. Due to nationalisation policies, dire political instability and military coup,

[29] the lower case letters indicates the values in log form

[30] *"General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defence and security, but excludes government military expenditures that are part of government capital formation"* (WDI-definition).

trade openness touched its minimum point in year 1978. However, there were signs of improvement later on. During 1990's, the widespread economic sanctions after the 1998 atomic tests by Pakistan and subsequent military takeover, resulted in a down turn of the trade indicator when it reached the minimum point again. This fall was also contributed by the severe drought in year 2000, which stringently affected the exports of Pakistan: that mainly consists of primary agricultural or agro-based items including textile, cotton, rice and leather goods among others. However, some stability can be noticed later on.

Furthermore, tax to GDP ratio and labour force participation rate were also considered during the analysis. Pakistan has the lowest tax-to-GDP ratio in the world (Sherani, 2006). The total tax as a ratio to GDP remained almost stagnant over the period (hovering around 11 percent), and has witnessed even further reduction in the recent past[31]. Total labour force relative to total population also indicates that the demographic bonus phase for Pakistan has started (Arif and Choudhry, 2008; Hussain *et al.* 2009). During the last decade, Pakistan has started to experience the growing labour force mainly due to the higher population growth rate in the past and increased female participation. Lastly, inflation was used to proxy macroeconomic situation in the country, which remained quite volatile in Pakistan during the period under analysis.

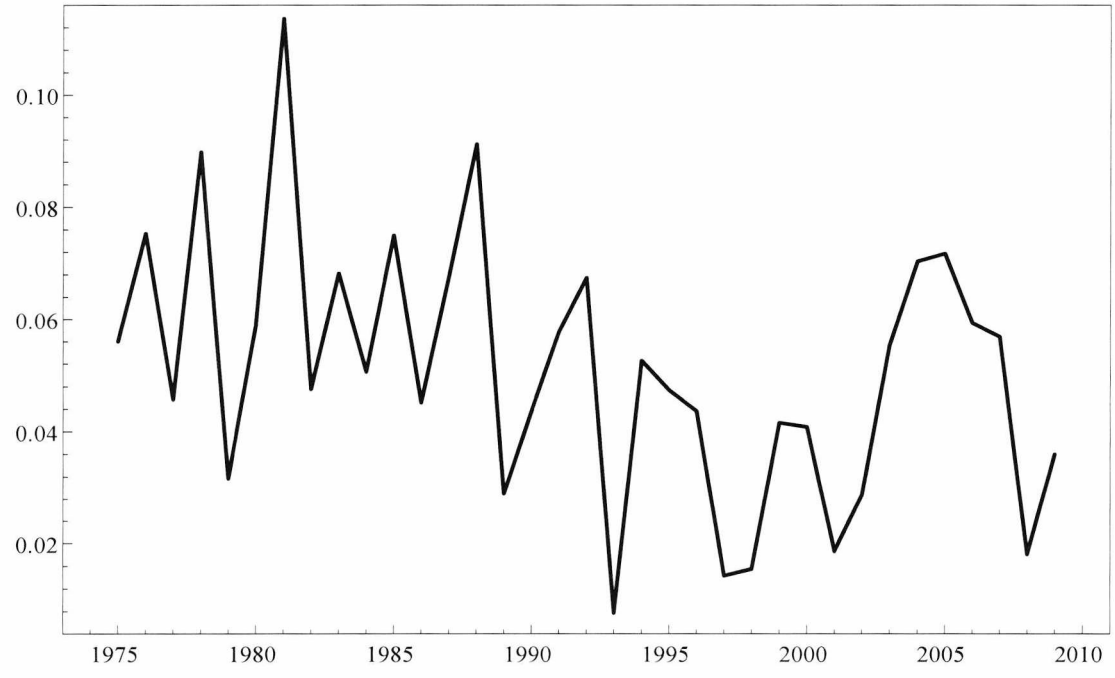

Figure 2.1: GDP growth (in logs)

[31] This variable had stationarity issues and was later dropped from the analysis

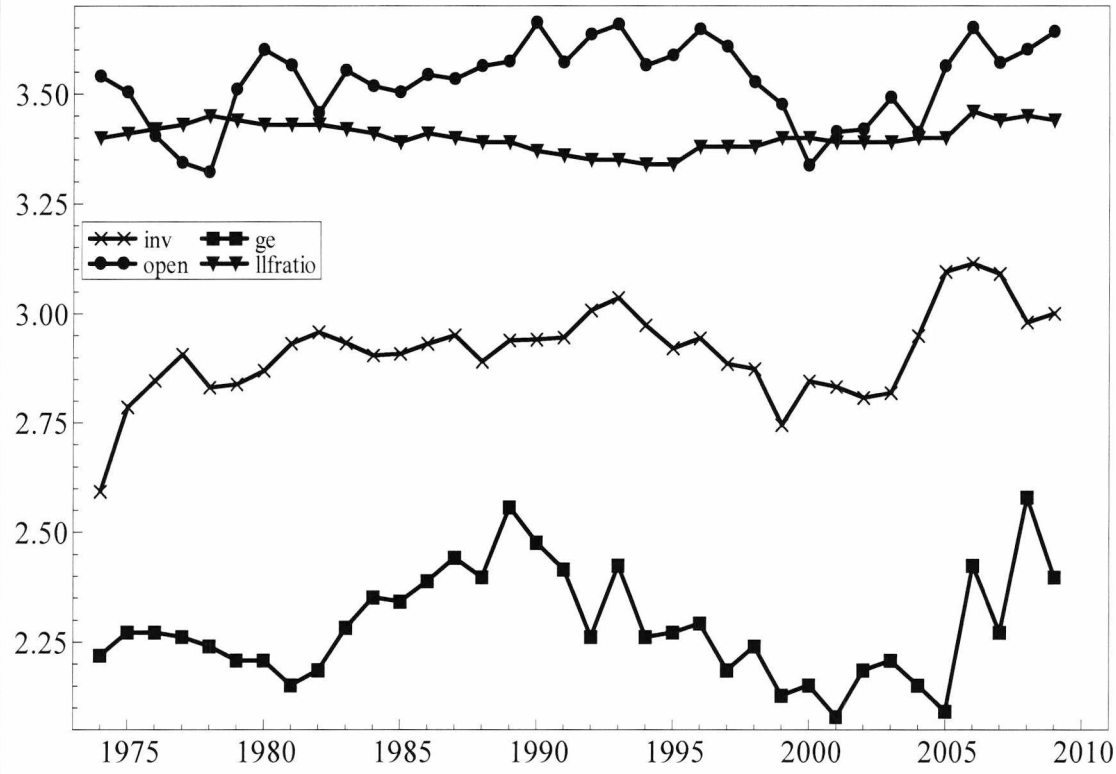

Figure 2.2 : Log of; Investment to GDP ratio (*inv*), Government Expenditure to GDP ratio (*ge*), Trade Openness (*open*) and Labour force participation rate (*llfratio*)

2.3.2.b Graphical representation of the fiscal decentralisation measures

Having discussed the fiscal decentralisation mechanism and the important determinants of economic growth, we are now in a position to discuss proxies for the variable of interest i.e. fiscal decentralisation. As stated previously, revenue approach was adopted in this study to isolate the effects of two major sources of revenues i.e. the provincial own source revenues and federal transfers. Fiscal decentralisation measures were expressed as ratio to total government revenues and are presented in Figure 2.3. Due to the significant nature and its magnitude in the provincial revenues, federal transfers are discussed earlier.

Federal transfer indicates two periods of trough during 1980-86 and 1997-2005. During the first period i.e. 1980-86, federal transfers to the provinces remained very low because of a strong federal government at the centre under the dictatorship, whereas provinces were ruled by governors, hence provincial governments had limited role. Immediately after the 1985 elections, provinces started to receive greater transfers. During 1986, provinces received these transfers in the form of non-tax revenue i.e. as grants/loans but as those were not part of the systematic federal transfers (being unplanned ones),

therefore, federal transfers posted the lowest value. This issue was however, resolved in 1987 and there seems improvement in the federal transfers there on. On the other hand, following 1991 National Finance Commission[32] (NFC) award, provinces started to receive more resources due to the expansion of the divisible pool and there is a visible increase in federal transfers to provinces during 1991to1996. Nonetheless, these arrangements could not continue for long and the subsequent NFC award in year 1997 significantly reduced funds availability to the provinces, as is visible in the figure. Lastly, after year 2004 federal transfers to the provinces are on the rise again.

After discussing overtime behaviour of federal transfer to provinces (*ftrans*), we now consider the second important aspect of fiscal decentralisation i.e. the provincial own revenues. The impact of provincial own resource base is used in two ways i.e. provincial own tax revenues (*tax*) and provincial local revenues (*loc*), where the second measure consists of the own tax revenues plus the non-tax revenues. Figure indicates that there is noticeable decline in the share of provincial tax revenues, overtime. Nevertheless, provincial local revenues posted somewhat steadiness with a dip during 1988-1990. However, provincial ability to generate revenues had remained very low. It is obvious that provinces were not entrusted and thus remained under-capacitated in taxation power with respect to federal government.

Lastly, in order to take into account the overall effect of fiscal decentralisation arrangements (with increasing federal transfers but stagnant taxation powers), we also used total provincial revenues (*tpr*), that includes revenues from all the stated sources. Figure 2.3 indicates that total provincial revenues has increased overtime but this increase was clearly not funded by provincial own revenues except the initial period. Instead, figure indicates that provincial revenues from other sources has increased overtime while provincial tax revenues has reduced in its relative contribution to total provincial revenues. Therefore, total provincial revenues share similar trends with federal transfers and was mainly driven by the transfers.

To sum up, this section elaborated two important constituents of revenue sources for the provincial budget which were taken into account during the analysis. Firstly, 'federal transfers to provinces' were used by the federal government to correct vertical fiscal imbalance overtime. This presents the government's fiscal stance and provides overtime evidence regarding the central government's emphasis, i.e. explaining the way to

[32] National Finance Commission is the constitutional set up which is responsible for intergovernmental fiscal resource distribution

decentralise. Similarly, the second measure used for reflecting fiscal decentralisation is ability of the provinces to raise revenue from own sources. This indicator reflects the relative taxation power of the provincial governments and demonstrates fiscal autonomy of the provinces. These measures of fiscal decentralisation would thus proxy the incremental improvement (or deterioration) associated with the given decentralisation mechanism. It is supposed that by using the above stated proxies for fiscal decentralisation in this study, we would be in a position to properly analyse the fiscal decentralisation stance in Pakistan.

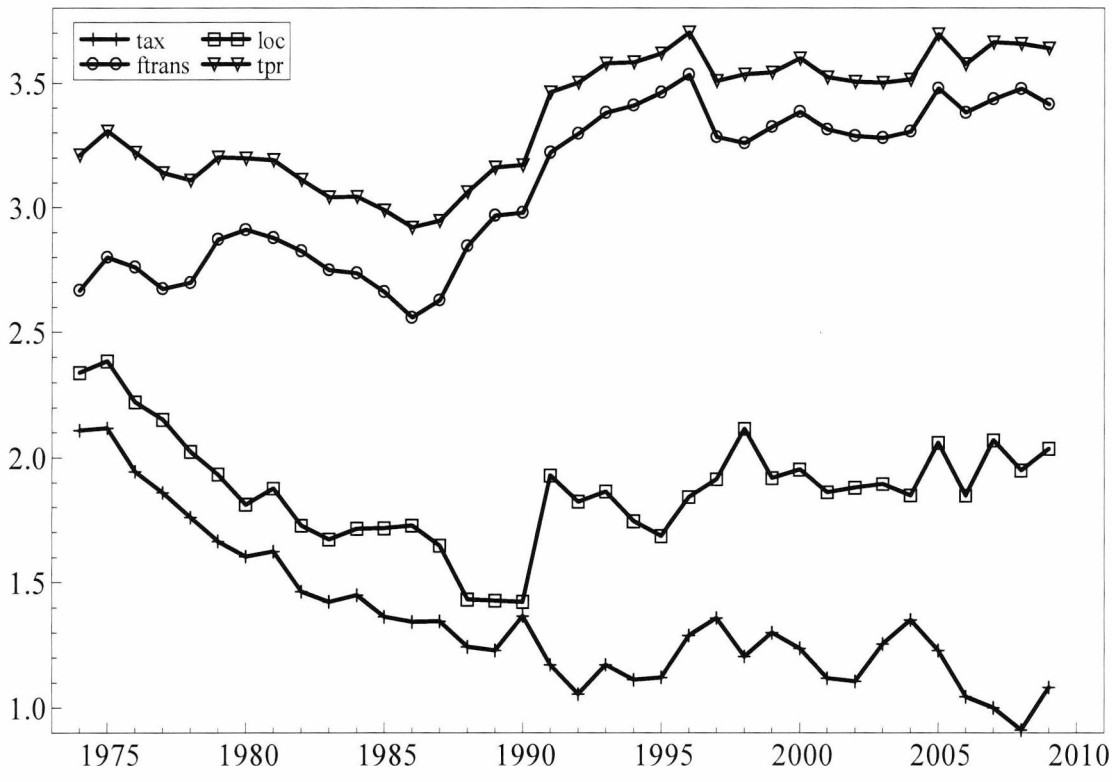

Figure 2.3: Fiscal decentralisation measures (as ratio to Total Government revenue) (in logs)

Note1: Total government revenues consists of federal and provincial government revenues

Note2: *tax* indicates Provincial Tax Revenues ratio,
loc refers to Provincial Local (tax + non-tax) Revenues ratio
ftrans refers to Total Federal Transfers to Provinces ratio,
tpr presents the ratio of Total Provincial Revenues

2.3.2.c Analysis of the data properties

Graphical examination of the time series properties of the data will give us a rough idea about the behaviour of the data and will help in application of appropriate tests. Based on the information obtained from the earlier graphs, both the informal graphical methods

as well as the formal unit root test (Augmented Dickey Fuller test) was used to investigate the stationarity of the variables.

First of all, we present the core variables in log levels to grasp their overtime behaviour. Figure 2.4 presents GDP (*rgdp*), investment (*rinv*), government expenditure (*gexp*), total labour force (*tlf*), federal transfers to provinces (*rftrans*), provincial tax revenues (*ptax*) and federal tax revenues (*ftax*), where all the variables were presented in constant values. The graphical inspection of the series in levels makes it clear that the variables share common trend and seems cointegrated. Figure 2.4 contains important information and provide basis to investigate the cointegrating relationships among the series.

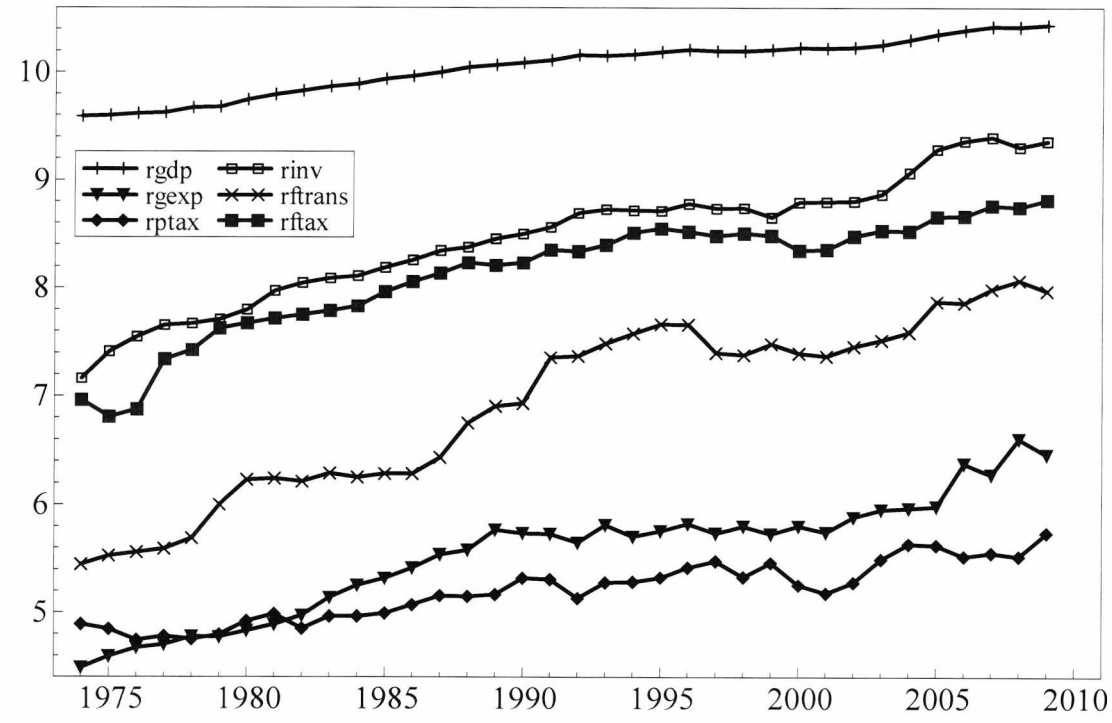

Figure 2.4: Log level representation of variables (deflated values)

Note: All variables were expressed in real terms (deflated to the base year 2000) where;
rgdp refers to Real GDP, *rinv* refers to Real Total Investment,
rgexp presents Real General Government Expenditures,
rftrans means Real Federal Transfers to Provinces
rptax indicates Real Total Provincial Tax Revenues, *rftax* refers to Real Total Federal Tax Revenues

To supplement the graphical presentation, the correlograms for Autocorrelation function (ACF) and Partial autocorrelation function (PACF) are presented graphically at Appendix I. Firstly the ACF and PACF correlograms for series in real terms are presented

as Figure A2.1. Being in levels, variable indicate monotonic adjustment overtime as is clear from ACF correlograms. However, the effects are dampening out with time.

After observing the general behaviour of the variable in real terms, we now turn to the variables that were actually used in the analysis. For the empirical estimation, series were expressed in ratio form which yields better economic interpretation. The correlation functions for variables that were expressed in ratio form are given at Figure A2.2 at Annex I. It can be noticed that expressing the time series variables in ratios has dampen the autocorrelation within the series (e.g. for investment, government expenditure and provincial local revenues).

We know that if the data generation process is white noise, the autocorrelation function should remain within the five percent confidence level at any lag greater than zero, which is not the case for all the variables. Most of the variables in our data set present a consistent trend of gradually reducing lag spikes. The ACF correlograms shows persistent correlation among the successive lags of the variables. This property is reflective of a non-stationary process. However, it can be noted that the correlograms starts with high spikes which then die out with the successive lags; this provides evidence for the reduction in correlation among the successive lags. On the other hand, PACF correlograms reveal that each variable has only one significant spike which then disappears for further lags, illustrating that the autocorrelation problem is only significant at the first lag. Thus, the PACF indicates that autocorrelation problem settles down at the second lag for almost all the variables. The bars remain in the 95 percent confidence interval except for the first lag which exhibits the presence of strong autocorrelation for one lag only. Hence, the PACF correlograms suggest that the first difference operators of the given time series should result in stationary process.

Based on the insights from graphical analysis, data is expressed in first difference form (presented at Figure A2.3, Appendix I). At first difference the data plots clearly indicate the absence of trends in the data. Similarly, the ACF and PACF correlograms for the differenced data are presented in Figure A2.4 (Appendix I) and there is no evidence of autocorrelation. The differenced series were white noise (except one variable i.e. the government expenditure to GDP ratio). Both the ACF and PACF values for the given variables were well within the 95 percent confidence interval for the first lag. Thus, graphical representation indicates the removal of time trends after differencing and the analysis suggests that the series are first difference stationary. Nonetheless, graphical

method alone is not enough to conclude about the stationarity issue rather it provides a clue regarding the issue. Hence, to further confirm the degree of unit root in the data, the formal Augmented Dickey Fuller (ADF) test is used and elaborated in the following section.

2.3.2.d Results for Augmented Dickey Fuller test

As the stated variables represent the time series data therefore these were transformed into log levels[33] so as to dampen the short run fluctuations. In addition, log transformation improves the distributional properties of the time series data by reducing the skewness of the data and help in achieving symmetry. Generally, it is normal to expect unit root problem in time series data due to time variation in mean, variance and/or auto-covariance. Using non-stationary data might lead to spurious regression results because if the data contains time trends, the estimated regression coefficient will not present the actual behaviour of the variable alone and these are quite likely to carry effects of the time trend. Therefore, before initialising the analysis of time series data it is always important to investigate the true order of integration for data series. For this purpose the Augmented Dickey–Fuller (ADF) test was undertaken for all the series.

We included up to two[34] lagged differences for each variable and used the more general form as presented in Eq. (a) that contains the deterministic terms i.e. 'constant' and 'trend' factors. Hence, the null hypothesis H_0: $\pi = 0$, is tested against an alternative hypothesis that variable is stationary i.e. H_1: $\pi < 0$. During the first stage of estimation, we check for the significance of deterministic terms[35], otherwise, model is estimated without it.

$$\Delta y_t = \alpha_0 + \delta_t t + \pi\, y_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta\, y_{t-i} + \varepsilon_t \qquad \text{(a)}$$

The ADF test results for the set of variables used in this study are presented in Table 2.2a. The test produces interesting results for variables in levels. It is interesting to note that variables expressed in ratio form indicate stationarity straight away. An important variables i.e. *inv* was stationary at levels with zero lag (the higher lags were insignificant and thus ADF test reduces to simple Dickey–Fuller test only). Results also indicate that one of the fiscal decentralisation variables namely fd_{tpr} was trend stationary with zero lag.

[33] where the abbreviations in small letter refers to the log values
[34] As a rule of thumb, two lags are used for annual data to ensure a serially uncorrelated error term
[35] Because the limiting distribution only changes with the presence of either of the intercept and trend terms, consequently different critical values are required in each case.

The rest of the variables were non stationary in levels. However, the ADF test results for the first difference form suggest that all variables are first difference stationary. Whenever the higher lags were insignificant, results were estimated at zero lag. In brief, results indicate that the data set contains a mix of variables that are trend stationary, level stationary as well as some are integrated of order one.

Table 2.2a: Results for ADF test

Variables	Var	τ - ADF with Constant	τ - ADF with Constant and Trend	Variables	τ - ADF with Constant
Real GDP	***rgdp***	-1.445	-----	Δ***rgdp***	-4.484**
Investment	***inv***	-3.723**	-----	Δ***inv***	-----
Government Expenditure	***ge***	-1.865(2)	-----	Δ***ge***	-2.988*(1)
Openness	***open***	-2.492	-----	Δ***open***	-6.085**
Labour Force participation	***lf***	-1.216	-----	Δ***lf***	-5.357**
Inflation	***inf***	-2.764	-----	Δ***inf***	-5.527**
Federal transfers	fd_{tax}	-2.850(2)	-----	Δfd_{tax}	-5.254**(1)
Provincial tax revenues	fd_{loc}	-2.767(2)	-----	Δfd_{loc}	-3.946**(2)
Provincial local revenues	fd_{trans}	-0.9914	-----	Δfd_{trans}	-4.745**
Total provincial revenues	fd_{tpr}	-----	-2.183	Δfd_{tpr}	-6.077**
Critical values 1%=**, 5%=*		-3.64 -2.95	-4.26 -3.55	Critical values 1%=**, 5%=*	-3.64 -2.95

Note: All variables were expressed in logs

2.3.4 Methodology

There are number of econometric techniques which can be used to quantify the relationship between economic variables. Selection of appropriate estimation technique from the available alternative methods depends upon the nature of data, its availability and the kind of relationship in which researchers are interested. In our case, National Finance Commission decides the resource distribution mechanism and awards are constitutionally required to be announced after every five years. These awards reflect government decentralisation policy that remains implemented for fairly long period and therefore, should be analysed for long run implications.

Similarly, fiscal resource distribution mechanism is favoured on the grounds that it help the local governments to channelize government spending towards such public goods

that are in line with local needs and preferences. This setup is expected to eventually increase productivity of local population and would add to economic growth due to their increased satisfaction with local development. Fiscal decentralisation can thus lead to improved efficiency for local enterprises and would result in higher and more sustainable economic growth (Qian and Roland, 1996). Resultantly, due to the increased satisfaction level, such developments are supposed to convince people to contribute more towards economy both in monetary terms[36] and in terms of increased productivity. Local representatives are also under closer scrutiny by their electorates and elections provide them greater incentives to work in public interests over the long run (Lin and Liu, 2000). Hence, there is evidence that fiscal decentralisation will have long term implications for economic growth (Oates, 1993) and therefore, it needs to be analysed for the long run impact on the economy.

Nevertheless, it is important to consider that this arrangement may also carry certain short run consequences and the quantification of short run effects would add to the analysis. Therefore, in this study we are interested to find both the short term as well as the long run effects of fiscal decentralisation in Pakistan. This analysis is aimed to present the net effect of government's stance over fiscal decentralisation and identify areas of focus. So in brief, the appropriate econometric technique for estimating such kind of relationship can rightly be pointed out as the "Cointegration technique" and Error Correction Model (ECM).

For the identification of cointegrating long-run relationship among the variables, several techniques are in practice and their selection is dictated by the research interest and data availability which explains the model specification requirements. Available techniques include the Error Correction Mechanism (ECM) approach by Sargan (1964), the single equation residual based Engle and Granger (1987) technique; the maximum likelihood approach of Vector Autoregressive (VAR) model by Johansen (1988, 1991, 1995), Johansen and Juselius (1990), and Juselius (2006); the fully modified OLS procedure by Phillips and Hansen (1990), and quite recently, the ADL approach, which is catching attention again. Hendry (1995), Pesaran (1997), Pesaran and Shin (1998), Banerjee *et al.* (1986, 1993, 1998) and Kiviet and Phillips (1992) contributed to the Autoregressive Distributed Lag (ADL) model. These researches presented the short run and long run coefficient estimates in an ECM representation that is derived from ADL specification. The most noticeable property of the ADL single equation approach is that it

[36] Such as reduction in tax evasion, which is crucial in developing countries

is the only cointegration technique that allows for the instantaneous inclusion of I(0) and I(1) variables in the single equation estimation. Moreover, this modelling technique produces better results in small samples as compared to other available techniques.

To provide some background, Engle and Granger (1987) can be regarded as pioneer in developing the cointegration technique. They argued that if the linear combination of non-stationary variables produce a stationary series of residuals, it manifest a stable long run relationship among the variables. However, this technique suffers from small sample bias. On the other hand, the Johansen VAR approach to cointegration is nowadays the most widely used method to model the long run relationship in multiple equation framework. This method is preferred for being more elaborative as it gives information about the number of cointegrating vectors among the given series. Nevertheless, the Vector Autoregressive (VAR) model requires the inclusion of enough number of lags (for its unrestricted model) in the first stage of estimation so as to determine the true lag length of the cointegrating series. This technique is quite data intensive and requires large number of parameters for better results. In addition, the above stated techniques produce better results if all the variables are integrated of same order i.e. I(0) or I(1). Hence, these techniques are not feasible in samples as is the case in this study.

In our case, we have 36 annual observations therefore such technique needs to be used which is consistent with small samples. Furthermore, as our dataset contain variables that are integrated of different orders i.e. I(1) and I(0), therefore, we will use the ADL approach following Kiviet and Phillips (1992). As the ADL models encompass all the nested models, authors build their analysis on this property to derive the ECM set up and suggested test for cointegration. The test uses the dependent variable in lagged level form as the error correction term to correspond to the existence of long run relationship. The unrestricted dynamic model presented by Kiviet and Phillips (1992) can be written as Eq. (2):

$$\Delta y_t = \boldsymbol{\alpha}' \Delta \boldsymbol{x_t} + \beta\, y_{t-1} + \boldsymbol{\theta}' \boldsymbol{x_{t-1}} + \epsilon_t \qquad \text{Eq.(2)}$$

where y_t is the dependent variable and $\boldsymbol{x_t}$ is the vector of independent variables. In the above equation $\boldsymbol{\acute{\alpha}}$ represents the short run effect of changes in $\boldsymbol{x}$ on y. It is important to note that in ECM models, the long run effects are not readily available. The long run multiplier effects for the set of independent variables are calculated using the $\boldsymbol{\theta'}$

estimates[37]. Lastly, the coefficient of lagged dependent variable i.e. β indicates the error correction term and helps in finding that following a shock, how much of the disequilibrium is adjusted each period. Thus, $(\beta-1)$ can also be explained as the rate at which model achieves equilibrium in the long run. The value of the β lies between zero and minus two ($\beta \in 0, -2$) where zero mean no long run relationship among the variables while value above minus one ($\beta > -1$) represents over shooting (Kiviet and Phillips, 1992, pp. 359; Banerjee *et al.* 1998, pp. 269). Hence, any value of β below "−1" ($0 < \beta < -1$) indicates stability of the model.

Finally, to empirically estimate the stated relationship in this study we applied the General-to-specific (*Gets*) model selection procedure following Krolzig and Hendry (2001); Hendry and Krolzig (2003, 2005). According to the *Gets* approach, analysis should start with a plausible general model, followed by removing the insignificant variables and consulting the diagnostic checks till the final specification is reached where all the variables are significant. *Gets* approach in our case will benefit the analysis by providing a congruent parsimonious model and will eliminate the insignificant variables and lags thus providing better degree of freedom for the rest of the variables to be estimated[38]. However, it should be noted that in ADL specification the most crucial problem is the presence of autocorrelation in error term (captured by AR-test) which if exists, would indicate inconsistent estimates. Therefore, various misspecification tests including error autocorrelation, heteroscedasticity, non-normality and functional form misspecification were applied to get reliable results.

2.4 EMPIRICAL QUANTIFICATION

This section presents the chronological progress of the estimation process that was adopted for the empirical quantification of the relationship of interest. First of all, a general economic model was developed to find out the determinants of economic output in Pakistan. This model was investigated for the existence of long run cointegrating relationship using ADL specification. Following that, once a parsimonious specific model was obtained through *Gets* approach and it was established that cointegration exists among the variables in the general model, the effects of fiscal decentralisation proxies were

[37] Long run elasticities are calculated by dividing the coefficient of lagged level explanatory variable over the lagged level dependent variable i.e. $k = \theta' / -\beta$, in accordance with equation (2) specification

[38] Kirchgässner and Wolters (2007) applied similar general-to-specific methodology to arrive at a parsimonious model of the identical specification

analysed using the ECM setup associated with the given ADL model. The section concludes with the results interpretation and discussion.

2.4.1 Modelling Economic Output in Pakistan

In order to get reliable results, it is very important to specify empirical model in such a manner that avoid common econometric misspecification problems, omitted variables bias and endogeneity issues. Therefore, it is always of interest and equally important at the same time to explain the procedure adopted for finding a representative model. In this connection, first of all search was conducted to get; a prudent economic model, its correct functional form and workable econometric technique that is reliable enough to explain economic output in Pakistan. Once these targets were achieved, the resulting model was used in the next subsection to explore the relationship between fiscal decentralisation and economic growth.

In this study, first of all we aimed to identifying important variables, their adequate lags and to find appropriate control variables that can best explain the situation in Pakistan. Hence, to investigate the long run relationship and identify the important exogenous variables for general economic model, the Autoregressive Distributed Lag (ADL) modelling approach was adopted (Hendry,1995; Pesaran 1997; Kiviet and Phillips, 1992). Following the ADL methodology, all the variables were expressed in levels to explain the long run economic output. It is important to note here that the soundness of the final specific model depends upon the adequacy of the initial general unrestricted model, that is assumed to correctly approximate the data generation process (Hendry and Krolzig, 2004). Keeping this in mind, viable general model was framed whilst minimising the risk of missing out any important variable. Initially, five explanatory variables were identified including investment, government expenditure, trade openness, inflation and labour force for explaining the dependent variable i.e. real GDP. The resulting conditional autoregressive distributed lag (ADL) model can be written as Eq. (3):

$$rgdp_t = \alpha_0 + \delta t + \theta D_t + \sum_{e=1}^{m} \beta_e rgdp_{t-e} + \sum_{f=0}^{n} \beta_f inv_{t-f} + \sum_{h=0}^{p} \beta_h ge_{t-h} + \sum_{i=0}^{q} \beta_i open_{t-i} + \sum_{j=0}^{r} \beta_j inf_{t-j} + \sum_{k=0}^{s} \beta_k lf_{t-k} + \varepsilon_t$$

Eq. (3)

Furthermore, Hassler and Wolters (2006) showed that if explanatory variables are exogenous, the inclusion of instantaneous effects for the explanatory variables would lead to more powerful cointegration test. However, according to the specification used in this study, three explanatory variables (i.e. investment, government expenditure and trade openness) appeared as ratio to GDP[39]. At the same time, the real GDP appears on the L.H.S. as dependent variable, so any output shock will affect both the sides of the equation simultaneously, which points to the possible endogeneity issue and the explanatory variables might relate to the error term. Therefore, to have plausible outcome, the contemporaneous effects were avoided for the above mentioned explanatory variables and only their lagged values were used. The deterministic part of the equation consist of a dummy variable 'D_t' that represent the politically volatile years[40] while *trend 't'* was used to capture the effects of time trend in the equation (if any). The general unrestricted model was framed using two lags as rule of thumb for annual data. In addition, it is important to mention that all the variables used in the estimation were expressed in log form so that the coefficients could be explained as elasticity which is easy to interpret. Based upon the above procedure, it is most likely that the given model would produce reliable outcome.

As next step, once the appropriate specification is finalised, the automated general-to-specific (*Gets*) model selection procedure was applied using *PcGets* to eliminate the redundant regressors and to obtain a congruent parsimonious model. This procedure drops the insignificant variables out of the general model without causing efficiency loss (Krolzig, 2001; Hendry and Krolzig, 2005). Hence, during the selection process, two regressors i.e. labour force and government expenditure failed to gain statistical significance and were excluded from the final specific model. Furthermore, for investment, the 2nd lag remained insignificant and was eliminated. Last to mention is inflation, for which the contemporaneous effect and first lag was eliminated. Thus, the specific model contains investment, openness and inflation alongside the dummy[41] and *trend*. The general and specific model can be seen in Table 2.3.

Once the specific model was obtained using the *PcGets*, the Kiviet and Phillips (1992) test for cointegration was applied to the model (which is embedded in the *PcGive*

[39] where GDP was used as a measuring rod to capture the overtime behaviour of the variable

[40] These include disturbed election years (1977, 1988, 1991, 1993, 1997, 2007), invasion of Afghanistan and huge influx of refugees into Pakistan (1979), Nuclear tests (1998), Military Coup (1999) and year worse hit by terrorism and political instability (2008)

[41] Dummy for the political instability is retained in the model, despite being insignificant, due to its important nature and its potential effects on growth.

unit root test[42]) to investigate the cointegrating relationship among the given variables. The Kiviet and Phillips (1992) test statistic has the empirical value equal to "-4.29" which is statistically significant at 10 percent level of significance. Thus, results reject the null hypothesis of "No Cointegration", establishing that real GDP is cointegrated with the given explanatory variables and evidence exists for the long run relationship among the given series. Nevertheless, before proceeding further it is important to check the economic validity of the resulting empirical estimates. Considering the economic interpretation of the final specific model, results suggest that 10 percent increase in investment (relative to GDP) will result in 2.4 percent increase in the level of real GDP in Pakistan. The positive relationship of investment and GDP is thus an exposition of Solow (1956) and is in line with the already established research results by Barro (1991), Bleaney (1996) and Levine and Renelt (1992). Similarly, trade openness positively affects the level of economic output in Pakistan which marks the importance of international trade. Lastly, coefficient for inflation appears with negative sign and is in accordance with Barro (1997) and Zhang and Zou (2001) and depicts the negative supply side shocks for Pakistan. The dummy representing the politically non-stable years also have posted a negative sign as expected. Hence, all the coefficients in the specific model are according to expectations and the specific model parsimoniously explains economic growth in Pakistan. In addition, all the diagnostic tests against error autocorrelation (AR), heteroscedasticity (ARCH and hetero), non-normality (Normality) and functional form misspecification (RESET) were satisfied. Therefore, as the results were validated from the economic theory, have desirable econometric properties and cointegration is established, the next section is based upon the given specific model to enquire the effect of fiscal decentralisation in Pakistan using the ECM technique.

[42] It is important to note that the Error Correction term (*rgdp_1*) does not follow the standard t-distribution, instead, the *PcGive* unit root test provides the correct significance test for ADL representation of the models (see Banerjee and Hendry, 1992 and Ericsson and MacKinnan, 2002, Banerjee et al., 1993, pp. 54-55, Kiviet and Phillips, 1992)

Table 2.3: Results for ADL representation of General Economic Model (Dependent Variable-*rgdp*)

Variables		General ADL Model (with 2 lags)	Specific Model 1	Solved static LR Equation for Model 1	
Constant	Constant	3.80*	2.01***	Variables	Model 1
	rgdp_1	0.56***	0.69***	Constant	6.57***
Real GDP	*rgdp_2*	-0.001	----	inv[#]	0.24
	inv_1	0.11*	0.07*	open	0.69***
Investment	*inv_2*	-0.01	----	inf	-0.11***
Government	*ge_1*	0.03	----	Dummy	-0.03
Expenditure	*ge_2*	-0.01	----	Trend	.04***
	open_1	0.10	0.10**	----	----
Openness	*open_2*	0.17**	0.11**	----	----
	lf	0.35	----	----	----
	lf_1	-0.30	----	----	----
Labour force	*lf_2*	-0.33	----	----	----
	inf	0.01	----	----	----
	inf_1	-0.01	----	----	----
Inflation	*inf_2*	-0.04***	-0.03***	----	----
Political instability[#]	D_t	-0.01	-0.01	----	----
Trend	*t*	0.02**	0.01**	----	----
Number of observations		34	34	----	----
Number of parameters		17	8	----	----
PcGive Unit root test[##]			-4.29*	----	----
AR 1-2 test		1.9382 [0.1784]	1.6821 [0.2072]	----	----
ARCH 1-1 test:		0.88209 [0.3547]	0.21440 [0.6465]	----	----
Normality test:		3.8888 [0.1431]	2.1323 [0.3443]	----	----
hetero test:		Not enough observation	0.89304 [0.5731]	----	----
RESET test:		3.0451 [0.1002]	1.8114 [0.1851]	----	----

Significant at 1%=***, 5%=**, 10%=* ,
marginally insignificant at 10% level of significance
Note1: [##] *PcGive* Unit root test represents the Kiviet and Phillips (1992) test for cointegration
Note2: All variables were expressed in logs

2.4.2 Error Correction Model for fiscal decentralisation variables

From the above discussion it has established that the economic output and the explanatory variables i.e. investment, openness and inflation are cointegrated. Hence, the specific model explains the long run effects of explanatory variables in relation to real GDP. Now as the variables in the general economic model are cointegrated, the inclusion

of fiscal decentralisation proxies in the model is expected not to distort the established relationship. Therefore, it is reasonable to use the Error Correction Model (ECM) associated with the above level relationship in ADL so as to estimate the relationship between fiscal decentralisation and economic growth. The proxies for fiscal decentralisation (i.e. fd_{tax}, fd_{loc}, fd_{trans} and fd_{tpr}) were incorporated into the ECM to find out both the short run and long run effects of the variables of interest. However, the proxies of fiscal decentralisation were incorporated turn by turn into the model due to the degrees of freedom issue and to avoid possible collinearity among alternative measures of fiscal decentralisation (Table 2.4). Once again *Gets* approach was applied, however, being the variables of interest, both the dynamic and lagged level effects of fiscal decentralisation variables were kept *fixed* [43] (alongside the variables in levels from the earlier specific model i.e. from Model 1 (given at Table 2.3) and a restricted model is estimated with *PcGets*. Finally, the ECM specification of the estimated model can be presented algebraically as below in Eq. (4) while the empirical results for the given specific models are reported in Table 2.4. The equation follows general explanation as is given for Eq. (2) whereas two lags were used for the dynamic short run effects while avoiding the contemporaneous effects for *inv* and *open*.

$$\Delta rgdp_t = \nu + \delta t + \theta D_t + \sum_{e=1}^{m} \beta_e \Delta rgdp_{t-e} + \sum_{f=1}^{n} \beta_f \Delta inv_{t-f} + \sum_{h=1}^{p} \beta_h \Delta open_{t-h} + \sum_{i=0}^{q} \beta_i \Delta inf_{t-i} + \sum_{j=0}^{r} \beta_j \Delta fd_{t-j} + \gamma_1 rgdp_{t-1} + \gamma_2 inv_{t-1} + \gamma_3 open_{t-1} + \gamma_4 inf_{t-1} + \gamma_5 fd_{t-1} + \varepsilon_t$$

..... Eq.(4)

[43] With *PcGets*, variables of interest can be forced into the model by keeping their status as *F:fixed*, so as to avoid their deletion

Table 2.4: ECM Results for the effects of fiscal decentralisation on economic growth (Dependent Variable $\Delta rgdp$)

		Model 2	Model 3	Model 4	Model 5
Constant	Constant	----	2.754**	2.253***	2.200***
Openness	$\Delta open\_1$	-0.109*	-0.115*	-0.119**	-0.124**
Inflation	Δinf_1	0.033***	0.027**	0.023*	0.025*
Real GDP	$rgdp\_1$	-0.12***	-0.38***	-0.35***	-0.34***
Investment	inv_1	0.069	0.081*	0.091*	0.104**
Openness	$open\_1$	0.257***	0.206**	0.241**	0.235***
Inflation	inf_1	-0.045***	-0.031***	-0.035**	-0.038**
Ratio of Provincial tax revenues to Total Govt. revenues	Δfd_{tax}_1	-0.056			
	fd_{tax}_1	0.088***			
Ratio of Provincial local rev to Total Govt. revenues	Δfd_{loc}_1		0.023		
	fd_{loc}_1		-0.029		
Federal Transfers to Provinces as ratio to Total Govt. revenues	Δfd_{trans}			0.074**	
	fd_{trans}_1			0.007	
Ratio of Total Provincial rev to Total Govt. revenues	Δfd_{tpr}				0.083*
	fd_{tpr}_1				0.015
Dummy	D_t	-0.018**	-0.010	-0.018**	-0.018**
Trend	t	0.006***	0.018***	0.015***	0.014***
Number of observations		34	34	34	34
Number of parameters		10	11	11	11
PcGive Unit root test[##]		3.63**	3.38	4.59**	4.72**
Long run Elasticity for Provincial tax revenue		0.752			
AR 1-2 test		3.2678 [0.0572]	1.3956 [0.2697]	1.4984 [0.2464]	1.5817 [0.2292]
ARCH 1-1 test:		0.0008 [0.9776]	0.4699 [0.5005]	0.0355 [0.8518]	0.8684 [0.3584]
Normality test:		0.57928 [0.7485]	0.7124 [0.7003]	0.4998 [0.7789]	0.1053 [0.9487]
hetero test:		0.99023 [0.5179]	0.1968 [0.9906]	1.5195 [0.2146]	1.6805 [0.1629]
RESET[23] test:		1.0539 [0.3655]	0.4194 [0.5240]	1.1967 [0.3220]	0.9589 [0.3995]

Significant at 1%=***, 5%=**, 10%=*,

Note1: [##] *PcGive* Unit root test represents the Kiviet and Phillips (1992) test for cointegration

Note2: All variables were expressed in logs

2.4.3 Results Interpretation

The results for the ECM model are presented at Table 2.4. Most importantly, results satisfied the test for the existence of long run cointegrating relationship between fiscal decentralisation and economic growth in Pakistan. The error correction term depicted by the lagged level dependent variable (*rgdp*_1) has coefficient ranging between 0.12 - 0.35[44] across alternative models. The *PcGive* unit root test[45] for the models once again substantiate the rejection of the null hypothesis of no cointegration (Table 2.4) and confirms what we observed in ADL model. As the error correction term indicates that with each period following a shock, the relationship will converge to its long run steady state at the given rate (i.e. 0.12 - 0.35) for alternative models as presented in Table 2.4. Hence, analysis provides evidence that the long run cointegrating relationship do exist among the variables discussed in the study.

To start with, Table 2.4 contains the result for the different aspects of fiscal decentralisation. As we have used two measures to gauge provincial autonomy i.e. provincial tax revenues and provincial local revenues, Model 2 presents the relationship between 'provincial tax revenues' and output growth. Δfd_{tax}_1 reports the dynamic short run effects for the stated variable on the economic growth and is statistically insignificant with negative sign. Despite being insignificant, it guides us that an increase in provincial revenue raising capacity may have short run distortionary effects for the economy. On the contrary, over the long run enhanced provincial taxation powers positively contribute to economic output. This is depicted by the lagged level 'provincial tax revenues' (fd_{tax}_1) which is statistically significant and has positive sign. Thus, results suggest that provincial autonomy makes the SNGs more productive and responsible which stimulate economic output in the long run. The adjustment in provincial taxes may lead to short run fluctuations in the economic output but over the long run it contributes positively. According to Model 2, the long run elasticity for provincial tax revenues is 0.75[46]. Although it seems quite high, nevertheless, due to slow adjustment (indicated by the lower error correction term for Model 2 i.e. -0.12) it was not unexpected. Furthermore, for this

[44] Because the LR relationship for Model 3 is statistically insignificant

[45] As the *PcGive* unit root test provides the significance test for the lagged dependent variable only (which in the ECM representation is not the error correction term) therefore, the critical values and p-values used for the significance for the *PcGive* unit root test in Table 2.4 were obtained using the response surfaces in Ericsson and MacKinnon (1999), as implemented in the program ECMtest.xls (version 1.0) and discussed in Ericsson and MacKinnon (2002), pp. 316

[46] Where $k = \gamma_{5i}/-\gamma_1$, in accordance with equation (4) specification, and ***i*** refers to proxy for fiscal decentralisation variable which is fd_{tax} in this case

analysis due to small sample we are not interested in magnitudes but instead signs are more important so as to detect the effects of alternative fiscal decentralisation reforms policies.

However, same effects could not be validated for the second proxy of provincial autonomy i.e. the provincial local revenues as presented in Model 3 within Table 2.4. The coefficients for the fd_{loc} turned insignificant both in the short run and the long run. However, it is surprising to note that lagged level coefficient (i.e. fd_{loc}_1) has a negative sign. This hints that any increase in the unplanned revenues of provincial governments lack any positive impact on the economic output. Despite the fact that fd_{loc} is statistically insignificant, still if we calculate the multiplier effect it is very small (0.076). This suggests that economic returns from provincial autonomy, in form of higher taxation powers only, has positive and significant long run effects on the GDP of Pakistan.

In this study, the separation of distinct aspects of fiscal decentralisation provides an opportunity to have an in-depth analysis of different sources of decentralisation. In this regard, the third important measure for fiscal decentralisation was the 'federal transfer to provinces' (Model 4). This measure characterises the partial fiscal decentralisation and it has posted reverse short run and long run implications in terms of significance as compared to provincial tax autonomy measure that is discussed earlier. Results indicate that federal transfers have positive effects in the short run only. According to the results, 10 percent increase in federal transfers will increase real GDP by 0.7 percent in the short run, nevertheless, this arrangement will not cause any long run contribution as fd_{trans}_1 remains statistically insignificant. This shows that any further increase in federal transfers, that actually constitute enormous portion of the provincial revenues, will have no effect towards the long run economic output.

Lastly, as total provincial revenues were dominantly financed through federal transfers, similar results were obtained for fd_{tpr}_1 as well i.e. having significant short run effects only (Model 5). Empirical results hence suggest that an increase in total provincial revenues without increasing the provincial autonomy will not contribute to the long run economic productivity. Thus, the current mechanism of increasing total provincial revenues in Pakistan through higher federal transfers seems ineffective in enhancing the economic efficiency of the provinces and continuation of such policy might lead to diseconomies. The emphasis is therefore needed to alter the respective share of own revenues and federal transfers in provincial budgets and to encourage provinces to generate more revenues from own resources. This can be achieved through diversification of the

resource distribution formula to include efficiency enhancing measures which can help to tape efficiency gains instead of just increasing the share of SNG at national level.

Finally, following the signs of the control variables across different models we are confident that the results are robust. The investment measure had insignificant short run effects and was therefore eliminated following the general-to-specific (*Gets*) approach. However, it produced statistically significant lagged level effects (*inv*_1) in three out of four models in Table 2.4. Similarly, openness measure had produced the statistically significant short run and long run coefficients. In the short run, it has negative effect on economic growth which may be driven by the heavy imports and trade deficits. But it is established in the literature that international trade enhances economic growth and the same is depicted by the statistically significant positive coefficient for openness i.e. *open*_1. On the other hand, inflation produced a significant positive short run coefficient but it posted negative lagged level effects which is consistent with economic theory. Thus, variables continued to carry the same signs and significance with comparable magnitudes as indicated in the general economic model in Table 2.3 and results were consistent across the given ECM models in Table 2.4. Lastly, the same control variables across different models (for alternative measures of fiscal decentralisation) allows for precise comparison among available estimates and help in better analysis. Most importantly the control variables and proxies for fiscal decentralisation have produced almost the same results with comparable magnitudes, signs and significance in Table 2.4. Hence, with such careful analysis, results are believed to be reliable and representative of the actual state of affairs.

2.4.4 Discussion

The highlight of this analysis is that, to our knowledge it is the first study that applied the cointegration technique to the topic and have separated the short run effects from the long run implications of fiscal decentralisation on economic growth. This study not only quantified the effects of different sources of provincial revenues but also bifurcate their short run and long run implications attached to the economic output. As different measures of fiscal decentralisation have been used, this exercise identified the avenues where added emphasis is required so as to enhance economic growth in the long run. Short run effects help in recognising instant effects of a policy change whereas the long run analysis bring to the light the actual economic contribution of the fiscal decentralisation stance in Pakistan. Thus, despite the fact that fiscal decentralisation is a long run

phenomenon, this study make us aware of the immediate consequences of a resource shift policy and for the first time we are able to weigh both the effects, simultaneously.

Empirical analysis made it clear that fiscal decentralisation can influence economic growth only through the channel of efficiency enhancement. Out of the given fiscal decentralisation measures, only provincial tax autonomy depicted long run positive implications which reflects that increase in provincial autonomy will improve economic productivity. Findings suggest that if SNGs are given higher revenue raising responsibilities, it will enhance economic growth through the channel of fiscal decentralisation. This mechanism increases their capability, make the SNGs innovative as well as responsible (Oates, 1993; Thornton, 2007; Martinez-Vazquez and McNab, 2003). Thus, provinces respond efficiently to local needs (Brennan and Buchanan, 1980) due to the yardstick competition (Besley and Case, 1995) which in turn increases productivity of economic agents and stimulates economic growth. Moreover, difference between the coefficients of fd_{tax} and fd_{loc} reflects that provincial tax revenues are relatively more efficiency enhancing and reliable source of SNG revenues and therefore it has positive impact on economic growth as compared to revenues generated from non-tax sources. Thus, with the given fiscal decentralisation system in Pakistan, provincial autonomy in domestic revenue generation has not yet achieved its growth consistent optimum level and there are opportunities available which can stimulate economic growth.

On the contrary, in the long run, any further increase in the already dominant factor of provincial revenues (i.e. federal transfers which contributed 76 percent on average) will be non-productive in terms of its contribution to economic output (though it may have social dimensions). The poor provincial capacities to generate own resources and dominant dependence on federal transfers seems to have undermined the long run net effects of fiscal decentralisation in Pakistan. On the other hand, if we follow Xie *et al.* (1999) explanation, results suggest that the partial fiscal decentralisation mechanism adopted in Pakistan has reached its maximum level to achieve higher levels of productivity and efficiency at provincial level[47]. Further increase in federal transfers with the given distribution mechanism (i.e. adopting single criterion of population) may harm the economic performance of the country.

As results differ for distinct fiscal decentralisation measures in their short run and long run implications, these correctly identify the weaknesses of fiscal decentralisation

[47] Although, there is no econometric evidence for that from the given analysis

mechanism. In Pakistan, provinces had negligible taxation powers which makes around 15 percent of total provincial resources on average over the period under analysis (while it was recorded as only 7 percent of total provincial revenues in 2009). Similarly, provincial local revenues which include both the tax as well as non-tax revenues has contributed around 23.5 percent to total provincial revenues on average over the period from 1974-2009 (although it was recorded as 20 percent in 2009). On the other hand, federal transfers has constituted on average 76 percent of the total provincial revenues (while its contribution was recorded as 80 percent in year 2009). What seems obvious from this information is that in Pakistan the focus of decentralisation was mainly through the partial fiscal decentralisation mechanism and it was evident from this analysis that any further increase will not generate any long run positive outcome for economy of Pakistan. We have detected that with the enhancement of provincial capacities to generate own revenues i.e. greater level of provincial autonomy will result in positive long run effects. However, provincial own source revenues contribute a modest portion to the total provincial revenues and the overall effect of fiscal decentralisation is thus far from optimal.

Another line of argument could be that as federal transfers were being decided only on the basis of a single criterion (i.e. population) thus it merely presented expenditure needs of SNGs. Resource distribution formula in Pakistan was deficient of any consideration for the efficiency aspects, which is the main stay of fiscal decentralisation theory. Similarly, federal transfer to provinces represents transfer payments to the provincial governments from the funds that are already collected by the federal authorities therefore; on its own it will not stimulate the economic efficiency of the provinces. Instead, federal transfers might have resulted in higher consumption spending by SNG's, not necessarily in accordance with local needs. Rodden (2002) stated that increase in transfers from national to SNG lead to much higher consumption expenditures as compared to similar increase originated from the local resources, which means that provincial autonomy makes the SNGs more responsible. Same pattern was observed by Ahmed *et al.* (2007), that with the increase in federal transfers, the non-developmental expenditures of the provinces had increased, which had no bearing on long run economic output through the channel of fiscal decentralisation.

Thus, excessive dependence on federal transfers coupled with single criterion formula has presumably failed to affect provincial capacity to grow optimally and bared efficient contribution to economic growth in the long run. One can say that under the given fiscal decentralisation system, provinces were not better positioned to take advantage of

these transfers. This reflects that during the period under analysis, decentralisation mechanism in Pakistan was lacking the required incentives that could make the SNGs more responsible, innovative and productive. Lastly, inconsistencies with respect to fiscal decentralisation and disturbed political setup in the country might also be responsible for the outcome. In brief, it was found that the fiscal decentralisation mechanism adopted in Pakistan still have avenues to explore so as to produce optimum results.

2.5 ROBUSTNESS CHECKS

This section provides important robustness checks for the analysis. It provides information on the direction of causality and examines the validity of using linear regression model for estimation. In addition, the provincial panel data is also analysed to investigate the validity of results that were obtained with the national data analysis.

2.5.1 Is it really the Fiscal Decentralisation which causes Economic Growth?

During the study, it has been explained that fiscal decentralisation in Pakistan was subject to policy decisions. During the period under analysis i.e. 1974-2009, a number of policy decisions were taken and noticeable changes occurred to the definition of the divisible pool. In addition, province's right on a number of endowments were accepted at different times and provinces started to receive amounts in the form of straight transfers[48]; that were the amounts not transferred before. With this background, therefore, fiscal decentralisation was treated as the exogenous determinant for the economic output in Pakistan, during this analysis. However, fiscal decentralisation mechanism had certain deadlocks as well, where the given fiscal resource distribution formula remained implemented for longer period of time (e.g. 1974-1990). In those situations, there are chances that economic progress of the country might have taken the driving seat and have started to determine the resource availability at the provincial levels. If that happened, it will violate the assumed relationship, where fiscal decentralisation determines the economic output. For this reason, it is worth to consider the direction of causality between fiscal decentralisation and economic growth. In econometrics, for this purpose the Granger causality test can be used to potentially establish the direction of causation.

The Granger causality test is valid for enquiring the direction of causality for one-step-ahead prediction, where the lagged values[49] are used to predict the contemporaneous values of the dependent variable. Nevertheless, it is important to note here that this test is

[48] like royalties for oil, gas and hydel power generation
[49] Lags of the variable in question and that of the explanatory variable(s)

valid for predicting one-step-ahead values only and it does not tell us anything about the long run relationship among the variables. Having mentioned that, now we will use the Bilateral Causality test to enquire whether it is the fiscal decentralisation which causes economic output (FD → GDP) or it is the other way around (i.e. GDP → FD); where the arrow indicates the direction of causality. As it has already been discussed (in section 2.3.2.d) that fiscal decentralisation and GDP variables are first difference stationary, therefore, the variables used for this test were expressed in first difference form, because, stationarity is crucial for Granger causality test (Gujarati, 2004).

In order to address the question of direction of causality with Granger causality test, the following two equations need to be estimated. In accordance with the question asked in this section, Eq.(2.6) shows that the current values of FD (Δfd) are related to the past values of itself[50] as well as that of real GDP growth[51] ($\Delta rgdp$); while Eq. (2.7) depicts the vice versa situation. Eq. (2.6) indicates that the direction of causality in the form of $\Delta rgdp \rightarrow \Delta fd_{tax}$. The significance of the distributed lagged coefficients in each equation will determine the importance of past values of the right hand side variable in predicting the left hand side variable, and thus will determine the direction of causality. The equations are given below:

$\Delta fd_t = \sum_{e=1}^{m} \alpha_e \Delta fd_{t-e} + \sum_{f=1}^{n} \beta_f \Delta rgdp_{t-f} + u_{1t}$	Eq. (2.6)
$\Delta rgdp_t = \sum_{h=1}^{m} \alpha_h \Delta rgdp_{t-h} + \sum_{i=1}^{n} \beta_i \Delta fd_{t-i} + u_{2t}$	Eq. (2.7)

As the selection of lagged values has important implications for the test results, therefore, the test is performed at different lags and results are presented below. Table 2.5 presents the results for Granger causality test[52] and indicates that there is no concrete evidence to establish that fiscal decentralisation measures were caused by the economic growth in Pakistan. For all the fiscal decentralisation measures, the calculated p-values were statistically insignificant at 5 percent level of significance and hence we cannot reject

[50] The autoregressive (AR) part
[51] The distributed lagged values (DL); where it is the DL part, the significance of which determines the results for the Granger causality test
[52] Which is also called 'Granger Non-Causality Test' at times, due to the nature of the null hypothesis

the null hypothesis[53]; which embeds that the lagged values of the variable used to explain (the dependent variable) does not play a role in determining the current values of the dependent variable. The Granger causality test thus at least solves the question and confirms that the direction of causality does not flow from economic growth towards fiscal decentralisation, and that fiscal decentralisation was the exogenously determined policy decision.

Table 2.5: Granger Causality Test Results

1) Provincial Tax revenues and Economic growth

Direction of causality	Number of lags	F-value	P-value	Decision[1]
$\Delta rgdp \rightarrow \Delta fd_{tax}$	2	2.60467	0.0917	Accept H_0
$\Delta rgdp \rightarrow \Delta fd_{tax}$	3	1.62205	0.2094	Accept H_0
$\Delta rgdp \rightarrow \Delta fd_{tax}$	4	2.00070	0.1296	Accept H_0
$\Delta fd_{tax} \rightarrow \Delta rgdp$	2	0.02506	0.9753	Accept H_0
$\Delta fd_{tax} \rightarrow \Delta rgdp$	3	0.09169	0.9639	Accept H_0
$\Delta fd_{tax} \rightarrow \Delta rgdp$	4	0.23685	0.9145	Accept H_0

2) Provincial Local revenues and Economic growth

Direction of causality	Number of lags	F-value	P-value	Decision[1]
$\Delta rgdp \rightarrow \Delta fd_{loc}$	2	0.71223	0.4992	Accept H_0
$\Delta rgdp \rightarrow \Delta fd_{loc}$	3	0.76889	0.5223	Accept H_0
$\Delta rgdp \rightarrow \Delta fd_{loc}$	4	1.13867	0.3643	Accept H_0
$\Delta fd_{loc} \rightarrow \Delta rgdp$	2	0.82334	0.4493	Accept H_0
$\Delta fd_{loc} \rightarrow \Delta rgdp$	3	0.48684	0.6945	Accept H_0
$\Delta fd_{loc} \rightarrow \Delta rgdp$	4	0.43407	0.7825	Accept H_0

Note 1: At 5 percent level of significance

2: Variables were expressed in first difference form to achieve stationarity

3: H_0: Variable under consideration does not 'Granger cause' the other variable; whereas arrow (→) indicates the direction of causality

[53] In both the cases i.e. (EG → FD) and (FD → EG)

Table 2.5: Granger Causality Test Results (cont...)

3) Federal Transfers to Provinces and Economic growth

Direction of causality	Number of lags	F-value	P-value	Decision[1]
$\Delta rgdp \rightarrow \Delta fd_{ftrans}$	2	0.63754	0.5361	Accept H_0
$\Delta rgdp \rightarrow \Delta fd_{ftrans}$	3	0.63970	0.5966	Accept H_0
$\Delta rgdp \rightarrow \Delta fd_{ftrans}$	4	0.62729	0.6481	Accept H_0
$\Delta fd_{ftrans} \rightarrow \Delta rgdp$	2	0.49999	0.6118	Accept H_0
$\Delta fd_{ftrans} \rightarrow \Delta rgdp$	3	0.35335	0.7871	Accept H_0
$\Delta fd_{ftrans} \rightarrow \Delta rgdp$	4	0.32142	0.8606	Accept H_0

4) Total Provincial revenues and Economic growth

Direction of causality	Number of lags	F-value	P-value	Decision[1]
$\Delta rgdp \rightarrow \Delta fd_{tpr}$	2	0.91825	0.4109	Accept H_0
$\Delta rgdp \rightarrow \Delta fd_{tpr}$	3	0.80928	0.5007	Accept H_0
$\Delta rgdp \rightarrow \Delta fd_{tpr}$	4	0.97011	0.4437	Accept H_0
$\Delta fd_{tpr} \rightarrow \Delta rgdp$	2	0.97825	0.3885	Accept H_0
$\Delta fd_{tpr} \rightarrow \Delta rgdp$	3	0.66504	0.5814	Accept H_0
$\Delta fd_{tpr} \rightarrow \Delta rgdp$	4	0.52000	0.7219	Accept H_0

Note 1: At 5 percent level of significance

2: Variables were expressed in first difference form to achieve stationarity

3: H_0: Variable under consideration does not 'Granger cause' the other variable; whereas arrow (→) indicates the direction of causality

2.5.2 Is the Relationship between Fiscal Decentralisation and Economic Growth Non-Linear?

One of the important questions that arise is to enquire whether or not the relationship between fiscal decentralisation and economic growth is linear. If the relationship proves to be non-linear then it will have serious impact over the results interpretation and the effect of fiscal decentralisation on economic growth will need to be assessed differently. Hence, to enquire the non-linearity in relation, a squared level series of fiscal decentralisation proxies was entered into the given specification of Eq. (2.5) so that the possibility of long run non-linear relationship between fiscal decentralisation and economic growth can be explored. The resulting specification can be presented in Eq. (2.8), where the statistical significance of γ_6 will determine the acceptance or rejection of the hypothesis about the non-linearity in relationship between fiscal decentralisation and economic growth.

$$\Delta rgdp_t = \nu + \delta t + \theta D_t + \sum_{e=1}^{m} \beta_e \Delta rgdp_{t-e} + \sum_{f=1}^{n} \beta_f \Delta inv_{t-f} + \sum_{h=1}^{p} \beta_h \Delta open_{t-h} + \sum_{i=0}^{q} \beta_i \Delta inf_{t-i} + \sum_{j=0}^{r} \beta_j \Delta fd_{t-j} + \gamma_1 rgdp_{t-1} + \gamma_2 inv_{t-1} + \gamma_3 open_{t-1} + \gamma_4 inf_{t-1} + \gamma_5 fd_{t-1} + \gamma_6 fd_{t-1}^2 + \varepsilon_t \quad \text{.....(2.8)}$$

In order to estimate the given model with *PcGets*, the series in levels for control economic variables (i.e. investment, openness and inflation) and the observed as well as squared series of fiscal decentralisation proxies were kept *fixed* while the estimated results are given in Table 2.6. Results indicate that during the estimation none of the squared proxy of fiscal decentralisation could achieve statistical significance. Therefore, the hypothesis of non-linear relationship is rejected and in accordance with the available evidence from the given data set, the relationship between fiscal decentralisation and economic growth is linear.

Table 2.6: Testing for Non-Linearity in effects of Fiscal Decentralisation (Dependent Variable -- $\Delta rgdp$)

		Model 2	Model 3	Model 4	Model 5
Constant	Constant	----	2.727**	2.757***	3.503**
Openness	$\Delta open\_1$	-0.090*	-0.115*	-0.128**	-0.134**
Inflation	Δinf_1	0.034***	0.028**	0.024*	0.024*
Real GDP	$rgdp\_1$	-0.12***	-0.37***	-0.36***	-0.38***
Investment	inv_1	0.699	0.084*	0.080	0.091*
Openness	$open\_1$	0.258***	0.209**	0.258**	0.248***
Inflation	inf_1	-0.046***	-0.033**	-0.036**	-0.039**
Ratio of Provincial tax revenues to Total Govt. revenues	Δfd_{tax}_1	-0.055			
	fd_{tax}_1	0.073			
	$fd^2_{tax}\_1$	0.005			
Ratio of Provincial local rev to Total Govt. revenues	Δfd_{loc}_1		0.021		
	fd_{loc}_1		-0.095		
	$fd^2_{loc}\_1$		0.019		
Federal Transfers to Provinces as ratio to Total Govt. revenues	Δfd_{trans}			0.085**	
	fd_{trans}_1			-0.258	
	$fd^2_{trans}\_1$			0.044	
Ratio of Total Provincial rev to Total Govt. revenues	Δfd_{tpr}				0.110**
	fd_{tpr}_1				-0.631
	$fd^2_{tpr}\_1$				0.099
Dummy	D_t	-0.018**	-0.011	-0.019**	-0.020***
Trend	t	0.006***	0.016***	0.015***	0.016***
Number of observations		34	34	34	34
Number of parameters		11	12	12	12
AR 1-2 test		3.3188 [0.0559]	1.6689 [0.2136]	1.2085 [0.3196]	1.4151 [0.2662]
ARCH 1-1 test:		0.0008 [0.9776]	0.3560 [0.5549]	0.04381 [0.8355]	0.6457 [0.4276]
Normality test:		0.5289 [0.7676]	0.5719 [0.7513]	0.6536 [0.7212]	0.2315 [0.8907]
hetero test:		0.9902 [0.5179]	0.8482 [0.6403]	1.2042 [0.3727]	1.4243 [0.2594]
RESET[23] test:		0.8856 [0.6080]	0.8384 [0.4470]	0.7300 [0.4943]	0.7453 [0.4873]

Significant at 1%=***, 5%=**, 10%=*,
Note: All variables were expressed in logs

2.5.3 Data and Methodology for the Analysis at the Provincial Level

This section discusses the effects of fiscal decentralisation on provincial economic growth and is based on the provincial data. According to the nature of the data, two estimations techniques were adopted to analyse the provincial panel data for three provinces.

2.5.3.a Economic model and determinants of provincial GDP

Based on the economic rationale advanced in the earlier sections, analysis of the effects of fiscal decentralisation on economic output can be extended to the provincial level. Quantification of the effects of fiscal decentralisation on the provincial GDP will provide a robustness check to the results found at the national level estimation. In addition, the provincial analysis will also highlight the fundamental differences among the provinces (if any). With the provincial level analysis, it will also be possible to figure out that whether or not the effects of fiscal decentralisation were uniform for all the provinces in Pakistan or these differed among the provinces. Hence, the provincial panel data was used to investigate the effects of fiscal decentralisation on provincial GDP at the SNG level.

Despite the potential benefits for the provincial level study, the data availability issues cannot be ignored. As we know, there are number of economic indicators which are mainly available explicitly at the national level like openness, inflation and national investment[54]. In addition, availability of disaggregated data at SNG level is particularly problematic in the developing countries, including Pakistan. For this reason, the economic model is kept simple and explicit. To evaluate the effects of fiscal decentralisation on the economic performance at the SNG level in Pakistan, the provincial GDP (***pgdp***) is used as the dependent variable. On the other hand, the set of independent variables included[55], the proxies for fiscal decentralisation (i.e. federal transfers to SNGs and SNG's domestic tax revenues-both expressed as ratio to respective total provincial revenues), human capital indicators (proxied with education and health indicators) and investment by the provincial and national governments. Hence, the general economic model for the relationship under consideration can be presented as Eq.(2.9).

$$pgdp_{it} = \alpha + \beta_1 fd_{jit} + \beta_2 lpri_{it} + \beta_3 lhbed_{it} + \beta_4 ldev_{it} + \beta_5 inv_{it} + \varepsilon_t$$

.....Eq.(2.9)

[54] Which, due to the huge spillover effects, cannot exactly be separated on the basis of geographical location
[55] Provincial population was left out of the model due to stationarity issues

Where ***i*** refers to province, ***t*** refers to time while in the case fiscal decentralisation ***j*** refers to the two measures of fiscal decentralisation. The above equation provides basic model that would be used to assess the effects of fiscal decentralisation on the provincial GDP (***pgdp***). It is important to note here that the human capital measures (***pri*** and ***hbed***) along with the provincial development expenditures (***dev***) are expected to be influenced by the prevailing level of fiscal decentralisation. Therefore, to avoid endogeneity issues, these variables were lagged by one period in the model, represented by (***lpri***, ***lhbed*** and ***ldev***). The assumption here is that although the current level of fiscal decentralisation can have an effect upon the contemporaneous values of the given explanatory variables, it cannot affect the previous year's predetermined values. In this manner the problem of endogeneity is tackled and hence the letter "***l***" at the start of given measures indicates their lagged values. The discussion below elaborates basic rationale for the inclusion of the important explanatory variables.

Fd: Fiscal decentralisation is our main variable of interest. It is obvious from the literature that informed policy making results in better resource allocation and hence positively affects economic performance. Two measures are used to proxy fiscal decentralisation i.e. share of SNG tax revenue (***ptax***) and the federal transfers to the SNGs (***ftrans***). Both the fiscal decentralisation measures are expressed as ratio to total provincial revenues (of the respective province). These measures will help to distinctly identify the effects of different sources of subnational government's finance on their economic performance. Different sources of subnational government's revenues are assumed to have distinct incentives for the local governments and the research question is that whether it is the resources or the autonomy that enhances local government productivity.

Pri: in order to explain the economic output, human capital is considered to have very important role. If the population in a society is educated, it is assumed to be better equipped to engage in the 'learning by doing' practices and people are relatively more efficient and productive. Therefore, we use two measures to proxy the human capital at the provincial level, and primary school enrolment (***pri***) is one of these. As the data on literacy rate is not available (even at the national level) in Pakistan therefore, primary school enrolment is used to capture the given effect in each province. This variable is thus an important determinant of economic productivity in the provinces and captures an important aspect of human capital.

Hbed: another important contributor to better human capital is considered to be the health sector. Healthy minds and bodies are capable to work in better way and can explain the difference in the economic performance. Here we use the health facilities measure to capture the effects of health sector in the larger preview of human capital. The available health facilities at each province will be captured by using the measure of hospital bed availability per 1000 population (***hbed***), at each province. Hence, in the broader concept of human capital, this indicator of health facilities will help in explaining the economic performance of the provinces.

Dev: Among the other very important determinants of economic output includes the investment level. Once again two measures were used to capture the effects of investment on economic output in each province and SNG's development expenditure (***dev***) is used as one of the indicator of investment. The provincial development expenditure (as ratio to total provincial expenditures-of the respective province) is used to capture the effects of investment, financed by provincial government, on the provincial GDP. Each provincial government allocates certain amounts for the development expenditures within the province and this measure will thus help in identifying the effects of indigenous public investment on the SNG's economic output.

Inv: lastly, it is equally important to take into account the trends at the macro level and therefore, total investment carried out at the national level is also analysed for its effects on provincial GDP. The fact is that federal government undertakes mega investment projects like building dams, motorways, ports, and similar kind of other projects, which carry huge spillover effects and hence, potentially affects the economic performance of the provinces. Thus total investment at the national level (as ratio to national GDP-***inv***) is used to capture the said effects.

Having discussed the economic model, Table 2.7 provides basic definition for each of the variable while the next sub-section provides the data sources.

Table 2.7: Variable names and definitions

Variable		Name	Definition
Economic prosperity		*pgdp*	Provincial GDP (at constant prices)
Fiscal decentralisation	Provincial own source revenues	*ptax*	Provincial tax revenue as ratio to total provincial revenues (for each province)
	Federal transfers to SNGs	*ftrans*	Federal transfers to provinces as ratio to total provincial revenues (for each province)
Human Capital	Enrolment at Primary level	*pri*	Number of students enrolled at the primary schools (in 000s)
	Hospital Beds relative to population	*hbed*	Number of Hospital Beds per 1000 population
Investment level	Development expenditures by the Provincial Govt.	*dev*	Provincial development expenditures relative to total provincial expenditures (for each province)
	Investment at national level	*inv*	Total investment at the national level
Provinces		*i*	Prov: 1 = Punjab Prov:2 = Sindh Prov: 3 = Khyber Pakhtunkhwa (KPK) *

Note 1: All variables were expressed and used in logs for estimation (as indicated by lower case letters)

Note 2: * formally known as North West Frontier Province-NWFP

2.5.3.b Data and Methodology

This section summarises the data availability situation and the methodology adopted for the analysis at the provincial level.

2.5.3.c Data availability

For the provincial analysis, data set represents three out of four provinces of Pakistan. The three provinces include Punjab, Sindh and KPK, while Balochistan is left out of the analysis due to its troubled political history and unique demographic condition[56]. Data was collected from a number of sources including Provincial Development Statistics (various issues for Punjab, Sindh and KPK), State Bank of Pakistan (2005, 2010), World Bank Economic Reports (for Punjab and KPK), Pakistan Economic Survey (G.o.P., 2007), Provincial budget statements and Bengali and Mahpara (2006). Data covered the period consists of 22 annual observations, from 1980-2001. In fact, following the promulgation of

[56] This province represents only 5.1 percent of the total population while it constitutes 44 percent of whole area of Pakistan, hence it faces severe cost disabilities as compared to the other provinces

'Local government ordinance, 2001', the local government system for the third tier of government was implemented in Pakistan since 2002. The devolution plan allocated various spending responsibilities to the district levels (114 in total) and due to the ambiguity regarding data collection responsibilities, the data for provincial level spending is not systematically available thereafter. Hence, for the data we have, the time dimensions 'T' (22 years) is much longer than the cross-sectional dimension 'N' (3 provinces) of the panel. Therefore, different econometric techniques were used to get reliable results.

2.5.3.d Estimation technique at the provincial level

Analysing provincial data for empirical estimation in this study provides a unique opportunity for learning and deducing information in a challenging situation. Time series dimension of the data is very long as compared to the cross-sectional element; that was only three provinces. With the small 'N' and long 'T' dimensions of the available data, it is not suitable to use the most popular techniques such as the IV estimator by Anderson and Hsiao(1982), the first difference GMM by Arellano and bond (1991) and the System GMM by Blundell and Bond (1998). These estimators hold its properties best for data sets which have large cross-sectional dimension 'N' then time series dimension i.e. 'T' (Baum, 2006, Bruno, 2005).

The long panel data set with large 'T' and small 'N' has different issues to focus on. Large 'T' inherently carries the time series characteristics and therefore requires efforts to avoid spurious regression. As a result, such panels need to be assessed for the cointegrating relationship among the variables, using the dynamic panel data analysis techniques. Recently a number of new techniques emerged for the analysis of long panels e.g. the residual based cointegration models and the error correction mechanism (ECM) based models. The residual-based cointegration tests are however much criticised for the assumption of common factor restriction. As pointed out in Banerjee, Dolado and Mestre (1998) and Kremers, Ericsson and Dolado (1992), in the residual-based tests the long-run parameters for variables (in levels) are required to be equal to the short-run parameters (i.e. variables in differences). Once this assumption is not fulfilled, it can cause significant loss of power for residual-based cointegration tests. On the contrary, the ECM based cointegration tests are developed by using the structural, rather than residual, dynamics. Starting from the mid 1990's, different tests were developed for panel cointegration estimation including Pesaran, Shin and Smith (1999) and Westerlund (1997). One of the

distinctive advantage of ECM based tests is that these can be applied to data irrespective of the fact that the variables are I(1) or I(0).

Pesaran, Shin and Smith (1999) proposed Pooled Mean Group (PMG) estimator, where both the pooling of the data as well as averaging of the coefficients, is offered. This estimator allows for intercept, short-run dynamic effects and error variances to differ among the groups, however, the long run coefficients are constrained to be the same across the groups and uses the whole pooled data for estimation of the long run coefficients. The significance of the error correction terms is taken as evidence of the cointegration for the given panel unit. On the other hand, Westerlund (2007) devised four new tests for panel cointegration, which were inspired from the Banerjee, Dolado and Mestre (1998). These new tests were also based on ECM mechanism and the tests are so general that these can accommodate unit-specific short-run dynamics, serially correlated errors, unit-specific "trend, intercept as well as slope parameters" and are reportedly able to tackle cross-sectional dependence (Westerlund, 2007). Under this technique, once the individual unit-specific regressions are estimated, the resulting information is then used to calculate the given four tests. Two group-specific tests are designed to test the alternative hypothesis that at least one individual unit is cointegrated (Gt, Ga), while the other two panel-specific tests deal with the alternative hypothesis that panel as a whole is cointegrated (Pt, Pa).

Given the nature of data, both the estimation techniques, namely the Pooled Mean Group (PMG) estimator and the Westerlund (2007) tests were used to investigate panel cointegration.

2.5.3.e Empirical Results

Estimation results for Eq.(2.9), representing the model for provincial GDP, are given below. Table 2.8 and Table 2.10 represent the results for two proxies of fiscal decentralisation and estimates are based on the Pooled Mean Group (PMG) estimator, which uses ECM specification for Eq.(2.9). Similarly, the empirical results for Westerlund's Estimation technique are presented at Table 2.9 and Table 2.11, to present the effects of federal transfers and provincial own source revenues, respectively. Estimations were performed in Stata 12.1.

This exercise has produced valuable insights and broadly confirms the earlier results obtained with the national data. The regression estimates has produced relatively better results for the federal transfers (***ftrans***) as a measure of fiscal decentralisation and

the explanatory variables has mostly produced the expected signs. Overall, the PMG has produced better results and this can be attributed to the efficient use of the available information in the panel. The PMG technique uses the whole panel data to calculate the long run coefficients as against the Westerlund's technique, which treats each unit separately. Hence, to start with, we will first discuss the results for model containing the federal transfers that is estimated with PMG estimator, followed the Westerlund's estimation results (Table 2.8 and Table 2.9).

Before going into detailed discussion, it is important to evaluate the performance of estimation techniques and to confirm whether the assumed long run cointegrating relationship did appear to be intact. Most importantly, we found evidence for long run cointegrating relationship between provincial GDP and fiscal decentralisation measures. Both the estimation techniques reject the null hypothesis of no cointegration; when fiscal decentralisation was proxied with federal transfers to provinces (***ftrans***) as presented at Table 2.8 and Table 2.9. The PMG estimation provides evidence regarding the long run relationship for the given economic model, where most of the long run coefficients along with the error correction terms for each province (_ec), are statistically significant. Similarly, Westerlund's estimator rejects the null hypothesis (no-cointegration) at 5 percent level of significance for the group and unit specific tests i.e. 'Ga' and 'Pa'. Hence, evidence exists for cointegrating relationship between provincial GDP and federal transfers to provinces and the results are not spurious.

However, outcome is not very encouraging for the second measure of fiscal decentralisation i.e. ***ptax***. Despite the fact that the PMG estimation indicates evidence for long run cointegrating relationship for all the provinces (based on the statistical significance of the error correction terms (_ec[57])), only 2 out of 5 long run coefficient could achieve significance (Table 2.10). In addition, the Westerlund's estimator also accepts the null hypothesis (no-cointegration) even at 10 percent level of significance for the entire four tests (Table 2.11). So in econometric terms, with the given dataset, results are not very strong for provincial tax revenues as a determinant of provincial GDP. Nevertheless, the signs for the two measures of fiscal decentralisation are consistent with what was found at the national level.

[57] Where the error correction terms are also less than 1, indicating the stability of the economic model

Results for federal transfer to provinces as the determinant of provincial GDP

Pooled Mean Group (PMG) estimation

Having discussed the outcome for the cointegrating relationship, now we move on to the explanation for the results involving ***ftrans***. Analysing the long run coefficients at Table 2.7, results are very encouraging. Explanatory variables have produced expected signs and are mostly statistically significant. The long run coefficients are more important and are therefore discussed here one by one.

The fiscal decentralisation measure i.e. federal transfer to provinces (***ftrans_1***) is highly statistically significant and has produced negative sign, which is consistent with the earlier estimation results at the national level. It reconfirms that without any consideration for efficiency[58], higher federal transfers will cause negative effects for the economic output in the long run. This though is discouraging, but explains the efficiency loss associated with the use of single criterion resource distribution formula (based on population) in Pakistan.

The other important long run coefficients at Table 2.10 include the proxies of human capital. The coefficient for primary school enrolment (***lpri_1***) is statistically significant at 1 percent level of significance and has produced positive sign, as expected. Thus, higher the educated people in the society, higher would be the productivity, resulting in the positive effects for provincial economic output (***pgdp***). Similarly, the second proxy for human capital is the health sector indicator i.e. hospital beds availability to population (***lhbed***). Any deterioration in the provision of health services is assumed to have negative implications for the productivity and similar results were exhibited for the statistically significant coefficient of ***lhbed_1***. The negative sign indicates that as the number of people per hospital bed increases, people will be left worse-off in health facilities, which ultimately will result in lower economic output in the provinces.

Lastly, investment level was also proxied with 2 measures that are provincial development expenditures and the national total investment. Out of the two, the national level investment (***inv_1***) could not explain the provincial GDP and it was insignificant both as the long run coefficient as well as in the provincial short run dynamics. However, the provincial development expenditures (***ldev_1***) appeared with wrong sign for the long run

[58] It is important to remember that only population was used to apportion the federal transfer among the SNGs

coefficient, despite being statistically significant. It is important to note though that within the individual dynamic short run effects, the provincial development expenditures (D1. ***ldev***) appear with the positive sign.

As the most important long run coefficients are discussed, we will not go into details for the short run dynamics for each province, however, the most important finding at the individual province level is that provinces behave differently to the economic shocks. Analysing the error correction terms (_ec) it is obvious that following a shock, Sindh appears to be adjusting at a faster rate (0.57 percent each year) followed by KPK and Punjab. However, it is a fact that we need more observations and data on different variables[59] to further comment on the speed of adjustment for each province.

Westerlund's estimation technique

Now we would discuss the empirical results obtained with the Westerlund's cointegration test and as discussed above, we have the statistical evidence for the long run cointegrating relationship between federal transfers to provinces and provincial GDP (Table 2.9). In the Westerlund's estimation technique, the error correction term is indicated by the lagged level dependent variable which is ***pgdp_1*** in this case. Once again the focus of discussion will be the significance of error correction terms and the long run coefficients for each province, so as to remain focussed on the more important issue.

To start with, the error correction term (***pgdp_1***) is highly significant at 5 percent level of significance and the respective coefficient for each province is well below the numerical value of '1', which indicates the stability of the model. Once again the speed of adjustment, following a shock, is highest for province Sindh (0.74) followed by KPK and Punjab. The long run coefficient for federal transfers as measure of fiscal decentralisation (***ftrans_1***) has once again produced negative sign though it was insignificant for Punjab. Hence, once again we have evidence that federal transfers produced negative effects for the economic performance and apparently, this was because of the absence of proper efficiency enhancing measures in the resource distribution formula.

Among the other important long run coefficients, ***pri_1*** is positive and significant for all the three provinces and indicates that increase in education positively affects provincial GDP in the long run. The second measure of human capital i.e. ***hbed_1*** has produced the expected negative sign for Punjab and Sindh. Lastly, investment level could

[59] Like governance, law and order, and data on agriculture, industry and natural resource endowments

not produce the expected signs, whenever it achieved significance, which is disappointing result. However, as the Westerlund's technique treats the each member of the panel separately to estimate individual long run effects, therefore, the observations[60] might have not been enough to exhibit the long run effects for investment.

Results for Provincial tax revenues as the measure of fiscal decentralisation

This section discusses the effects of provincial tax revenues on provincial GDP. Table 2.10 presents the PMG estimation while the result for Westerlund's cointegration technique is presented at Tables 2.10. As already mentioned above, the estimation results for model involving provincial tax revenues as a measure of fiscal decentralisation are not up to the mark and we need to be careful in the interpretation of results.

Pooled Mean Group (PMG) estimation

To begin with, the empirical results obtained with Pooled Mean Group (PMG) estimation are discussed first (Table 2.10). The positive aspect of the empirical results is that the long run coefficient for provincial tax revenues (***ptax_1***) has produced positive and significant coefficient for provincial GDP. Thus it confirms the finding obtained with national dataset. Results suggest that any increase in provincial autonomy, via higher own tax revenues will have positive implications for the provincial GDP in the long run.

The second important determinant of the provincial GDP which has produced positive and significant long run coefficient is the primary school enrolment (***pri***); proxing the positive effects of human capital on provincial GDP. Despite these encouraging results, it is important to mention that the rest of the explanatory variables are insignificant. The long run coefficients for ***lhbed***, ***ldev*** and ***inv*** have failed to achieve statistical significance at the given economic model involving ***ptax***. On the other hand, the error correction terms (_ec), for each individual province, are statistically significant and exhibits the stability of the model. Under the given circumstances, we leave this question to future research when more data is available.

Westerlund's estimation technique

Lastly, the empirical results obtained with the Westerlund's cointegration test are presented at Table 2.11. The Westerlund's estimation technique has indicates the acceptance of null hypothesis for no-cointegrating relationship for the model relating

[60] Which are only 20 annual observations left for the calculation of the ECM representation

provincial tax revenues and provincial GDP (Table 2.11). In addition, the error correction term (indicated by the lagged level dependent variable) ***pgdp_1*** is statistically insignificant for Punjab. On the other hand, though the error correction term (***pgdp_1***) is statistically significant for Sindh and KPK provinces, still none of the long run or short run coefficients could achieve significance. Thus the Westerlund's estimation technique could not produce any meaningful results for the model relating provincial tax revenues and provincial GDP.

2.5.3.f Summary

To conclude, the provincial analysis provided us with the opportunity to check the robustness of the results that were obtained at the national data analysis. It is encouraging to note that to the extent of fiscal decentralisation measures, the result confirmed that the two fiscal decentralisation policies contain different implications for the economic performance. In addition, as the coefficients of error correction terms for the provinces in question were different, which indicated that provinces have fundamental differences and do not adjust a equal speed to any economic shock. Hence, while devising economic policies, the basic economic capabilities of the SNGs should be particularly considered to avoid inefficiencies.

2.6 CONCLUSION

Lower own tax revenue was termed by Brueckner (2009) as an obstacle in achieving the true local autonomy and would restrict its benefits in Tiebout style. In this study we captured different aspects of fiscal decentralisation i.e. SNG's autonomy and factor presenting partial fiscal decentralisation. By using different measures for fiscal decentralisation we responded to the Thornton (2007) criticism for not differentiating between revenues accruing from provincial own sources and other sources. With the revenue approach we tried to avoid the criticism attached with earlier studies using expenditure approach for not discriminating between the expenditures made by SNGs indigenously and those mandated by national governments. In addition the revenue approach helps us to identify the weak aspects of fiscal decentralisation mechanism in Pakistan.

This study provides important results for Pakistan and identified the areas for focus. Results were supportive of the fact that SNGs have limited autonomy and if they were allowed and incentivised for more revenue generation, those arrangements will help in achieving higher economic output for Pakistan. For the other important aspect of fiscal

decentralisation i.e. federal transfers, we observed from both the national and provincial analysis that any further increase without taking appropriate measures will have negative effect on the economic growth of Pakistan. Similarly, the total provincial revenues share of SNGs appears to have no long run effects under given resource distribution mechanism. Thus, there is a need to balance the provincial autonomy factor to have future economic gains. We also identified potential areas of efficiency losses in the process. Most importantly, federal transfers were apportioned following a single-criterion formula, so there is potential available to tape by diversifying the resource distribution formula. To conclude, if appropriate efficiency enhancing measures are taken, fiscal decentralisation in Pakistan still has the potential to contribute to the economic productivity in the long run.

Results for Federal transfer to Provinces as Determinant of Provincial GDP

Table 2.8: Results for Pooled Mean Group Regression (Dependent variable-Provincial GDP i.e. *Dpgdp*)

Panel Variable (i): prov			Number of obs	=		60
Time Variable (t): year			Number of groups	=		3
			Obs per group: min	=		20
			avg	=		20.0
			max	=		20
			Log Likelihood	=		157.3674
	Coefficient	Standard Error	z	P > z	[95% Conf.	Interval]
LR-coefficients						
ftrans_1	-0.157	0.034	-4.56	0.000	-0.225	-0.090
lpri_1	0.395	0.049	8.11	0.000	0.299	0.490
lhbed_1	-0.751	0.302	-2.49	0.013	-1.344	-0.159
ldev_1	-0.122	0.029	-4.23	0.000	-0.179	-0.066
inv	0.146	0.218	0.67	0.504	-0.281	0.572
SR-coefficients						
PUNJAB						
__ec	-0.158	0.071	-2.22	0.027	-0.298	-0.018
D1. ftrans	-0.003	0.025	-0.10	0.919	-0.051	0.046
D1. lpri	-0.179	0.101	-1.77	0.076	-0.377	0.019
D1. lhbed	0.011	0.157	0.07	0.946	-0.298	0.319
D1. ldev	0.042	0.023	1.81	0.070	-0.003	0.087
D1. inv	-0.016	0.089	-0.18	0.853	-0.191	0.158
_cons	1.815	1.061	1.71	0.087	-0.264	3.895
SINDH						
__ec	-0.575	0.136	-4.21	0.000	-0.842	-0.307
D1. ftrans	0.053	0.026	2.05	0.040	0.002	0.104
D1. lpri	-0.130	0.080	-1.61	0.107	-0.287	0.028
D1. lhbed	0.074	0.183	0.40	0.686	-0.285	0.433
D1. ldev	0.036	0.022	1.64	0.100	-0.007	0.080
D1. inv	-0.093	0.090	-1.04	0.300	-0.269	0.083
_cons	6.605	2.447	2.70	0.007	1.809	11.401
KPK						
__ec	-0.298	0.126	-2.36	0.018	-0.546	-0.050
D1. ftrans	-0.054	0.045	-1.19	0.234	-0.142	0.035
D1. lpri	-0.058	0.079	-0.74	0.461	-0.213	0.096
D1. lhbed	-0.222	0.246	-0.90	0.367	-0.704	0.260
D1. ldev	0.043	0.030	1.42	0.157	-0.016	0.101
D1. inv	0.017	0.120	0.14	0.890	-0.218	0.251
_cons	3.351	1.568	2.14	0.033	0.277	6.425

Note: All variables were expressed in logs

Table 2.9: Results for Westerlund ECM panel cointegration tests (Dependent variable-Provincial GDP i.e. *Dpgdp*)

PUNJAB	Coefficient	Standard Error	z	P > z
ftrans_1	-0.027	0.033	-0.84	0.403
Lpri_1	0.349	0.165	2.11	0.035
Lhbed_1	-0.560	0.299	-1.87	0.061
Ldev_1	0.048	0.053	0.90	0.370
inv_1	-0.380	0.189	-2.01	0.044
_cons	6.950	4.386	1.58	0.113
pgdp _1	-0.541	0.215	-2.52	0.012
D1. ftrans	-0.044	0.027	-1.64	0.101
D1. lpri	0.143	0.138	1.04	0.299
D1. lhbed	-0.019	0.243	-0.08	0.938
D1. ldev	0.055	0.036	1.51	0.132
D1. inv	-0.082	0.142	-0.58	0.565
SINDH				
ftrans_1	-0.133	0.065	-2.06	0.040
Lpri_1	0.308	0.130	2.36	0.018
Lhbed_1	-0.782	0.586	-1.34	0.182
Ldev_1	-0.100	0.049	-2.05	0.040
inv_1	0.118	0.231	0.51	0.610
_cons	10.082	5.705	1.77	0.077
pgdp _1	-0.744	0.252	-2.95	0.003
D1. ftrans	-0.082	0.070	-1.17	0.243
D1. lpri	0.130	0.111	1.17	0.242
D1. lhbed	-0.478	0.288	-1.66	0.097
D1. ldev	-0.040	0.026	-1.54	0.125
D1. inv	0.053	0.188	0.28	0.779
KPK				
ftrans_1	-0.140	0.050	-2.78	0.005
Lpri_1	0.273	0.108	2.53	0.012
Lhbed_1	0.752	0.433	1.74	0.082
Ldev_1	-0.065	0.051	-1.28	0.200
inv_1	-0.005	0.189	-0.03	0.979
_cons	-1.492	3.092	-0.48	0.629
pgdp _1	-0.637	0.275	-2.31	0.021
D1. ftrans	-0.117	0.063	-1.85	0.065
D1. lpri	0.173	0.105	1.64	0.100
D1. lhbed	-0.040	0.378	-0.11	0.915
D1. ldev	0.010	0.045	0.22	0.822
D1. inv	-0.005	0.169	-0.03	0.977

Note: All variables were expressed in logs

Table 2.9: Results for Westerlund ECM panel cointegration tests (cont...)

(Dependent variable-Provincial GDP i.e. *Dpgdp*)

Results for H0: no cointegration
With 3 series and 5 covariates

Statistic	Value	Z-value	P-value	Robust P-value
Gt	-2.594	0.094	0.538	0.210
Ga	-12.370	0.547	0.708	0.010
Pt	-4.379	-0.249	0.402	0.210
Pa	-11.317	-0.000	0.500	0.030

Results for Provincial Own Source Revenues as Determinant of Provincial GDP Facilities

Table 2.10: Results for Pooled Mean Group Regression (Dependent variable-Provincial GDP i.e. *Dpgdp*)

Panel Variable (i): prov			Number of obs	=		60
Time Variable (t): year			Number of groups	=		3
			Obs per group: min	=		20
			avg	=		20.0
			max	=		20
			Log Likelihood	=		154.8181
	Coefficient	Standard Error	z	P > z	[95% Conf.	Interval]
LR-coefficients						
ptax_1	0.130	0.040	3.25	0.001	-0.208	0.051
lpri_1	0.206	0.049	4.20	0.000	0.110	0.303
lhbed_1	-0.373	0.308	-1.21	0.225	-0.977	0.230
ldev_1	-0.029	0.026	-1.13	0.258	-0.080	0.021
inv_1	-0.279	0.194	-1.44	0.149	-0.659	0.100
SR-coefficients						
PUNJAB						
__ec	-0.113	0.051	-2.19	0.028	-0.214	-0.012
D1. ptax	0.022	0.026	0.86	0.391	-0.028	0.072
D1. lpri	-0.156	0.100	-1.57	0.118	-0.352	0.039
D1. lhbed	-0.033	0.146	-0.23	0.821	-0.319	0.253
D1. ldev	0.023	0.024	0.94	0.345	-0.025	0.070
D1. inv	-0.012	0.089	-0.13	0.893	-0.186	0.162
_cons	1.227	0.735	1.67	0.095	-0.213	2.668
SINDH						
__ec	-0.392	0.095	-4.13	0.000	-0.578	-0.206
D1. ptax	0.027	0.016	1.70	0.089	-0.004	0.058
D1. lpri	0.053	0.075	0.71	0.481	-0.094	0.199
D1. lhbed	-0.182	0.143	-1.27	0.203	-0.462	0.098
D1. ldev	0.014	0.018	0.78	0.437	-0.021	0.049
D1. inv	-0.071	0.089	-0.80	0.422	-0.245	0.103
_cons	4.284	1.692	2.53	0.011	0.968	7.600
KPK						
__ec	-0.589	0.183	-3.22	0.001	-0.949	-0.230
D1. ptax	0.026	0.046	0.56	0.576	-0.065	0.116
D1. lpri	-0.125	0.081	-1.54	0.124	-0.285	0.034
D1. lhbed	-0.060	0.275	-0.22	0.827	-0.598	0.478
D1. ldev	0.027	0.032	0.82	0.412	-0.037	0.090
D1. inv	0.032	0.129	0.25	0.802	-0.221	0.286
_cons	6.142	2.520	2.44	0.015	1.204	11.081

Note: All variables were expressed in logs

Table 2.11: Results for Westerlund ECM panel cointegration tests (Dependent variable-Provincial GDP i.e. *Dpgdp*)

PUNJAB	Coefficient	Standard Error	z	P > z
ptax_1	0.000	0.027	-0.01	0.988
Lpri_1	0.242	0.157	1.54	0.123
Lhbed_1	-0.371	0.203	-1.83	0.067
Ldev_1	0.087	0.046	1.91	0.056
inv_1	-0.259	0.177	-1.46	0.143
_cons	4.105	3.094	1.33	0.185
pgdp _1	-0.333	0.216	-1.54	0.124
D1. ftrans	0.000	0.028	0.00	1.000
D1. lpri	0.051	0.163	0.31	0.756
D1. lhbed	0.042	0.201	0.21	0.836
D1. ldev	0.074	0.034	2.15	0.031
D1. inv	-0.072	0.133	-0.54	0.590
SINDH				
ptax_1	-0.053	0.041	-1.28	0.201
Lpri_1	0.112	0.161	0.70	0.485
Lhbed_1	-0.128	0.388	-0.33	0.741
Ldev_1	-0.013	0.024	-0.56	0.578
inv_1	-0.130	0.229	-0.57	0.571
_cons	4.331	3.991	1.09	0.278
pgdp _1	-0.432	0.198	-2.18	0.029
D1. ftrans	-0.023	0.034	-0.69	0.493
D1. lpri	0.154	0.153	1.01	0.314
D1. lhbed	-0.332	0.271	-1.23	0.219
D1. ldev	0.000	0.028	0.00	0.997
D1. inv	-0.200	0.191	-1.05	0.294
KPK				
ptax_1	-0.082	0.092	-0.90	0.370
Lpri_1	0.115	0.093	1.25	0.213
Lhbed_1	-0.041	0.560	-0.07	0.942
Ldev_1	-0.013	0.072	-0.19	0.853
inv_1	-0.137	0.322	-0.43	0.670
_cons	4.708	5.492	0.86	0.391
pgdp _1	-0.577	0.309	-1.87	0.062
D1. ftrans	-0.063	0.080	-0.78	0.436
D1. lpri	0.000	0.123	0.00	0.998
D1. lhbed	-0.222	0.479	-0.46	0.644
D1. ldev	0.018	0.056	0.33	0.741
D1. inv	-0.129	0.293	-0.44	0.661

Note: All variables were expressed in logs

Table 2.11: Results for Westerlund ECM panel cointegration tests (cont...) (Dependent variable-Provincial GDP i.e. *Dpgdp*)

Results for H0: no cointegration
With 3 series and 5 covariates

Statistic	Value	Z-value	P-value	Robust P-value
Gt	-1.861	1.427	0.923	0.490
Ga	-7.966	1.473	0.930	0.100
Pt	-3.144	0.893	0.814	0.470
Pa	-7.495	0.794	0.786	0.140

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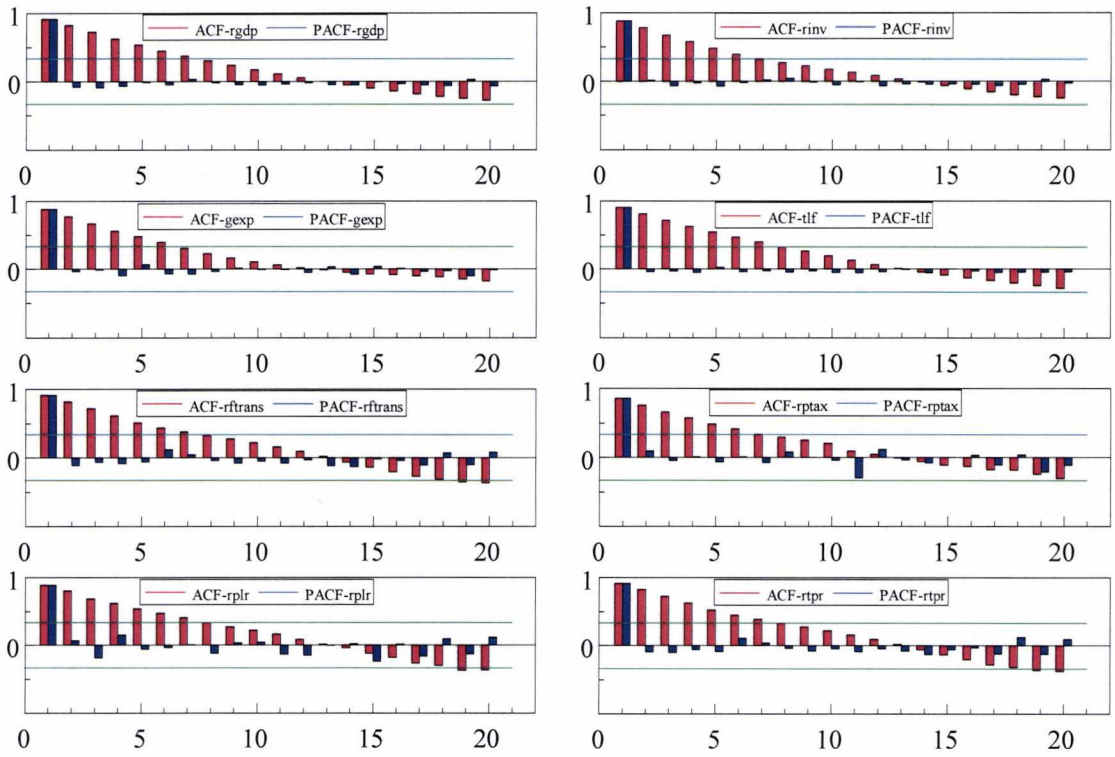
Appendix I

Graphical presentation for untreated variables in log levels

Figure A2.1: Correlograms for ACF (Red bars) and PACF (Blue bars)



Graphical presentation for data series in logs, as used for the analysis (i.e. in ratio form)

Figure A2.2: Correlograms for ACF (Red bars) and PACF (Blue bars)

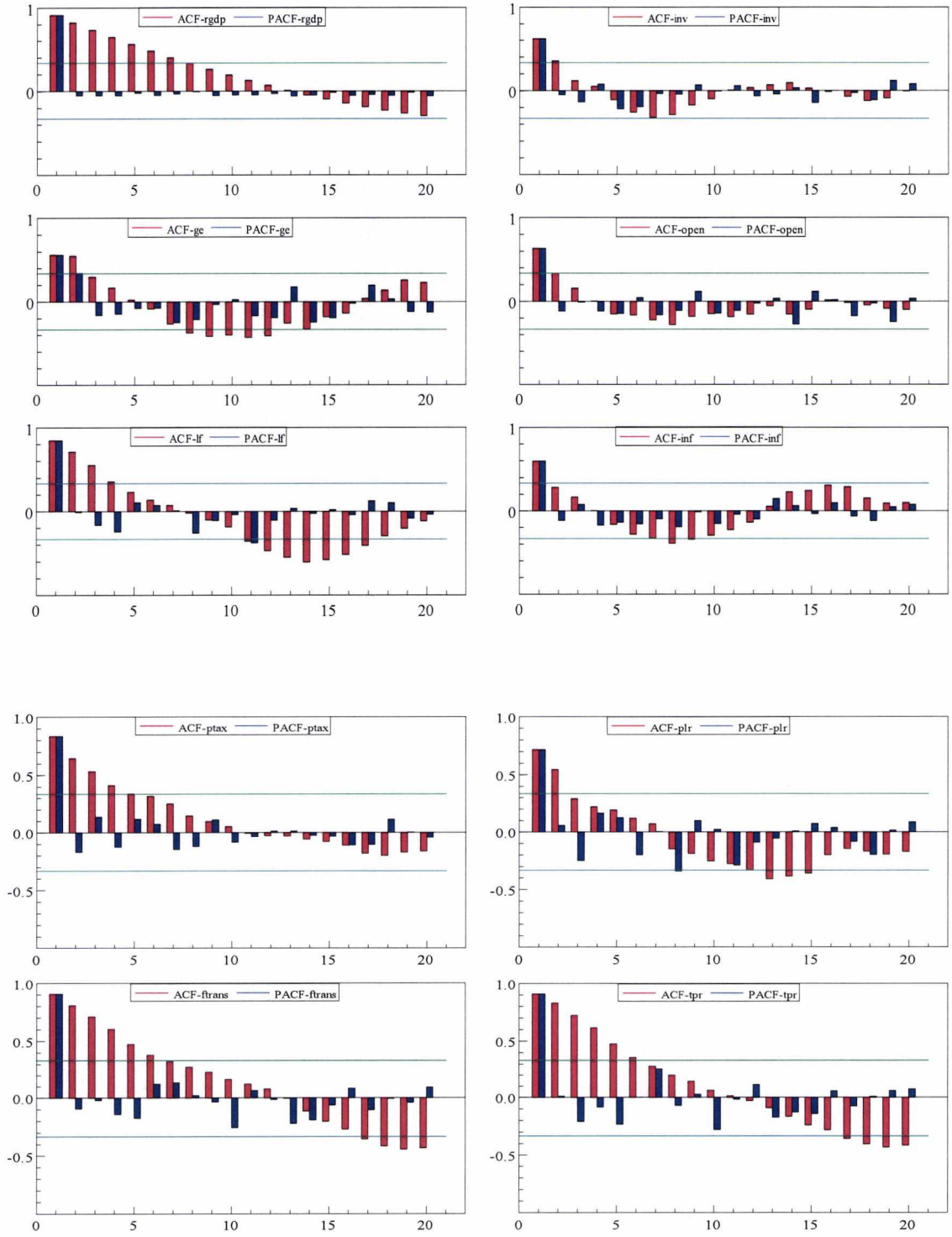


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Figure A2.3: Data in 1st difference form

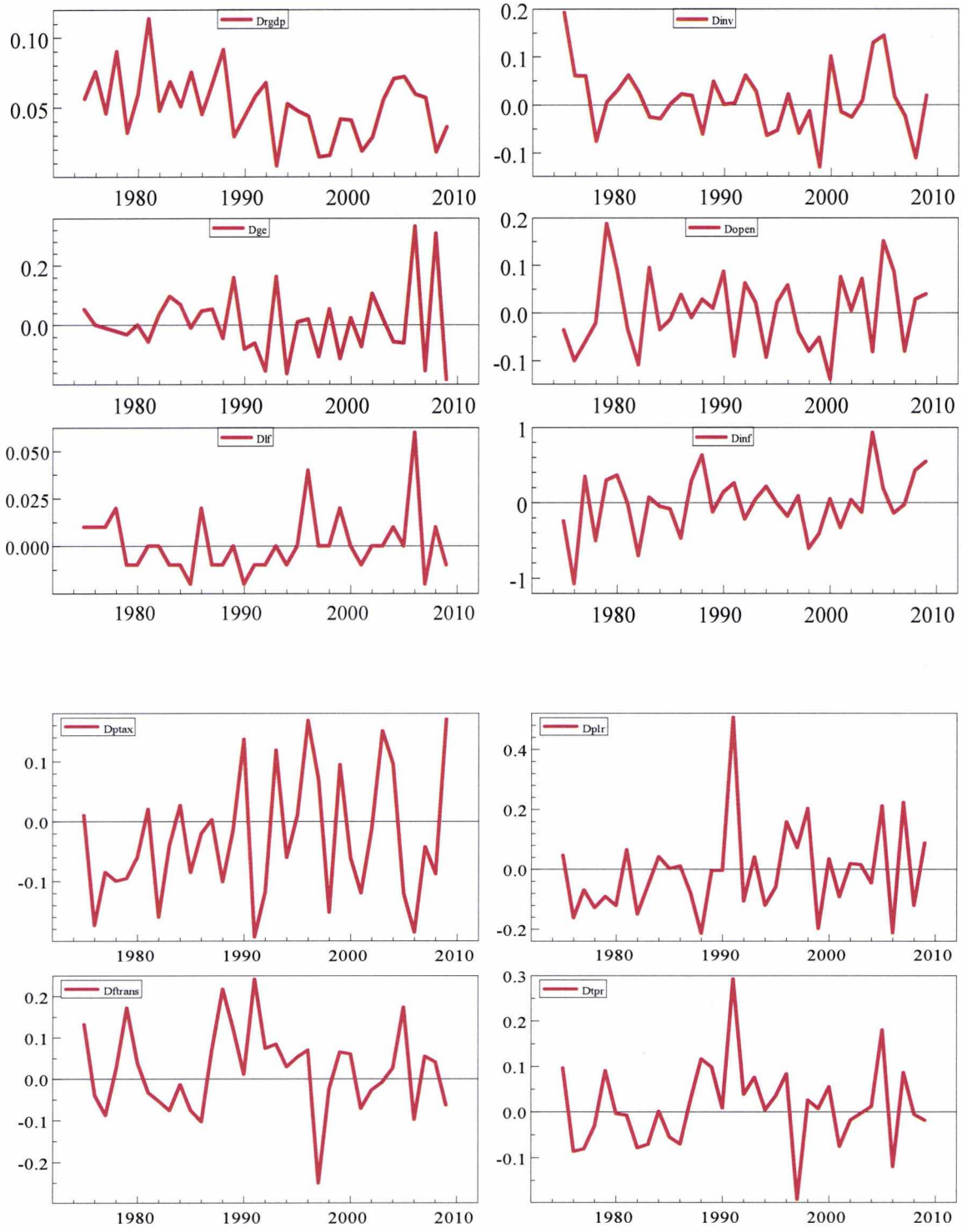
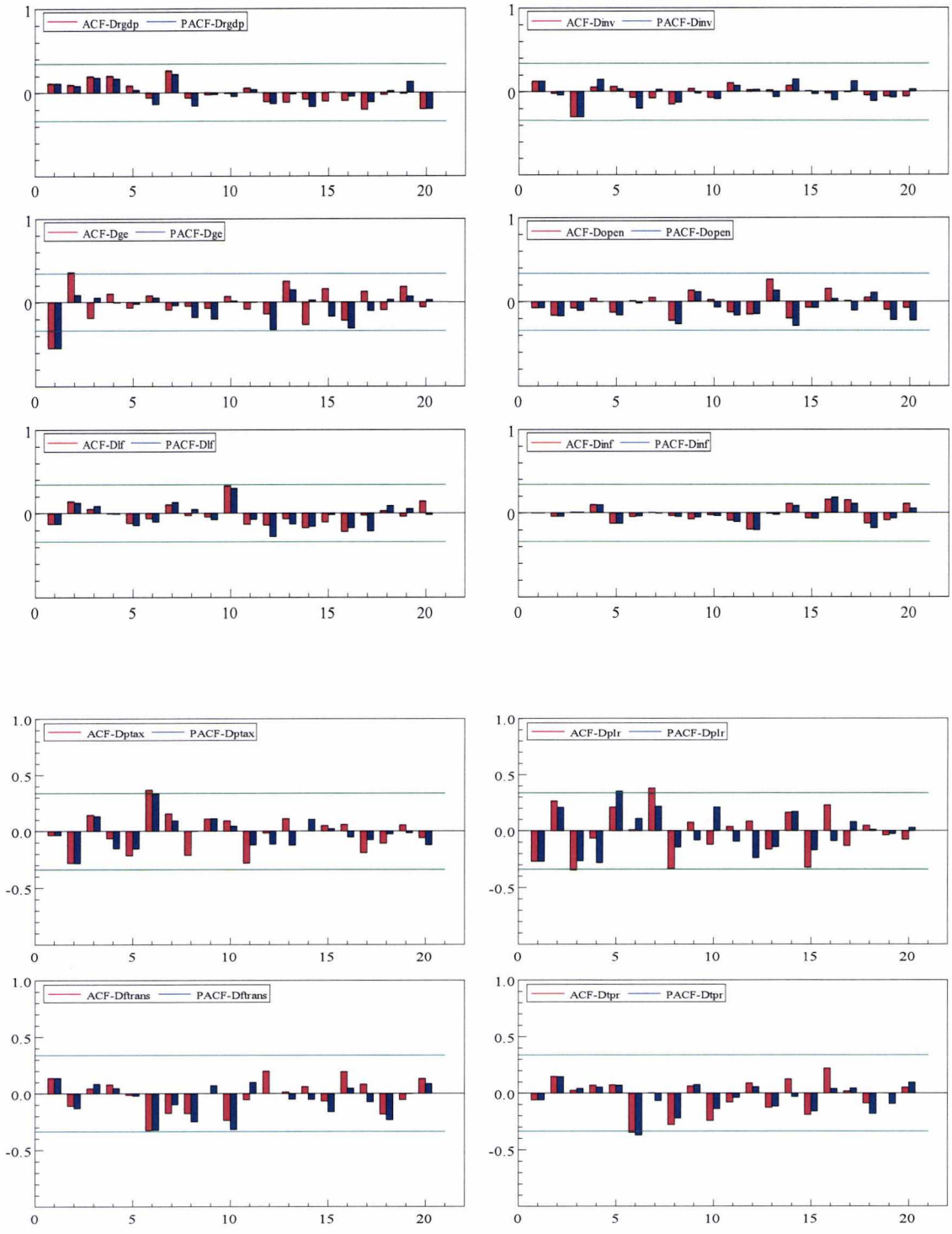


Figure A2.4: ACF and PACF correlograms for data at 1st difference form



CHAPTER 3 FISCAL DECENTRALISATION AND ITS EFFECTS ON HEALTH SECRTOR IN PAKISTAN

3.1 INTRODUCTION

Decentralisation is advocated to ensure improved local service provision, which is in line with public preferences and territorial needs. Decentralisation is believed to mould public spending into local's interest, which results in improvement of economic and social indicators. Therefore, assessing the effect of localisation on service provision is of great importance in the empirical research involving decentralisation. Recent literature on fiscal decentralisation tells us that over the past decade, emphasis has shifted away from the analysis of fiscal decentralisation and macroeconomic indicators (like economic growth, inflation, budgets deficit and public debt). Researchers are now interested in the investigation of the human face of fiscal decentralisation i.e. its impact on the social indicators especially health, education, basic local services[61] and poverty alleviation. Therefore, in line with modern research, the purpose of this essay is to analyse the effects of fiscal decentralisation on health service provision, with special reference to Pakistan.

Thorough review of literature suggests that the discussion in favour of decentralisation revolves around better service provision. It is argued that decentralisation improves governance, reduces corruption[62] as well as provides incentives for competition among the local jurisdictions; which ultimately yield positive economic and social returns (Tiebout, 1956; Oates, 1972). In another perspective, the theory of decentralisation has hint of "division of labour" rule, since the work of single central planner is distributed among a number of local managers. These local representatives has the advantage of being located near to the people, are resultantly better informed about the local needs and preferences, which leads to informed policy making.

Decentralisation also makes it easy to compare the performance of different jurisdictions and thus opens up prospects for policy experimentation. Local representatives from different jurisdictions have the opportunity to learn from the success stories. There is greater chance to imitate the innovative activities related to revenue generation, local spending and development projects; and to modify these policies according to local preferences and territorial characteristics. Hence, decentralisation potentially improves the resource utilisation, capacitates local population and increases productivity by providing

[61] including water and sanitation, streets paving and lighting
[62] as local election holds the government machinery accountable to local people

opportunity to contribute (Oates, 1972 and 1999). Hatfield and Kosec (2013) discuss that inter-jurisdictional competition results in higher efforts to compete for investment and better human resources and thus increases productivity. Decentralisation also helps in defining roles and responsibilities for each tier of the government and helps protect co-sharing of responsibilities (Martinez-Vazquez, 2001). Where we know that, co-sharing cause ambiguity in the determination of the exact responsibilities, which causes delay in implementation and results in economic inefficiency due to the mismanagement of resources (Vo, 2010). Similarly, Koethenbuerger and Lockwood (2010) presents a situation where tax levels under decentralisation can be even higher than the centralized level, which will retard economic growth. Hence, to obtain fruitful results, a well-conceived system of checks and balances is explicitly mentioned in the literature, as the necessary condition.

With decentralisation, public goods provision is assumed to improve due to people focussed public spending. This also leads to the selection of better projects, which are consistent with local conditions and accommodate public preferences. In addition, revenue raising from local resources make local representative more responsible and resultantly more sceptical about public spending, which ensures efficient allocation. Similarly, local revenue raising makes the representatives accountable to the people. Thus, local governments are assumed to channelize public spending towards sectors which need more attention. In this context, health sector qualifies as one of the important sector to analyse the effects of fiscal decentralisation on service provision. We know that, health has always remained one of the central point of attention, both in the developed and developing countries. Therefore, health sector appears to be the first choice for this study to analyse the effects of fiscal decentralisation on public services.

Nevertheless, the positive effects of fiscal decentralisation cannot be overemphasised without mentioning the prerequisites for its success. Theoretically, to realise its potential benefits, decentralisation has to be cost effective, efficient and responsive to local public needs. Similarly, there is need for special attention in the case of developing countries, where the lower tiers of government suffer from the dearth of administrative capacity, corruption and lower levels of democracy (Khaleghian, 2004). There are certain other limitations attached to decentralisation from the service provision aspect and these also need to be assessed alongside. For example, economies of scale cannot be realised under decentralisation (Jiménez and Smith, 2005). Free rider problem and national issues like the increased inequalities among jurisdictions can rightly be

pointed out as the potential issues. Lastly, from the perspective of empirical quantification, it is always very difficult to quantify the precise[63] effects of decentralisation.

Regardless of these issues, health is an important social sector, which has long-lasting effects on the welfare of the population. Hence, despite issues, literature quantifying the effects of fiscal decentralisation on social indicators like health is expanding. Therefore, main objective of this study is to contribute to the discussion regarding the potential effects of fiscal decentralisation on health sector. Keeping in view the importance of the topic, both the national and provincial data from Pakistan is used in this study, so as to arrive at results which can adequately approximate the situation in Pakistan.

3.2 LITERATURE REVIEW

This section summarises literature on the effects of fiscal decentralisation on service provision in general and health sector in particular. Hence, this section provides the basic theoretical and empirical background for the analysis ahead.

3.2.1 Decentralisation and Public Service Provision

During 1990's, researchers tried to explore the relationship between fiscal decentralisation and macro-level variables. Later on, however, emphasis shifted towards the analysis of the indirect effects of fiscal decentralisation on economic growth. The positive effects of fiscal decentralisation were assumed to take place via improved service provision and by realising efficient allocation of resources. Hence, new direction was introduced to the empirical analysis of fiscal decentralisation, which focused on the analysis of its link to service provision. We can find a number of studies that applied qualitative methods to explore the link between fiscal decentralisation and service provision, however, later on researchers formally called for rigorous empirical analysis. Martinz-Vazquez and McNab (2003) emphasised the need for explicitly examining the role of fiscal decentralisation in health and educational outcomes, so as to find its impact on the basic component of growth i.e. human capital. However, they admit the difficulties involved in such analysis, especially the data availability issues. Still a number of attempts have been made to analyse the effects of fiscal decentralisation on service provision.

[63] There are certain matters that are out of local governments' control and these can positively or negatively contaminate the empirical results. For example, international compliance on different issues (e.g. universal education, achieving lower infant mortality rate and eliminating poverty) can have a positive effect on services while geographical area and cost disabilities can distort the picture of local government's effectiveness, therefore, we need to be careful in results interpretation

Following are some of the studies which discussed the topic using the primary and secondary as well as qualitative and quantitative data sources.

To begin with, Bjørnskov *et al.* (2008) analysed the effects of decentralisation on the overall life satisfaction. International micro data from 66 countries, covering 60,000 individuals, was used for this study. Four measures were used to proxy fiscal decentralisation, which includes subnational government (SNG) total revenues, SNG's expenditures, federal transfers to SNG and domestic tax revenues. To capture the long run effects, proxies for fiscal decentralisation were averaged over 1980-2000. Weighted ordered probit model was used to analyse the dependent variable, which was categorical in nature i.e. "the subjective well-being[64]". Other explanatory variables included government consumption, openness, infant mortality, individual income levels and socio-ethnic dummies. Authors found results in favour of fiscal decentralisation, as result indicated that people were relatively more satisfied with decentralisation.

Faguet and Sanchez (2008) discussed the effects of decentralisation on education and health sector. This study analysed two countries (i.e. Bolivia and Colombia) to examine the effects of decentralisation on basic social services including health, education, water, urban development and agriculture. Authors used panel data and applied a mix of different methodologies (including Principal Component Analysis, panel OLS and IV method) to arrive at reliable results, under data-scarce situation. Authors found that local governments have redirected public investment from infrastructure to social services sector. Results were mainly driven by the previously neglected rural municipalities, which were in greater need of basic services. This study identified clear difference in the priorities of central and local government. The former channelized public spending towards investment in economic production and infrastructure. Whereas the major spending in the case of later i.e. local government, was on social services and human capital formation; which has relatively quick trickle down effects. To sum up, this study concludes that under decentralisation, public spending has become more responsive to local needs.

Ahlin and Mork (2008) analysed the effects of decentralisation on school resources in Sweden, where the responsibilities were decentralised from central government to local government level i.e. municipalities. Two measures were used to investigate the school resources i.e. spending per student and teacher-pupil ratio. This was panel data study for

[64] The dependent variable was measuring the subjective well-being and was based upon the direct question asked during the World Values Survey, 1997–2001 i.e. "How satisfied are you with your life these days?"

277 municipalities covering the period from 1989-2002 to analyse the major decentralisation reforms in 1991, 1993 and 1996. However, the study could not find any overwhelming results in favour of decentralisation.

Aslam and Yilmaz (2011) analysed the impact of decentralisation on service delivery in single county case i.e. Pakistan. Authors argued that by restricting their analysis to single country, they avoided the issues such as incomparability and aggregation problems, which are attached with cross county analysis. Authors used panel data set from 183 villages in Pakistan. Study analysed the effects of decentralisation on certain local services like street paving, construction of water canals, sanitation facilities and provision of basic amenities to schools[65]. Major focus of the study was to look at the local government reforms period in Pakistan following the promulgation of 'Local Government Ordinance 2001'. Data for 13 years covering the period from 1995-2007 was used to cover both the pre and post reform periods. Decentralisation was defined as dummy variable while fixed effects model was employed for estimating poison regression model. Data was collected from the primary source i.e. though local focus group discussions whereas figures on government projects were cross checked from secondary sources i.e. municipalities' records. This study found positive relationship between decentralisation and service provision. Results indicated significant improvement in service provision after the decentralisation reforms in 2001. The highest impact was noted on water canals, followed by schooling facilities, street paving and lastly, the sanitation.

Hence, there is evidence on the link between fiscal decentralisation and basic service provision. Studies cited above acknowledged the data limitation issues and used different forms of data including the cross country, aggregate national-level and primary data, to analyse the link. In the next section, we will concentrate upon the specific literature that examined the relationship between fiscal decentralisation and health sector indicators.

3.2.2 Decentralisation and Health Sector

For this section, before going deep into the discussion, it is important to discuss the general determinants of health care expenditures. Prieto and Lago-Peñas (2012) provided rigorous review of existing literature related to health care. Summarising the earlier studies on the said topic, authors discussed the methodologies, data and important variables that were used in different analysis. On the empirical side, this study provides brief background

[65] measured by construction of boundary walls, provision of teacher aides and drinking water provision at schools

of Spanish health services and used panel date set from 17 Spanish regions for the period 1992-2005. Per capita health expenditures was used as the dependent variable while the set of independent variables included per capita income, population (to represent demographic structure), number of general medical practitioners (per 1000 population) and number of beds for acute care (per 1000 population). Fixed effects model was used for estimation while dummies were introduced to isolate the administrative/political differences among the jurisdictions. Authors used different econometric methodologies including the simple panel OLS, OLS corrected for first order autoregressive errors and fixed effects model for estimation. Study identified that in regions where there is higher tax autonomy, higher regional GDP growth resulted in greater health care expenditures. Thus, indirectly their results favour decentralisation although it was not the subject matter of the study.

Jiménez and Smith (2005) discussed the effects of decentralisation on health outcome i.e. infant mortality rate. Authors systematically summarise important literature on decentralisation and developed theoretical model for the proposed relationship between decentralisation and health outcomes. Model suggests that enhanced level of health status depends upon level of prosperity (sub national income), federal transfers, local and non-local government health expenditure, social capital (education) and decentralisation. To test the implicit relationship between fiscal decentralisation and health outcomes, they used panel data from 10 provinces of Canada for the period 1979-1995. Decentralisation was defined as the ratio of subnational health spending over the total health spending (by sub national and federal governments) in Canada. Health outcome was measured through the infant mortality rate. Study concludes that decentralisation in Canada has positively and significantly influenced public policy, which resulted in better public health.

In the similar fashion, Robalino *et al.* (2001) developed a theoretical model to explore the effects of fiscal decentralisation on health outcome. Health outcome was once again proxied by the infant mortality rate. Based on the theoretical model, they estimated the relationship using the panel data for 67 countries covering the period 1970-1995. Fiscal decentralisation was defined as the proportion of local government expenditures to the total expenditures of the central government. Fixed effects model was employed for estimation and results suggested that fiscal decentralisation is consistently associated with lower infant mortality rate. Results also indicated that the effect is relatively large in the low income countries. Authors supplemented the results by reporting that in order to get desirable health outcomes associated with fiscal decentralisation, one of the pre-condition is the existence of appropriate institutional capacity at local level. In addition, optimal

allocation of local expenditure assignment, proper coordination between regions and adequate transfer mechanism were suggested as important contributors for the desired effects.

Similar results were found by Yee (2001[66]) for panel data analysis based on data from 29 Chinese provinces. They covered the important period of reforms in China that was from 1980-1993. Different proxies, including the number of doctor per 1000 people, the number of hospital beds per 10,000 people, the mortality rate and the local health care expenditures, were used to represent health sector. Moreover, decentralisation was measured by four different indicators. Random and fixed effects models were employed for the estimation and it was found that decentralisation results in higher health spending and lower mortality rate.

Jiménez-Rubio (2011, a) analysed the impact of fiscal decentralisation on infant mortality rate using panel data for 20 OECD countries, covering the period from 1970-2001. Fiscal decentralisation was reflected using two indicators i.e. revenue decentralisation[67] and local autonomy[68]. Infant mortality rate was described as an indicator for health status in OECD countries. The explanatory variables included decentralisation, total health care expenditures, level of income (per capita GDP), the education level and the consumption of alcohol and tobacco. Results were in support of significant relationship between fiscal decentralisation and lower infant mortality rate.

Uchimura and Jütting (2009) analysed the effects of decentralisation on health outcomes. Study was based on the panel data set for twenty six Chinese provinces, spanning over seven years from 1995-2001. Two measures were used to proxy decentralisation i.e. local expenditure responsibility[69] and local fiscal autonomy[70]. To measure health outcomes, infant mortality rate was used as the dependent variable while in addition to fiscal decentralisation measures other independent variables included illiteracy rate, birth rate, rural/urban ratio and provincial per capita GDP. Fixed effects model was used for estimation to take into account the differences among provinces. Results were in support of the argument that higher fiscal transfers contribute to better health outcomes i.e. by reducing infant mortality rate. Moreover, authors argued that increased level of

[66] As cited in Jiménez and Smith (2005)
[67] Share of sub national revenue over the total government revenues
[68] Based on the Stegarescu (2005) definition of autonomy over taxes by local government relative to general government
[69] local expenditure as ratio total expenditures at national level
[70] local expenditure share out of local own revenues to indicate vertical balance

spending will have better results if provinces can finance greater part of consumption from their own resources. Hence, this study implicitly mentioned that local revenue generation makes provinces responsible and this results in higher efficiency in spending.

Mahal *et al.* (2000) used primary data from 1750 rural villages covering 15 states of India to empirically analyse the link between decentralisation and child mortality rate. Decentralisation was defined as dummy for the states that had decentralised during the period 1974-1994. Results showed the expected negative relationship between decentralisation and child mortality rate. Study concluded that decentralisation is crucial for the improvement of local service delivery.

Ebel and Yilmaz (2001) analysed decentralisation for its effects on immunisation like DPT and measles for children under-12 months of age. Data for six developing countries was used for the period from 1970-1999. Fixed effects model was used for the estimation of the given panel data and results show that decentralisation increases the immunisation coverage for measles.

Khaleghian (2004) examined the similar relationship between decentralisation and immunisation coverage for DPT and measles (for children of age one year). They analysed cross-sectional time-series data for 140 low and middle income countries for the period 1980-1997. Dummy variable was constructed to proxy decentralisation, which was based on the presence of taxing, spending or regulatory authority at the lower level of government. Results indicated that decentralisation results in higher coverage rate in the low income countries only.

Habibi *et al* (2001) analysed infant mortality rate for its relationship with fiscal decentralisation. Two proxies were used for decentralisation e.g. "the ratio of revenue derived from co-participation, royalties and provincial taxes"[71] to total resources and secondly, the ratio of locally generated resources to locally controlled resources. Authors used the panel data set for 23 Argentinean provinces for the period from 1970-1994. Analysis indicated that decentralisation results in better health in the shape of lower infant mortality rate.

Bossert and Mitchell (2011) discussed the relationship between health sector decentralisation and local decision making in Pakistan, following the decentralisation reforms in 2001. They covered 17 districts across Pakistan and collected primary data from

[71] The locally controlled resources

health official and local decision makers. Mainly, the study targeted the scenario after the introduction of Local Government Ordinance, 2001. Authors focussed on three important aspects of decentralisation that were; the authority (decision space), institutional capacity and the accountability of local officials (to locally elected politicians). Responses were transformed into qualitative measures for four health sector functions i.e. strategic and operational planning, budgeting, human resource management and service delivery. Most importantly, despite having the similar decentralisation policy in place across provinces, official's actions and efficiency were not uniform across districts. Authors therefore deduced that decentralisation is collective responsibility and its outcome depends upon the interaction among the decision makers and facilitators. Results related to decentralisation were also influenced by official's involvement and willingness to practice the *'de jure'* decision making powers. This study was based on the qualitative assessment of the questionnaire responses and did not make use of any econometric technique. Authors concluded that in order to bring improvements to health services, decentralisation should be designed in a way that can increase the decision making powers at local levels, strengthen the institutional capacities and should be capable of ensuring accountability.

In another study, Mitchell and Bossert (2010) described health sector as one of the complex public good in social services, mainly because of the multiple stakeholders involved in it. Authors identified various organisational functions which determine the decision space in health sector. This paper was based on the qualitative analysis and authors present good summary of the situation. Data from six countries including Pakistan was used to analyse the effects of decentralisation on performance of heath sector. Based on the comparison among countries, Pakistan was ranked at the lower side of decentralisation in health sector (along with some other counties). Commenting on the situation in Pakistan; authors cited ADB (2004), mentioning that over the time, funds were normally allocated by the higher levels of the government, which left local levels with negligible decision space. They further elaborated that about 40 to 90 percent of development grants in health and education sector were determined by the vertical programmes. Similarly, citing Nayyar-Stone *et al.*, (2006), authors described that locally collected user fees were passed on to the parent departments, at the province level, so as to be reallocated horizontally among all the local governments in Pakistan[72]. Mitchell and Bossert finally concluded that due to limited financial resources, the local discretion on the fiscal and administrative decentralisation is very limited. However, this study lacks

[72] Hence there was no incentive for better performance

specialised econometric analysis and conclusion was arrived at only with the help of the descriptive analysis of the situation.

Kristiansen and Santoso (2006) assessed the impact on health services following the reforms of decentralisation and privatisation in Indonesia. They used data from primary sources including interviews, focus group discussion and household surveys. Study found negative effects of the given reforms and identified that the lack of accountability, in fact, incentivised the health centres towards profit orientation and thus caused the reduction in preventive health care. They used percentages and analysed comments from individuals (interviews and focus group discussions) to arrive at the conclusions. Decentralisation in 2001(alongside the economic downturn in Indonesia) was thus reported to have worsened the health facilities, compared to the earlier situation in Indonesia.

To sum up, there is ample evidence on the relationship between fiscal decentralisation and health outcomes, where the results are influenced by the country/region specific conditions. Empirical evidence was based on different types of datasets including the time series, panel and cross-sectional, as summarised in Table 3.1 and Table 3.2. In addition, some of the studies used primary data, to investigate the relationship between fiscal decentralisation and health. Hence, this section makes the importance of the topic clear and provides the economic rationale for the analysis under consideration. In brief, the discussion above elaborated important factors attached to health sector and helps to understand the role of fiscal decentralisation in health outcomes. Given below, Table 3.1 presents the summary of the general determinants of health sector indicators, while Table 3.2 specifically summarises the effects of fiscal decentralisation on health indicators.

Table 3.1: Summary of empirical studies in health sector
Dependent variable: Health Care Expenditure/ Health outcome

Study	Countries and Studied Period	Estimation technique	Dependent Variable(s)	Explanatory variables with their Significance and Signs
Abbas and Hiemenz (2011, WP[#])	Pakistan 1972-2006	Johansen's cointegration Technique	Health care expenditure per capita	Significant Variables: Per capita income (+), population per hospital Bed (+), unemployment (-), development health care expenditure as percentage of GDP (+), population of age 14 or below (+) and urbanisation (-) Insignificant variables: *nil*
Siddiqui *et al* (1995)	Pakistan 1974–93	Multivariate regression	Health care expenditure per capita	Significant Variables: Per capita GDP (+), urbanisation (-), Govt. expenditure (+) Insignificant variables: education, political dummy
			Doctors per (000) pop, Nurses per (000) pop and Hospital beds per (000) pop	Significant Variables: Per capita GDP (+), urbanisation (+), Govt. expenditure (+) Insignificant variables: Education, political dummy, Health exp.
Toor and Butt, (2005)	Pakistan 1972-1998	OLS, Engel and Granger Cointegration	Health care expenditure per capita	Significant Variables: Per capita GDP (+), literacy rate (+), urbanisation (-), crude birth rate (+),share of health exp. in total public exp. (+), foreign Aid (+) Insignificant variables: share of population under-15 and over 65, literacy rate
Prieto and Lago-Peñas (2012)	Spain, region level data, 1992-2005	OLS, fixed effects, Baltagi and Wu [1999] estimator (*xtregar*)	Health care expenditure per capita	Significant Variables: per capita Income (+), population, Doctors per 1,000 pop (+) and acute care beds per 1,000 pop (-) Insignificant variables: *nil*
Cantarero and Lago-Peñas (2010)	Spain region level data for 17 regions 1992 – 2003	OLS, fixed effects, dynamic panel estimators (*xtabond*) and (*xtregar*)	Health care expenditure per capita	Significant Variables: Per capita income (+),general practitioners per 1000 pop (+), pop (+), dummy for Autonomous Communities (+) Insignificant variables: Acute care beds per 1000 pop, Dummy for common Communities
Filmer and Pritchett (1999)	Cross-country data 1990	OLS, Instrumental Variables (IV) estimators	Child mortality and Infant mortality,	Significant Variables: Per capita income (-), health exp. (-), income inequality (+), female education (-) Insignificant variables: a variety of socio-economic variables

Table 3.2: Summary of empirical studies relating fiscal decentralisation and health Dependent variable: Health outcome/expenditure

Study	Countries and Studied Period	Estimation technique	Dependent Variable(s)	Explanatory variables with their Significance and Signs
Costa-Font and Moscone (2008)	Spain-region level data 1995–2002	OLS, Random effects model	Health care expenditure per capita	Significant Variables: Decentralisation (+), regional per capita GDP (+), population (-), No. of Doctors (+), No. of Beds (+), population of age 64–75 (+) and fiscal responsibility (+) Insignificant variables: Time from decentralisation
Jiménez-Rubio (2011, a)	20 OECD countries 1970-2001	Error Correction Model	Infant mortality	Significant Variables: Fiscal decentralisation (-), health care expenditure (-) and education (-) Insignificant variables: GDP per capita, Alcohol consumption, Smoking
Jiménez-Rubio (2011, b)	Canada-10 province data 1979-1995.	Fixed effects model	Infant mortality rate	Significant Variables: Health decentralisation (-), GDP per capita (-), per capita federal health care spending (-) and education (-) Insignificant variables: Health care block grants, Municipal government health spending in per capita, Private health care spending in per capita, Smoking and Low birth weight
Khaleghian (2004, WP[#])	140 low- and middle-income countries 1980 - 1997	OLS regression	Measles and DTP3 immuniza-tion	Significant Variables: Fiscal Decentralisation (+), GDP per capita (+), population density (+), and the illiteracy rate (-) Insignificant variables: population size
Uchimura and Jütting (2009)	China province-level data (26) 1995–200	Fixed effects model	Infant mortality rate	Significant Variables: fiscal decentralisation (-), provincial per capita GDP (-), provincial fertility rate (+) and the illiteracy rate (+) Insignificant variables: rural/urban ratio

Table 3.2: Summary of empirical studies analysing the effects of decentralisation Dependent variable: Health outcome/expenditure (cont...)

Study	Countries and Studied Period	Estimation technique	Dependent Variable(s)	Explanatory variables with their Significance and Signs
Habibi *et al* (2001, WP[#])	Argentina province-level data (23) (1970-94)	OLS, Generalised Least Squares, Fixed-effects model	Infant mortality rate	Significant Variables: fiscal decentralisation (-), provincial per capita GDP (-), public employees (-), dummy for autocracy (-) Insignificant variables: per capita GDP, Royalties/Controlled Resources, Conditional Transfers/ Total Transfers
Jiménez and Smith (2005, WP[#])	Canada 1979-1995	OLS, Instrumental Variables (IV) method	Infant mortality rate	Significant Variables: Decentralisation (-), private spending on health (+) Insignificant variables: GDP per capita, population, education and low weight at birth
Asfaw *et al* (2004, WP[#])	India, Rural villages from 14 major states, 1990-1997	Between effects, Fixed effects and Random effects Models	Infant mortality rate	Significant Variables: fiscal decentralisation index (-), per capita income (-) and Percentage of literate women (-) Insignificant variables: Political decentralisation index
Cantarero and Pascual (2008)	Spain-region level data 1992-2003	Fixed effects and Random effects model	Infant mortality rate	Significant Variables: Real per capita income (-), proportion of SNG health exp. (-), and general practitioners per 1000 pop (-) Insignificant variables: Acute care beds per 1000 pop

[#]WP: Working paper

3.3 SITUATION IN PAKISTAN

Before going into the empirical analysis section, it is always helpful to discuss the ground realities of the country under analysis as it provides the basic background to understand the estimation results in better way. The section ahead elaborates the basic structure of the health sector in Pakistan.

3.3.1 Status, Financing and Organisation of Health Sector in Pakistan

Pakistan is in the middle of epidemiological transition. In Pakistan, the infectious and communicable diseases constitute almost 40 percent of total burden of disease (BOD). Most important of these are diarrheal diseases, acute respiratory infections, malaria, tuberculosis, hepatitis B&C, and immunisable childhood diseases. Second important problem relates to the reproductive health which makes 12 percent of total BOD. Similarly, there is prevalence of Nutritional deficiencies particularly iron deficiency anemia, Vitamin-A deficiency and iodine deficiency disorders which collectively accounts for further 6 percent. Following that, the non-communicable diseases associated with unhealthy life styles, environmental pollution, irrational dietary habits and smoking results in cardio vascular diseases, cerebro-vascular accidents (hemiplegia), diabetes and cancers which constitute almost 10 percent of the BOD. In Pakistan the life expectancy is improving and this has also caused rise in diseases/disabilities of elderly especially eye problems, paralysis and bone diseases. Another important problem exists in the shape of drug addiction which is growing fast, especially in the youth. There are approximately 5 million drug addicts and 50 percent of these are heroin addicts. This is also contributing to the worsening situation of the hidden cases of HIV/AIDS and hepatitis-C amongst the addict population, mainly due to the shared use of infected injections (MTDF, 2005).

On the other hand, in Pakistan the infant mortality and child (under-five) mortality is still a challenge as it stands among the highest in the regional countries as evident from Table 3.3. During 2009, the life expectancy at birth was almost 65 years however the infant mortality was recorded as 71 out of 1000 live births that is the highest and not even comparable to the other developing countries in the region. To reduce child mortality, immunisation is recommended as one of the most effective health intervention. In this regards, children are immunised against DTP[73], tuberculosis[74], polio[75] and measles, however, Pakistan has still not achieved universal coverage for child immunisation. Table 3.4 represents that over the time Pakistan has lagged behind all the regional countries (except Nepal) in DTP and measles immunisation coverage. According to World Bank data, 15 percent of children under 12-months–age did not get immunisation against DTP while 20 percent were not immunised against measles in Pakistan during 2009. Hence, although there is significant improvement over the time yet there is much left to be done.

[73] diphtheria, pertussis and tetanus
[74] BCG
[75] Oral Polio Vaccine (OPV)

Table 3.3: Regional Comparison of Health Indicators (2009)			
Country	**Life expectancy at birth, total (years)**	**Infant mortality rate (per 1000 live births)**	**Mortality rate under-five (per 1000)**
Pakistan	64.96	70.70	87.90
India	64.78	49.50	64.70
Sri Lanka	74.57	14.70	17.10
Bangladesh	68.33	40.00	50.70
Nepal	68.00	43.30	52.20
China	73.06	16.80	19.60
Malaysia	73.79	5.60	6.60
Indonesia	68.47	28.10	36.80

Source: World Development Indicator (WDI)-2012

Table 3:4: Immunization coverage- DPT and Measles, A Regional Comparison (% of children ages 12-23 months)

	DPT					**Measles**				
Country	**1990**	**1995**	**2000**	**2005**	**2009**	**1990**	**1995**	**2000**	**2005**	**2009**
Pakistan	54	58	62	80	85	50	47	59	78	80
India	70	71	62	67	72	56	72	55	64	74
Sri Lanka	86	93	99	99	97	80	87	99	99	97
Bangladesh	69	69	83	96	96	65	79	72	94	98
Nepal	43	54	80	75	89	57	56	77	74	90
China	97	80	85	87	99	98	80	84	86	99
Malaysia	90	94	95	95	95	70	86	88	90	95
Indonesia	60	69	71	72	82	58	63	74	77	82

DPT vaccination is for diphtheria, pertussis and tetanus diseases, Source: WDI (2012)

3.3.2 Basic Structure of Public Health Services in Pakistan

In Pakistan, service delivery in public health is comprised of four components. We can start with (a) the Outreach and Community based activities, which deals with the child immunization, malaria control, maternal and child health, family planning and the Lady Health Worker programme. The second component of health services are (b) the primary care facilities, which basically provide the outpatient care and are located near to the people in local areas. Administratively, the primary care facilities (Basic Health unites (BHU) & Rural Health Centres (RHC)) are mostly managed by medical officer while lady

health visitor[76] (LHV) is in-charge of the maternity and child health centres (MTDF, 2005). The third important and relatively specialised health facilities exist in the shape of (c) tehsil and district headquarters hospitals which provide the inpatient as well as outpatient care and are operational day and night. These facilities provide treatment for normal cases while patients in need of specialised care are referred to major hospitals. Lastly the highly specialised health facilities appear in the shape of (d) tertiary care hospitals, which are located in the major cities and provide the highest level of specialised care. These are mainly the research and teaching organisations and are 24 hours operational.

Using the given infrastructure, a number of different vertical and horizontal programs are initiated from time to time in order to improve the basic health status in Pakistan. The vertically funded programs include Lady Health Worker Programme; Malaria Control Programme; AIDS Control Programme; National TB control program; National Programme for Prevention and Control of Blindness; National Programme for Family Planning & Primary Health Care; National Maternal, New-born and Child Health Programme; the Expanded Programme on Immunisation; Cancer Treatment Programme; Drug Abuse; Food and Nutrition Programme, and; the Prime Minister Programme for Prevention and Control of Hepatitis B & C (GoP, 2009-10, GoP, 2010-11). During the study period, the Ministry of Health at the federal level was in-charge for the various vertical health interventions (stated above) and for the federal hospitals in capital area. Whereas the provincial health departments ensured service delivery at the provincial level and has the responsibility for the budgetary, administrative and maintenance operation of the existing health facilities including Primary health care units and Hospitals (GoP, 2009-10).

3.3.2.a Organisation of health sector

According to the constitution of Pakistan, Health is provincial matter. Provinces are responsible for the service delivery in health sector while federal government has the responsibility to devise necessary policies in order to; achieve strategic goals, do monitoring and evaluation, achieve inter-provincial coordination, help in epidemic outbreak and to ensure compliance with international obligations. Despite this there are number of vertical programs which are initiated and funded by federal government (in collaboration with foreign donors). Over the time, efforts are being made to gradually

[76] More specialised than the lady health worker

decentralise various programs however, it often has led to the duplication of effort and resulted in inefficiency (WHO, 2007). Following is the role played by different stakeholder in the provision of health services.

Federal Level

Despite the fact that health is in the provincial domain, federal government assumes the responsibility of developing the National Health Policy and monitors its implementation to ensure equity among the provinces and to achieve the national and international goals. Ministry of Health at federal level provide support for prevention and control of communicable diseases like Malaria, TB, HIV/AIDS, Hepatitis, six fatal diseases of children under EPI, diarrheal diseases and other gastro-intestinal diseases. Thus Ministry of health keep vigilance on the epidemics and other health issues that arise from time to time anywhere in the country. In this regard, federal government not only coordinated health activities of the provincial Health Departments, but also keep close relationship with the international agencies like WHO, UNICEF, JICA, USAID, DFID, World Bank, Asian Development Bank, *inter alia* (MTDF, 2005).

Provincial Level

Provincial health departments coordinate the vast network of health care facilities at the provincial level. The facilities run by the provincial governments comprise of Hospitals, Dispensaries, Basic Health Units and Rural Health Centres, Mother and Child Health Centres, and TB Centres (MTDF, 2005). Provincial governments are responsible for the budgetary needs, infrastructure, human capital and governance maters of the stated facilities. In addition, funds are also allocated for the provision of first aid items and for the basic and emergency drugs for poor and injured patients.

Local Level

Local government system in Pakistan suffered from lack of continuity and was more as an 'ON' 'OFF' policy for political reasons. After the abolition of 'Basic Democracies' in 1971, local government system was deficient of serious constitutional role till 1979. 'Local government ordinance, 1979' established the local government system where local councils were responsible for local service provisioning including public health. However, this setup was deficient of the appropriate administrative and financial powers and fell victim to political interference. During 2001, the promulgation of 'Local government ordinance, 2001' was a serious attempt to introduce an empowered local

government structure. According to the level of health infrastructure, these were placed under the control of district, tehsil and union councils however, major teaching hospitals remained under the provincial governments. New local government system was introduced with the intention to transfer responsibilities to the local representatives at all levels however, it failed to continue due to political interference and is now on halt since 2007.

Private Health Services

Although government is an important provider of the basic health care to the people, yet private sector is very dominant in Pakistan. The private sector mainly acts as for-profit facilities and by far it is one of the most important providers of health services. During 2005, spending at private medical service accounted for up to 60% of total expenditures on health, which was mainly out-of-pocket spending by patients. The private sector facilities are predominantly located in urban areas as only 27 percent of all are situated in the rural areas (MTDF, 2005). According to Akram and Khan (2007) almost 80 percent of outpatients are served by the private sector. Similarly, PSLM (2004-05) depicts nearly the same picture by stating that 76 percent of the households consult the private sector (Table 3.5).

In fact, there is lack of serious effort for the meaningful documentation of the existing private sector, however, survey namely Private Sector Health Facilities (1989) showed some 42,700 private facilities. These mainly consist of clinics and chemist shops (69%), medical stores (27%) and 550 private hospitals, however, numbers are definitely much higher now. Similarly, the pharmaceutical industry is quite large in Pakistan with 33,000 registered drugs produced by over 343 licensed manufacturers (MTDF, 2005). In addition, a large number of unregistered practitioners are also in the market. In Pakistan, the traditional system of medicine, too, is actively providing health care especially in rural areas. The MTDF, 2005 reports about 55000 Tabbibs (Healers) with 31 Unani (Greek Medicine) diploma awarding institutions exists while there are three universities which award degrees in herbal medicines. Similarly, 135 Homoeopathic institutions operate in the private sector and have the degree awarding status.

Table 3.5: Health consultation in past two weeks (%)								
Province	Private Hospital/ Dispensary	Public Hospital/ Dispensary	RHC/ BHU	Hakeem/ Herbalist	Homeopathic	Chemist/ Pharmacy	Elder	Other
Urban Areas	**71.50**	**20.47**	**0.52**	**1.76**	**1.54**	**3.10**	**1.01**	**0.11**
Punjab	73.50	15.42	0.26	3.09	2.28	3.91	1.37	0.18
Sindh	78.93	17.79	0.75	0.75	0.96	0.14	0.65	0.03
KPK	55.81	31.31	0.39	0.67	1.44	9.13	1.09	0.16
Balochistan	56.47	40.68	1.20	0.99	0.10	0.13	0.43	0.00
Rural Areas	**64.31**	**20.68**	**3.50**	**2.32**	**0.60**	**6.89**	**1.36**	**0.35**
Punjab	71.08	15.27	1.20	4.74	1.22	3.85	2.28	0.35
Sindh	76.29	18.71	3.23	0.53	0.16	0.28	0.52	0.29
KPK	51.73	21.73	3.60	1.15	0.44	19.90	1.13	0.32
Balochistan	47.57	37.51	10.2	2.13	0.17	0.69	1.20	0.51
Overall	**67.40**	**20.59**	**2.22**	**2.08**	**1.00**	**5.26**	**1.21**	**0.24**
Punjab	72.27	15.34	0.74	3.93	1.74	3.88	1.83	0.27
Sindh	77.60	18.25	2.00	0.64	0.56	0.21	0.58	0.16
KPK	52.92	24.53	2.66	1.01	0.73	16.75	1.12	0.28
Balochistan	50.34	38.50	7.41	1.77	0.15	0.52	0.96	0.35
Source: PSLM 2004-05								

3.3.2.b Healthcare financing in Pakistan

In Pakistan, healthcare financing is based on two main sources. The first source can be mentioned as the government spending, which is financed through tax revenues, while the second one is the private, out-of-pocket spending. Government spending in health sector is carried out by both the federal and provincial governments. Out of the federal health budget, development spending in health sector constitutes almost 50 percent. However, the provincial governments mainly remain committed to the non-development spending (almost 70 percent), as summarised by Rajput (2005). Social insurance and private insurance has little role in healthcare financing in Pakistan. Out of the total population of 154 million in 2005, social health insurance[77] was available to one million employees in the public sector (MTDF, 2005). In addition, autonomous public sector institutions including universities, Pakistan International airlines (PIA), Water and Power Development Authority (WAPDA), Pakistan Railways, Pakistan Telecommunication Company Limited (PTCL) and Fauji Foundation also provided health facilities to

[77] Which does not guarantee the full cost of medication

additional 0.93 million people, during 2005. Lastly, armed forces are also covered with social health insurance.

Around the world, governments are increasing the amounts invested in health and education sectors to attain better human capital. However, over the time health sector in Pakistan remained neglected. Over the study period (1974-2009), average government spending on health sector remained only 0.78 percent of GDP, while it was recorded as only 0.6 percent of GDP in 2009 (GoP, 2009, WDI). Development spending was recorded at 31 percent, on average, while it constituted 48 percent of total public health expenditures during 2009. Figure 3.1 characterises the relative position of public sector development spending in health to total public health expenditure. Overall, out of the total health expenditure at the national level, public spending was recorded as 33 percent during 2009, while the rest was mainly financed through out-of-pocket private expenditure, due to negligible social insurance sector. Table 3.4 presents the overall picture of public spending on health over the period of time.

The consolidated public health spending (i.e. total spending on health by federal and provincial governments) remained alarmingly low, throughout the period under analysis i.e. 1974-2009 (Figure 3.2, Table 3.6). Public health expenditure constituted less than one percent of GDP, with the exception of only two years when it crossed one percent mark during 1986 and 1987. Health spending remained quite volatile for most of the period under analysis, however during past nine years it constantly hovered around 0.6-0.7 percent of GDP. There was gradual increase in the share of provincial spending on health relative to federal spending. Figure 3.3 indicates that over the time, pattern of public spending on health has reversed as provincial spending on health has increased from 35 percent (during year 1974) to 69 percent (in year 2001[78]) of total public health spending in Pakistan.

It is obvious that health sector in Pakistan is not sufficiently funded. Despite nominal increases, health spending relative to GDP has rather decreased over time. Duplication in the federal, provincial and local government's efforts is also an important source of inefficiency. Additionally, capacity issues and lack of financial management at provincial level are among the significant issues felt at the ground. Decisions are not derived from the cost-benefit analysis and policy makers lack information and abilities to

[78] After the devolution plan 2001, certain spending responsibilities (including health) were shifted to district governments (114 in total). Thus, these spending were no longer recorded at provincial budget statements.

efficiently allocate resources (MTDF, 2005). Similarly, no effort has been made so far to regularise private sector.

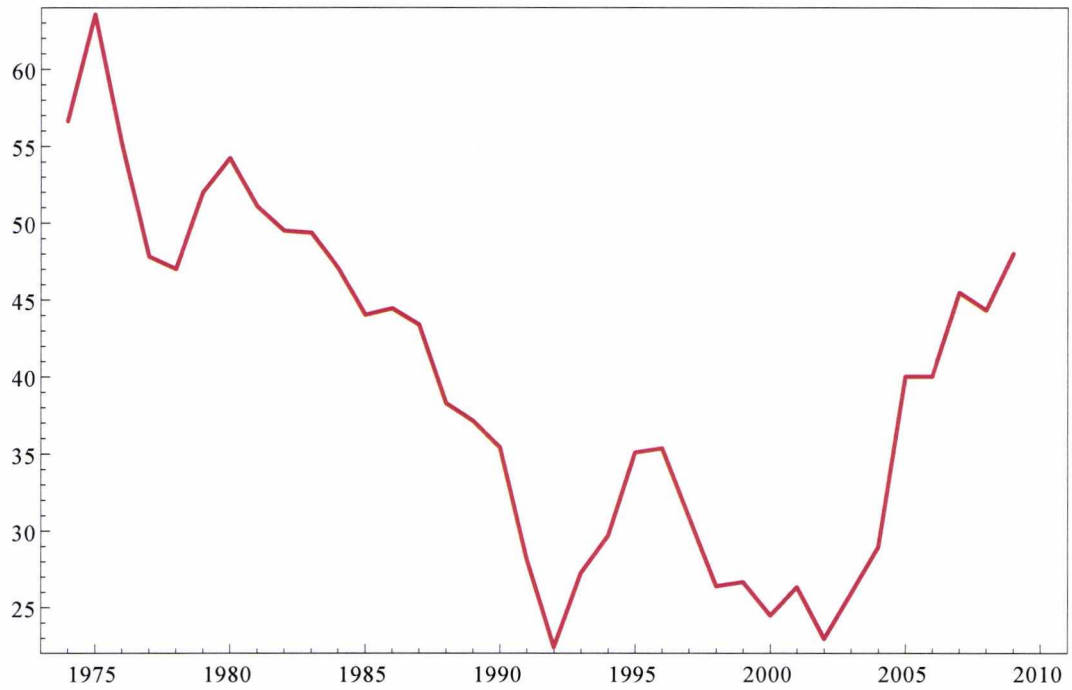


Figure 3.1: Share of development expenditure in total public health expenditure

Note: Development spending in public health sector is used for; construction of new hospitals, purchase of equipment, training of doctors and paramedic staff, and includes other capital spending in public health

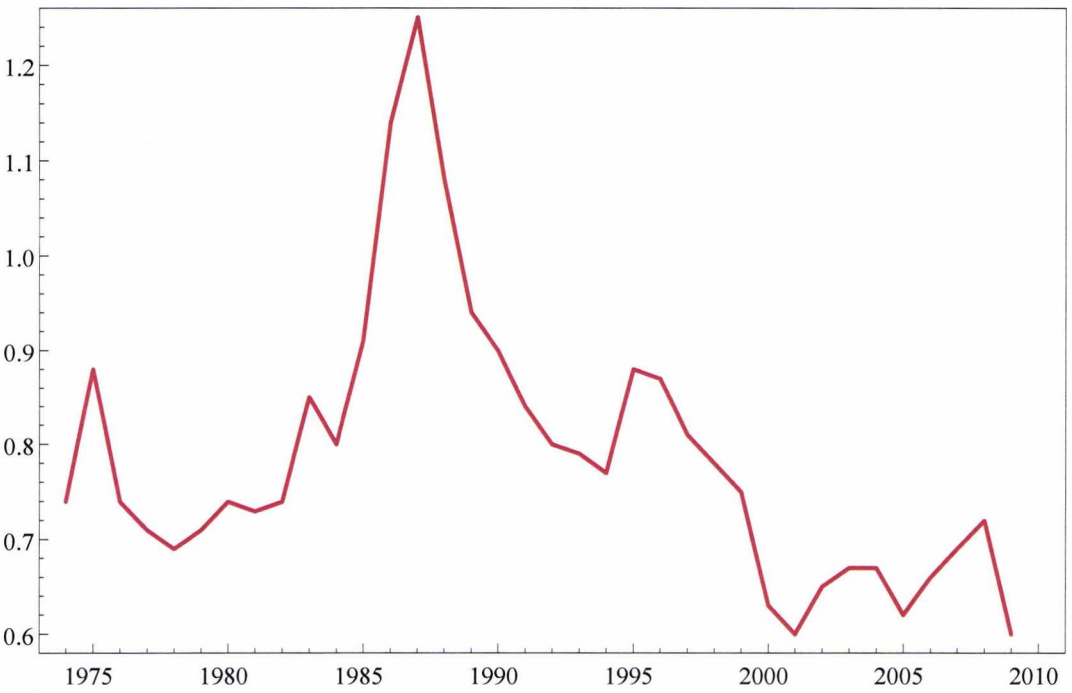


Figure 3.2: Total Public health expenditure relative to GDP

Figure 3.3: Percentage share of provincial health spending out of total public health spending

Table 3.6: Public sector Consolidated (Federal and Provincial) Health Expenditures 1974-2009 (Rs. Billion)

Fiscal year	Total Health Expenditure	Development Expenditure	Current Expenditure
1974	0.64	0.36	0.28
1980	1.74	0.94	0.79
1985	4.27	1.88	2.39
1990	7.74	2.74	4.99
1995	16.35	5.74	10.61
2000	24.28	5.94	18.34
2005	40.00	16.00	24.00
2009	78.86	37.86	41.00

Source: G.o.P. (1996 and 2010)

3.3.3 How to Measure Fiscal Decentralisation?

Having discussed the basic health infrastructure in Pakistan, we return to the basic aim of this study which is to find out the effects of political decentralisation of authority, from centre to subnational governments in Pakistan. This study will analyse, whether or not fiscal decentralisation has resulted in efficiency gains and how it has affected the service provision in the local jurisdictions. In this context, it is important to note that this study analyses the effects of political decentralisation on health services, whereas the

sector specific administrative or ministerial deconcentration is not the subject matter of this study. We have seen that federal government had a dominants role in the health sector in Pakistan, overtime; hence, as decentralisation reduces the central government influence, the analysis will isolate its effects on health sector and will make clear the contribution of the subnational governments.

Decentralisation is a multifaceted policy intervention that aims at enhancing efficiency in resource utilisation through informed policy making, therefore, researchers often find it hard to get an optimal empirical proxy for it. One of the possible way-out, normally pursued in the literature, is the use of fiscal instruments to gauge decentralisation. It is normal practice to use the sector specific or total expenditure incurred at the sub national level (i.e. the expenditure approach) to proxy decentralisation. Similarly, revenue accrued from different sources at the local level, is also used to measure local autonomy or local spending capacity (revenue approach).

In this study, revenue approach is adopted for the analysis. Financial indicators regarding the revenue raising powers of provinces helps in measuring the level of local autonomy. In addition, federal transfers also need to be analysed as these contribute to the fiscal capacity of the provinces. Hence, two main sources of provincial finances are used to assess the level of fiscal decentralisation in Pakistan. Such definition is in conformity with Khaleghian (2004), Rondinelli, Nellis and Cheema (1984), Thornton (2007); Rodden (2002) and Iimi (2005). For this study, the expenditure approach[79] was not adopted because of the ambiguity (with respect to the use of development funds[80]) and non-availability of data for the whole period under analysis.

3.3.3.a Measures for fiscal decentralisation

As discussed earlier, measures of fiscal decentralisation in this study are based on the level of fiscal authority as well as economic capacity at the provincial level. Three proxies for fiscal decentralisation were used to measure the level of autonomy in decision-making at the local level. The provinces' most obvious sources of funds are either their own resources (tax as well as non-tax revenues) or the transfers received from the central government, and both are equally important. Therefore, the first two proxies are derived from own source revenues i.e. i) provincial tax revenues from domestic sources and ii)

[79] as is done in many studies including Davoodi and Zou, 1998; Xie, Zou, Davoodi, 1999; Zhang and Zou, 1998 and 2001

[80] Provincial expenditures include development spending that were partly financed by federal government or funded under foreign project assistance

Provincial local revenues, which consist of the domestic tax and non-tax revenues. Non-tax revenues comprise of user charges, prices, fines and profits from autonomous bodies as well as interest, dividends, international grants and assistance at provincial level. Both measures are expressed as ratio of total government revenues. Provincial governments are free to spend these funds and there are no strings attached to these. Thus these measures will present the SNG's local revenue generation capacity and would be indicative of local autonomy.

The third proxy for fiscal decentralisation is federal transfers received by the provinces. These funds originate from the consolidated resource pool and are distributed among the provinces according to the resource distribution formula[81]. It is important to note that these transfers constitute lion share of the provinces' resources. Thus, enhanced federal transfer increases funds availability to the SNGs. To proxy fiscal decentralisation, federal transfers are also expressed as ratio to total government revenues. Thus, the higher level of domestic revenues or federal transfers represents greater flexibility in decision making and this study analyses its effects on health sector outcomes in Pakistan.

Hypothesis:

As discussed above, this study examines the effects of fiscal decentralisation on health sector indicators. The hypotheses rests on the assumption that fiscal decentralisation improves the resources allocation at local level, taking care of local needs and preferences; and this will lead to positive effects in health sector.

Main hypothesis regarding the effects of Fiscal decentralisation:

1. ***Provincial Autonomy***: Higher revenue collection from domestic sources improves provincial autonomy and leads to independence in local decisions making. The hypothesis is that higher level of provincial autonomy will result in better health facilities to the people, as improved health ensures better quality of life.

2. ***Provincial Capacity***: Federal transfers are important to provide the subnational government with adequate financial capability, so that they can achieve what is necessary for the people. This measure will quantify the effects of higher resource transfers from federal to subnational governments. Thus, analysis of provincial

[81] Which was based on provincial population, during the period under analysis

capacity will make it clear, whether or not the increased level of federal transfers helped Pakistan to achieve the desired positive effects in health sector.

These hypotheses will help in examining the effects of fiscal decentralisation on health sector in Pakistan. Fiscal decentralisation in the form of provincial autonomy is assumed to ensure that resources are allocated to the most immediate and important public needs, which is also expected to yield efficiency gains due to better targeting. Similarly, fiscal decentralisation in the form of higher federal transfers is also very important, because in Pakistan, provinces are heavily transfers dependent. By estimating the effects of federal transfers, the purpose is to analyse the effects of partial fiscal decentralisation (Brueckner, 2009), where the federal government collects revenues and the provincial governments has the responsibility to spend it in accordance with local needs.

3.4 METHODOLOGY

The available literature on health sector exhibits its importance and the researcher's interest in the topic. Different health outcome indicators like infant mortality rate, life expectancy and child immunisation were used to analyse the effects of decentralisation on health sector. However, the fundamental issue with such long term indicators is that, health outcome indicators are inherently influenced by a number of local and foreign factors including level of awareness in the society, education level, vaccination campaigns, food and hygiene situation as well as funding from the international donors and compliance with international obligations like Millennium Development Goals. As evident, some of these factors are far from local government control, which makes it difficult to accurately analyse the true impetus. In addition, Akin *et al.* (2001) pointed out an interesting situation in developing countries where the increasing level of decentralisation in health sector is associated mainly with the incentives provided for primary health care assistance. It was elaborated that international donor agencies like WHO and UNICEF makes the involvement of local community mandatory to advance grants and hence, it was the pre-requisite for health sector assistance that led to decentralisation, not the other way around. Therefore, restricting merely to health outcomes might leave us with insufficient information. What we need to analyse is the effects of fiscal decentralisation on input, output and outcome variables in health sector to properly analyse its short, medium and long term effects.

Hence, despite the mentioned issues in gauging effects related to health outcomes, we cannot ignore these. One can only comment on the situation, once the relationship is empirically estimated and assessed using appropriate econometric techniques. Therefore, as first step, this study estimated the effects of fiscal decentralisation on various health indicators and results are assessed thereafter to infer accordingly. A thorough analysis would help in finding out, whether fiscal decentralisation mechanism in Pakistan was successful in materialising the expected positive gains; in the form of better targeting, enhanced efficiency and better utilisation of scarce resources? Besides, this study aims to assess whether the impact of fiscal decentralisation was uniform or it differed among the provinces, for which the provincial data would be used.

3.4.1 Nature of Analysis

To proceed with the analysis, first of all the aggregate national level data is explored to find out how health sector was affected by the decentralisation, overtime. As discussed earlier, fiscal decentralisation at local level will be analysed both in the shape of local autonomy in decision making (own source revenues) as well as by analysing the effects of fiscal capacity (federal transfers), at provincial levels. Decision making autonomy helps SNGs in better targeting, while federal transfers[82] enhances provincial fiscal capability to serve the people.

The most important effect at national level is primarily to analyse the effects on health expenditure because in the central setup like Pakistan, a number of health interventions are financed by federal government. Therefore, it would be interesting to analyse the total health spending, when the provinces started to enjoy greater resources from the centre. The second important effect to analyse is that how fiscal decentralisation has affected the ground realities i.e. health infrastructural facilities (hospital beds) and the health services i.e. Doctors availability to public. Similarly, the effects of fiscal decentralisation on health outcome i.e. infant mortality rate were also analysed. Therefore, the first part of the empirical analysis is dedicated to the analysis at the national level, where the effects of fiscal decentralisation on health sector in terms of health spending, health infrastructure and health outcomes were analysed.

Following that, the second part of the empirical analysis reports the impact of fiscal decentralisation on health infrastructural facilities at the provincial level. The provincial level analysis would identify, whether fiscal decentralisation has improved the service

[82] That constitute lion share of provincial budgets in Pakistan

delivery and were provincial governments able to translate greater provincial resources in better health opportunities? Thus, analysing both the national and provincial level data would provide us with a comprehensive broader picture.

3.4.2 Data and Methodology for the Analysis at National level

This section elaborates the methodology used for the analysis at the national level. We will discuss different health indicators and the important determinants in each case. Data availability and sources of data are discussed while the important variables are presented graphically.

3.4.2.a Theoretical model and determinants of public health expenditures

Based on the discussion in Robalino *et al.* (2001), Jiménez and Smith (2005), Khaleghian (2004), Jiménez-Rubio (2011 a, b) and Uchimura & Jütting (2009), we can model the health sector indicators[83] for its relationship with decentralisation. Basic hypothesis in these studies is that health outcomes are determined by political, economic, social and demographic characteristics of the country. As discussed, in this study four health sector indicators are used to quantify the effects of fiscal decentralisation. First indicator can be regarded as health sector input variable, represented by total health expenditures in Pakistan. The second and third indicators represent the health sector output measures, including health infrastructure in the form of hospital beds availability and health services i.e. number of doctors. Lastly, fourth indicator will measure an outcome factor by assessing infant mortality rate. As all of these indicators are meant to explain health sector, therefore, there is an overlap in the explanatory variables that are used to explain each health sector indicator. Section below explains each equation in greater details.

(i) ***Health Input Equation***

Pubic health care expenditure is the prime input in ensuring basic health facilities. It has important bearing on the existing health facilities while it also determines their future availability. Therefore, we will start with per capita total health expenditure[84] which can be modelled as Eq. (1).

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[83] In addition, we also benefited from the studies which had explicitly analysed the determinants of different health care indicators including Abbas and Hiemenz (2011), Toor and Butt, (2005), Di Matteo (2005), Freeman (2003), Di Matteo and Di Matteo (1998) and Siddiqui et al. (1995).

[84] Including both the current expenditure and development expenditure

$$Hepc_t = \alpha_{11} + \theta D_t + \beta_{11} Y_t + \beta_{12} FD_t + \beta_{13} GE_t + \beta_{14} Lfp_t + \beta_{15} Pgr_t + \beta_{16} Aid_t + \varepsilon_{1t}$$

Eq.(1)

where $\boldsymbol{Hepc_t}$ is the per capita consolidated health expenditure, denoting the basic health input. Eq.(1) will isolate the immediate effects of fiscal decentralisation on health sector. Along with fiscal decentralisation other determinants of health expenditures includes overall level of economic prosperity, general government expenditure policy, population demographics and foreign aid. Lastly, $\boldsymbol{\varepsilon_t}$ represents the error term in each equation while the subscript $\boldsymbol{t}$ denotes time i.e. $\boldsymbol{t} = 1, \ldots, 36$.

Health expenditure at the national level can be divided into development and non-development (current) expenditures. The development expenditure helps in the purchase of new equipment, training of personnel and building new medical facilities, hence, impact of such spending need some time to appear. On the other hand, the impact of non-development expenditure can be felt in the same period as it relates to the operational needs of the existing health facilities. It is important to note that non-development expenditure has most of the time dominated the development expenditure. However, keeping our focus on fiscal decentralisation, we will not go into such deeper details and will concentrate on the total heath expenditure at the national level. Discussion below summarise each of the explanatory variable for its effect on total per capita health expenditures (***Hepc***), as indicated in Eq.(1).

***Per capita Gross Domestic Product (Y)*:** Among the explanatory variables one of the important determinants of health spending is the per capita Gross Domestic Product (GDP). It is leading development indicator in the social sector studies that is used to capture the prevailing living standards in the country. It determines the resource availability in the economy and thus is assumed to have positive effect on public health expenditure.

***Fiscal decentralisation (FD)*:** As the main focus of the study is to analyse the effects of fiscal decentralisation, provincial autonomy and federal transfers were used (as ratio to total government revenues) to assess its effects. Theory of decentralisation suggests that efficiency gains can be achieved through localisation and it can help in the provision of public goods in accordance with local needs and preferences because local setup has better channels of information (as these are located near to the people) to get informed about local demands. Due to the large number of influences on health sector, one cannot rule out the possibility of either positive or negative effects of fiscal decentralisation on total health

expenditures. In the absence of any fundamental change in the public health investment in Pakistan, fiscal decentralisation captures the commitment of the subnational levels to health spending and there are possibilities that overall spending on health may increase if local governments start to spare even more money on the health provision. However, if decentralised setup is not interested in higher spending but instead achieves better targeting, avoid unnecessary spending, eliminate duplication of services and is able to cap any loopholes in the spending chains, decentralisation can have negative effect on the overall health spending. Therefore, fiscal decentralisation contains important information and is expected to summarise the behaviour of subnational governments, overtime, with special reference to health expenditures.

***General government expenditure (GE)*:** Similarly, policy regarding general government expenditure is also very important and it is used to proxy government's commitment to the health sector. Generous government expenditure policy is expected to be seen in the health spending as well and we can expect it to have positive sign. However, if governments are involved in extravagant non-development spending, this can divert funds from the social sector and thus can exert negative effect on health spending. Hence, the significance and sign of this variable will provide interesting insights into the matter.

***Labour-force participation rate (Lfp)*:** As discussed earlier, private sector is an important provider of health services in Pakistan. Due to the unregulated private sector, it is difficult to find reliable data to represent the effects of private sector on the government's health spending policy. One possible solution to this situation, however, can be suggested as the use of labour-force participation rate to proxy the affordability of the people. Basically we assume that if there are more people able to work in the economy (that is operating at the natural rate of unemployment[85]) this can probably increase the chances to afford to pay for the private health facilities. Thus increased labour force participation is assumed to reduce general dependence on public health facilities, leading to reduction in public spending and vice versa. However, it is clear that labour force participation rate is not a perfect proxy for capturing the private health facilities in Pakistan.

Population growth rate (Pgr): The demographic characteristics of the country also play an important role in determining total health expenditure at the national level. It is believed that benevolent government has to take into account the population growth rate so as to maintain/improve prevailing health status in the country. Hence, if population growth is on

[85] During the period under analysis (1974-2009) the average rate of unemployment was 4.88 percent

the rise, government has to increase its unavoidable spending[86] otherwise, availability of health facilities, on average, will deteriorate.

Foreign aid (Aid): Foreign aid from various donor agencies also plays an important role, as these are intended to supplement governments' given efforts. Foreign aid is expected to increase health expenditures, because these funds should lead to the initiation of new projects, which needs certain efforts from the grant receiving country as well. However, if countries start to replace government spending with foreign aid (instead of supplementing it) then it would lead to negative effects, and it is important to know the exact effects in Pakistan.

Having discussed Eq.(1) that elaborated model for the effects of fiscal decentralisation on health expenditures, the next sub-section discusses the health outcome variables. Health expenditures can give us a hint about the immediate reaction of subnational governments to health sector, but even more important is to analyse the effects of fiscal decentralisation on actual health facilities on the ground. Thus the next sub-section will enable us to identify the service provision aspects of fiscal decentralisation in a more elaborate manner.

(ii) ***Health Output Equations***

In this study, two outcome variables i.e. health facilities and health services, are considered to determine the medium term effects of fiscal decentralisation on health sector. In Eq.(2), ***bedtp*** represents hospital beds availability to population and is used to proxy the health infrastructure facilities available to the public. Due to the non-availability of data from the private sector, only data from the public hospital are used. In addition, Eq.(3) represents Doctors availability to population, denoted by ***doctp***, and would capture the effects of fiscal decentralisation on available health services in Pakistan. The given health output indicators are modelled as presented in Eq.(2) and Eq.(3):

$$Bedtp_t = \alpha_{21} + \beta_{21} Hepc_t + \beta_{22} FD_t + \beta_{23} GE_t + \beta_{24} Pgr_t + \beta_{25} Urb_t + \varepsilon_{2t}$$

Eq.(2)

[86] Expenditure on lady health workers program, mother/child care centres and immunisation campaigns

$$Doctp_t = \alpha_{31} + \beta_{31}Hepc_t + \beta_{32}FD_t + \beta_{33}Lfp_t + \beta_{34}Pgr_t + \beta_{35}Urb_t + \varepsilon_{3t}$$

Eq.(3)

where

***Hepc*:** indicates consolidated public health expenditure in per capita terms which contains both the development as well as non-development expenditures. Health expenditure is an important determinant of health infrastructural facilities and health services, which is expected to yield positive effects.

***FD*:** represents provincial autonomy and partial federal decentralisation measures and three proxies are used to assess these effects as discussed earlier. Conditional upon the effectiveness of local governments, this variable is expected to have positive effect on health facilities and services.

***Ge*:** represents general government expenditure (as ratio to GDP) and is included in the model to evaluate the effects of government spending on hospital beds availability. The sign and significance of government expenditures will exhibit the commitment of rulers to people's social needs.

***Pgr*:** represents population growth rate and is very important variable. While planning future needs, if government fails to take population growth into account, it will affect the availability of hospital beds and health services to the rest of the people. Thus, this measure will gauge government preparedness for the future needs.

***Urbanisation (Urb)*:** is used to proxy the availability of important urban facilities to the people. In Pakistan, there is steady trend of migration from rural to urban localities, hence, this measure will show the effect of urbanisation on hospital beds and doctor's availability to public. This measure will also indicate whether or not there is urban bias in the provision of health facilities, in Pakistan. Urbanisation is represented by the ratio of urban to total population.

***Lfp*:** It is important to find out the role of private health care sector and to see how this sector affects the availability of necessary health services to general public. As private health facilities provide services of doctors and medical specialists, therefore, access to private facilities is important to analyse. For this purpose, in the absence of appropriate

data, labour force participation is once again used to proxy public affordability to pay for private health facilities, and is indicated by ***lfp***.

Hence, Eq.(2) and Eq.(3) will analyse the effects of fiscal decentralisation on health output measures, which determines the availability of health facilities to general public. The next section presents the final regression equation to analyse health outcome factor at the national level.

(iii) ***Health Outcome Equations***

Finally, infant mortality rate (***imr***) is used to determine the long run effect of fiscal decentralisation policy on health outcomes. This measure will report the ultimate effect of fiscal decentralisation policy on health sector in Pakistan. Eq.(4) summarise the situation as below.

$$imr_t = \alpha_{41} + \beta_{41}Hepc_t + \beta_{42}FD_t + \beta_{43}Bedtp_t + \beta_{44}Lfp_t + \beta_{45}Aid_t + \beta_{46}Fenrl_t + \varepsilon_{4t}$$

Eq.(4)

where ***imr*** is the dependent variable and represents infant mortality rate (per 1000 live births). The important control variables are discussed below.

Hepc*:** indicates consolidated public health expenditure in per capita terms which contains both the development as well as non-development expenditures. Infant mortality can be effectively reduced by ensuring appropriate vaccination and achieving better food and hygiene for children, which shows the importance of health expenditures. Moreover, as in Pakistan, federal government has remained engaged in running periodic vaccination campaigns; therefore consolidated health spending will isolate the effects of federal government contribution in reducing ***imr.

***FD*:** indicates the variable of interest which is represented by the three proxies for fiscal decentralisation. As advocacy for local governments rests on the assumption of being people focussed therefore, fiscal decentralisation is assumed to have positive effect on health and is expected to reduce infant mortality. Fiscal decentralisation is also expected to result in better coverage and greater participation from the public, which will result in the

successful execution of vaccination campaigns, which will ultimately lead to reduction in ***imr.***

***Bedtp*:** is used to proxy the health infrastructure facilities in Pakistan and is represented by the hospital beds availability. Better health facilities are assumed to help in curbing health issues and would help in saving human life, including those of infants as well.

***Lfp*:** Moreover, private health care services are quite important in Pakistan, but due to lake of data, the labour force participation is used as proxy for affording private health facilities.

Aid*:** International donors contribute to various programs that are aimed at improvement of public health, in general and childcare, in particular (e.g. immunisation and polio reduction campaigns). Therefore, ***aid represents foreign aid in per capita terms from UNICEF and is included in the model to evaluate its effects on ***imr***.

Fenrl*:** Lastly, female education plays very important role in ensuring better food and hygiene situation for and from 'to-be mothers' and it has direct effect on infant's health. In the absence of data on female literacy, we have used Female primary school enrolment (in thousands) to represent female education. Although, this might give rise to questions but there is no data available for the relative age groups of female population that are illiterate, which could be used as denominator. Nevertheless, ***fenrl will provide us with approximate directions of female literacy on infant mortality, instead of pushing this information towards error term.

To sum up, the given four health sector indicators will enable us to find out the effects of fiscal decentralisation in Pakistan, overtime. This effort will provide a comprehensive picture of the health specific effects of fiscal decentralisation in Pakistan. The next section provides details of the data availability for the analysis at the national level, while the provincial analysis will be presented at section 3.7.2.

3.4.2.b Data availability

For this study, national data set consists of times series observation for 36 years i.e. from 1974-2009. Data was collected from a number of sources including World Bank, Pakistan Economic Survey (G.o.P.), State Bank of Pakistan (2005, 2010) and Annual Budget Statements. As discussed earlier, the set of independent variables include; local autonomy and local capacity to represent fiscal decentralisation in Pakistan, level of economic prosperity, government commitment to public needs, affordability of private

health sector, (access to) improved infrastructure facilities, population needs and lastly, foreign aid in health sector. In order to quantify the effects of these important determinants in health sector, following proxies were used i.e. measure of fiscal decentralisation (revenue collected at local level and federal transfers to provinces), per capita GDP, consolidated general government expenditure, labour force participation rate, urbanisation, population growth and health specific foreign aid, respectively. Table 3.7 summarise the definitions and sources of the stated variables at national level.

Table 3.7: Variables names, definitions and sources of data

Variable	Name	Definition	Source
Health Expenditures	*Hepc*	Per capita real health spending (consolidated spending by federal and provincial governments)*	G.o.P. 1995, 2010, PSYB, 2009
Provincial own source revenues	Fd_{tax}	Provincial tax revenue ratio**	SBP, 2005; G.o.P. Various issues
Provincial local revenues	Fd_{loc}	Provincial tax + non-tax revenue ratio**	-do-
Federal transfers	Fd_{trans}	Federal transfers to provinces ratio**	-do-
Economic prosperity	*Y*	Per capita GDP (at constant prices)	WDI, World Bank
Government spending	*Ge*	General government expenditures (expressed as ratio to GDP)	-do-
Labour force participation	*Lfp*	Labour force participation rate	WDI, World Bank, G.o.P. Various issues
Urbanisation	*Urb*	Ratio of urban to total population	-do-
Population growth	*Pgr*	Population growth	WDI, World Bank
Foreign Aid (by UNICEF)	*Aid*	Per capita Foreign Aid (by UNICEF)	-do-
Health infrastructure	*Bedtp*	Number of hospital beds available per (000) population	-do-
Health services	*Doctp*	Number of Doctors per (000) population	-do-
Infant mortality	*Imr*	Infant mortality rate per 1000 live births	WDI, World Bank
Female literacy	*Fenrl*	Female primary school enrolment (in thousands)	SBP, 2005

Note1: * expressed in real terms using the GDP deflator[87]

Note2: ** Fiscal decentralisation measures were expressed as ratio to total government revenues

[87] GDP deflator (year 2000 as base) was used due to the non-availability of appropriate deflator for Medicare

3.4.2.c Graphical analysis over time

In this section, important variables are presented graphically[88] to discuss their overtime behaviour during the period under analysis. As variables are presented in real numerical values (without logs), these are shown in separate figures, mainly due to differences in measurement unites and bases. To start with, the dependent variable i.e. per capita total health spending is presented as Fig. 3.4.1 at Figure 3.4. It is clear that total allocation for public health spending remained alarmingly low during the entire period. We have already noted in Figure 3.2 that public health expenditure constituted less than one percent of GDP. Only two years were exceptional, when health expenditures crossed one percent mark [1986 (1.14%), 1987(1.25%)], therefore, 1987 was the year with highest per capita public health spending as shown in Figure 3.4.1. Health spending remained quite volatile for most of the period however after year 2000 there was slight improvement in the situation.

Fiscal decentralisation was represented via three major sources of provincial revenues i.e. the provincial tax revenues, provincial local (tax and non-tax) revenues and federal transfers. All the proxies of fiscal decentralisation were expressed as ratio to total government revenues. Provincial tax revenues are presented at Fig. 3.4.2, which depicts that revenue from domestic sources has relatively shrunk overtime. In 1974, provincial tax revenues constituted about 8 percent of total government revenues which reduced to 3 percent in 2009. This situation can be attributed to the stagnant revenue generation by the provinces (characterised by lack of incentives) and more importantly because of the ever increasing federal resources[89]. Similar behaviour can be observed in Figure 3.4.3 presenting provincial local revenues[90] but it shows somewhat improvement after 1990's, when provinces started to receive different royalties (oil, gas, electricity) from the centre. Hence, provincial ability to generate revenues from tax and non-tax revenues, collectively, accounted for 7 percent of consolidated government revenues in 2009.

Figure 3.4.4 presents federal transfers which indicate two periods of trough during 1980-86 and 1997-2005. During the first period i.e. 1980-86, federal transfers to the provinces remained very low because of strong federal government at the centre. Under the autocratic government, provinces were ruled by the unelected governors, hence, provincial

[88] Separate figures represent variable in real numerical values (without logs)
[89] Over the time, central governments kept control of buoyant taxes which left provinces with exhausted revenues sources and situation lead to transfer dependent behaviour on part of provinces
[90] Which consists of domestic tax and non-tax revenues

governments had limited role. Immediately after the 1985 elections, provinces started to receive greater transfers. With the continued democratic process, provinces started to receive even more resources due to the expansion of the divisible pool (following 1991 National Finance Commission[91] (NFC) award) and there is noticeable increase in federal transfers to provinces during 1991to1996. Nonetheless, these arrangements could not continue for long and the subsequent NFC award in year 1997[92] significantly reduced funds availability to the provinces, as is visible in the figure. Lastly, after year 2004 federal transfers to the provinces are on the rise again.

Figure 3.4.5 summarise per capita GDP, which shows fairly stable positive trend overtime. Nevertheless, during the 1990's there was a phase of relatively low economic output and this can be attributed to non-stable political environment, the widespread economic sanctions after the 1998 atomic tests and frequent change of power. Similarly, government expenditure policy is shown in Figure 3.4.6 which indicates general government expenditure[93] relative to GDP. Graphical inspection indicates great volatility in government expenditure. Government expenditure in its relative perspective peaked during 1989 but then it showed downturn during 1990's. However, after 2005 due to the deteriorating peace situation and 'War on Terror', there is sharp rise in the expenditures incurred on law enforcing agencies and thus government expenditures once again show an upward trend.

Figure 3.4.7 shows total labour force as ratio to total population and indicates that the demographic bonus phase for Pakistan has started (Arif and Nusrat, 2008; Hussain *et al.* 2009). Figure depicts that during the last decade, Pakistan has started to experience the growing labour force, mainly due to the higher population growth rate in the past but also because of increased female participation in labour market. Figure 3.4.8 indicates population growth which shows negative trend after 1985. Similarly, there is continues migration from rural to urban localities due to better economic and social opportunities as shown by urbanisation in Figure 3.4.9, where urban population was shown relative to total population. In 2009, 36 percent of the population was living in the urban areas (G.o.P.

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[91] National Finance Commission is the constitutional set up which is responsible for intergovernmental fiscal resource distribution

[92] Which was decided by an interim government that had basically the mandate to conduct new elections

[93] *"General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defence and security, but excludes government military expenditures that are part of government capital formation"* (WDI-definition)

2010). As population census in Pakistan was conducted with unequal time intervals[94] therefore, the population figures are based on estimates and shows nearly a linear trend.

Figure 3.4.10 presents the volatile nature of health specific foreign aid (from UNICEF), in per capita terms. It can be noticed that foreign aid remained quiet low as compared to public spending at Figure 3.4.1. Moreover, Figure 3.4.11 represents number of beds in public hospital per thousand people. Improvement can be noticed in hospital beds availability till 1994 while thereafter continuous deterioration is clear. Figure 3.4.12, on the contrary, summarise the consistent improvement in health status as the Infant mortality rate has steep negative slope. Lastly, Figures 3.4.13 and 3.4.14 represent the doctor's availability to population and female school enrolment at primary level, where both post positive trends.

[94] During the period under analysis, two population census were conducted, one during 1981 while the second took place during 1998

Figure 3.4: Graphical representation of important variables (in respective accounting values-without logs)

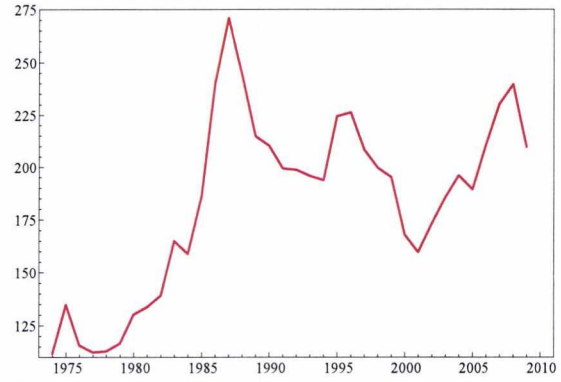

Figure 3.4.1: Real public health expenditure per capita (Rs.)

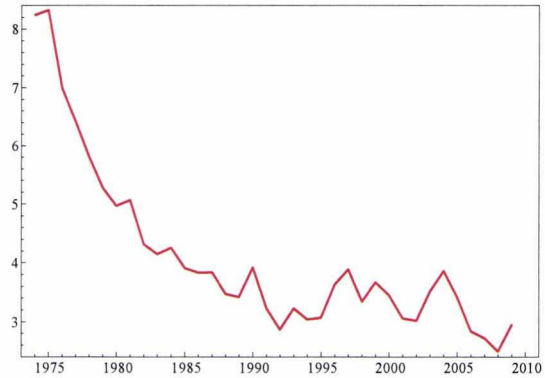

Figure 3.4.2: Provincial Tax Revenue as ratio to Total Government Revenue

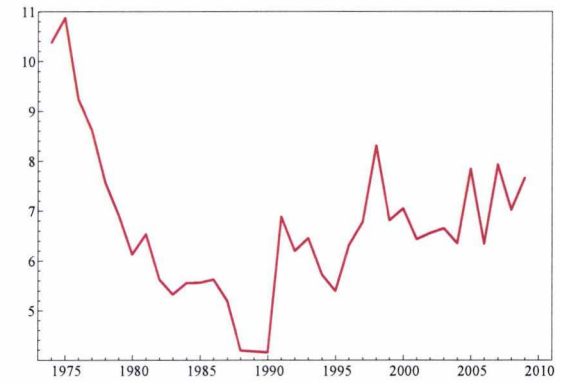

Figure 3.4.3: Provincial Tax+Non-Tax Revenue as ratio to Total Government Revenue

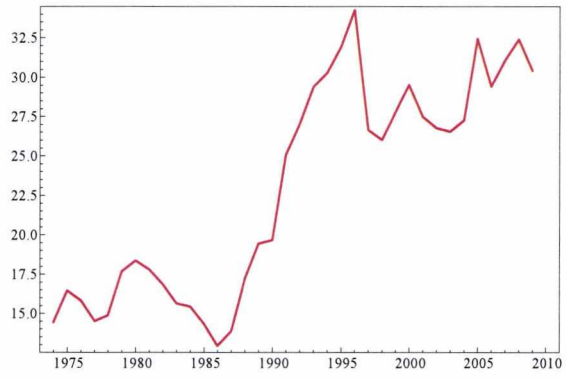

Figure 3.4.4: Federal Transfers as ratio to Total Government Revenue

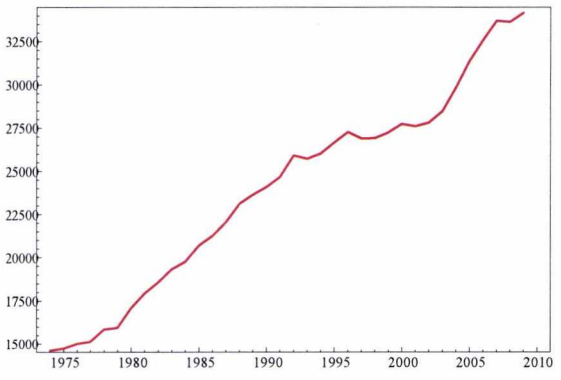

Figure 3.4.5: Per capita GDP (Rs.)

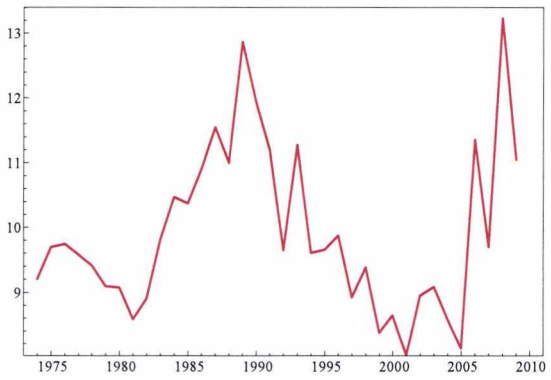

Figure 3.4.6: Ratio of Government Expenditure to GDP

Figure3.4: Graphical representation of important variables (in respective accounting values-without logs) (cont...)

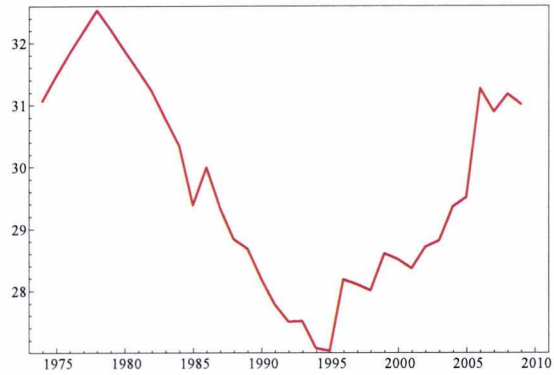

Figure 3.4.7: Ratio of Labour Force to Total Population

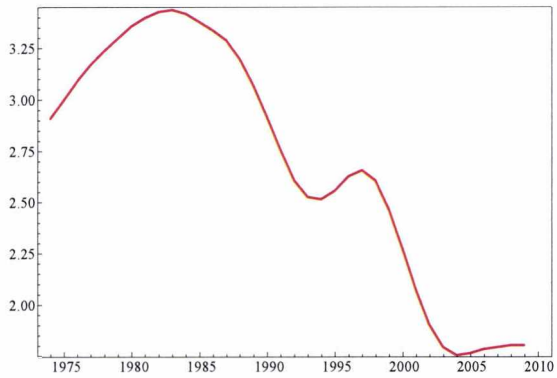

Figure 3.4.8: Population Growth rate

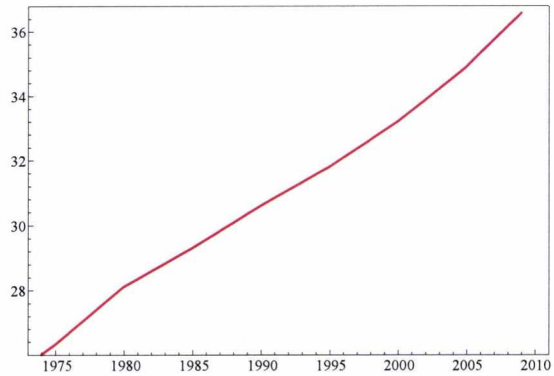

Figure 3.4.9: Ratio of Urban to Total Population

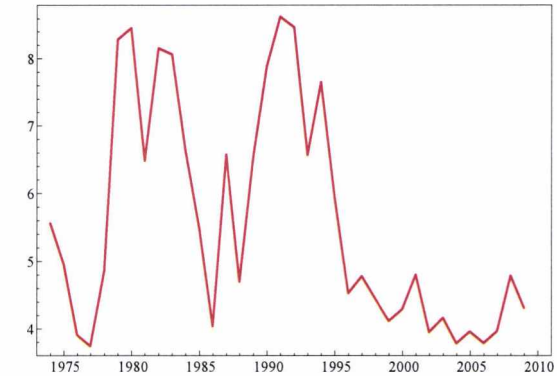

Figure 3.4.10: Per capita Foreign Aid by UNICEF (Rs.)

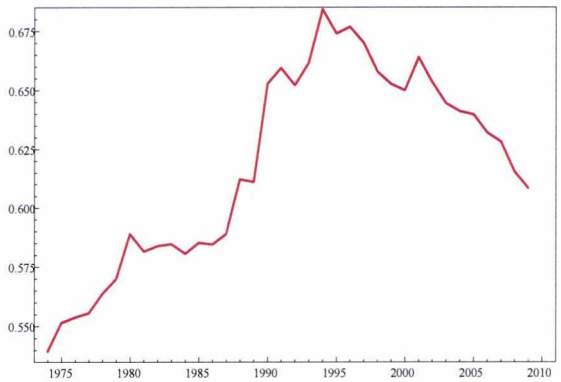

Figure 3.4.11: Number of beds in public hospital per (000) population

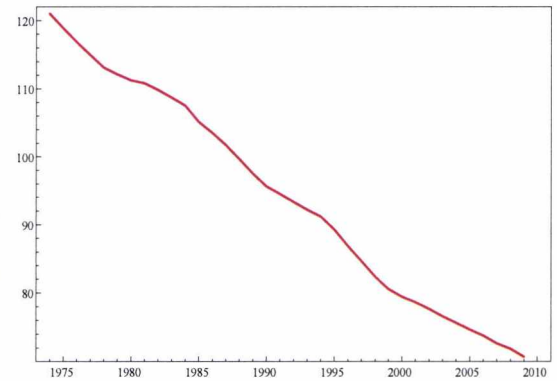

Figure 3.4.12: Infant mortality (per 1000 live births)

Figure 3.4: Graphical representation of important variables (in respective accounting values-without logs) (cont...)

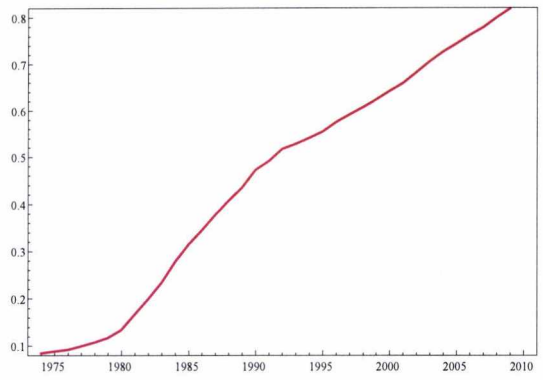

Figure 3.4.13: Number of Doctors per (000) population

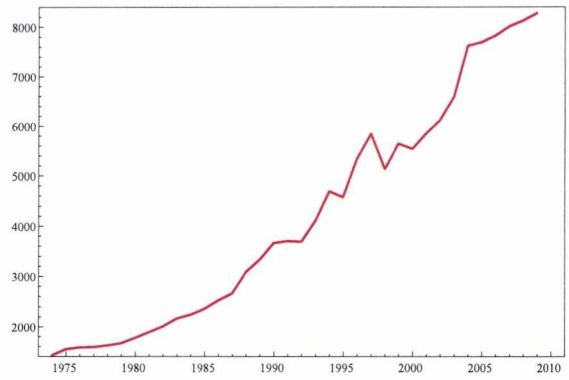

Figure 3.4.14: Female school enrolment, primary (000)

3.4.2.d Unit root test

In general, the time series data is non-stationary and to get reliable empirical results it is very important to know the correct order of integration for each variable, so that we can select appropriate methodology for estimation. For this purpose, the Augmented Dickey–Fuller (ADF) test was undertaken for all the data series. The ADF test contains the short run dynamics and is based on the vector error correction form. To start with, two[95] lags were allowed for each variable to whiten the error process. The procedure normally starts with the estimation of the more general form as presented in Eq. (5) that contains the deterministic terms including 'constant' and 'trend' factors. The null hypothesis is that the variable contains unit root i.e. it follows an integrated process. Hence, the null hypothesis H_0: $\pi = 0$, is tested against an alternative that variable is stationary i.e. H_1: $\pi < 0$. During the first stage of estimation, one can check for the significance of deterministic terms[96], otherwise, model is estimated without it. Hence, if calculated value of the ADF test statistic is higher than the critical values, the null hypothesis of unit root is rejected and vice versa.

$$\Delta y_t = \alpha_0 + \delta t + \pi y_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta y_{t-i} + \varepsilon_t \qquad \text{Eq. (5)}$$

[95] As a rule of thumb, two lags are used for annual data to ensure a serially uncorrelated error term

[96] Because the limiting distribution changes with the presence of either of the intercept and trend terms, consequently different critical values are required in each case

The ADF test results are presented in Table 3.8 and it contains the set of variables that were used in this study. For each variable, final number of lags was selected with AIC criteria and is shown in parenthesis. The test results indicate that most of the variables were non-stationary at levels except ***doctp*** which was level stationary while the other four i.e. ***urb, pgr, aid*** and ***imr*** were trend stationary. Hence, following the results for variables at levels, ADF test was applied to variables in first differences and all were found to be stationary. In brief, results indicate that the data set contains mix of variables where some are level and trend stationary while the rest were integrated of order one.

Table 3.8: ADF results for variables considered during estimation

Variable	τ - ADF with Constant	τ - ADF with Constant and Trend	Variables	τ - ADF with Constant
he	-2.542(1)	-----	Δ *he*	-3.715**
fd_{tax}	-2.850(2)	-----	Δfd_{tax}	-5.254**(1)
fd_{loc}	-2.767(2)	-----	Δfd_{loc}	-3.946**(2)
fd_{trans}	-0.9914	-----	Δfd_{trans}	-4.745**
ge	-1.865(2)	-----	Δ *ge*	-2.988*(1)
y	-2.011	-----	Δ *y*	-4.367**
lfp	-1.216	-----	Δ *lfp*	-5.357**
urb	-----	-1.915	Δ *urb*	-2.192
pgr	-----	-3.265	Δ *pgr*	-5.485**(1)
aid	-----	-3.041	Δ *aid*	-6.484**
bedtp	-1.856	-----	Δ *bedtp*	-5.041**
doctp	-3.787**(1)	-----	Δ *doctp*	-----
imr	-----	-3.046	Δ *imr*	-2.966*(2)
fenrl	-0.7208	-----	Δ *fenrl*	-6.558**

Note: All variables were expressed in log form, indicated by lower case letters

3.5 ESTIMATION TECHNIQUE AT THE NATIONAL LEVEL

Health sector intervention takes fairly long time to become visible and similar happens in the case of fiscal decentralisation, therefore, in this study, the main focus is to explore the long run relationship between public health indicators and fiscal decentralisation. The cointegration technique is used to investigate the long run

relationship. As the data span is 36 annual observations only, therefore, in order to avoid spurious results and to investigate the long-run relationship among the variables, it is optimal to adopt the single equation approach to enquire long run cointegrating relationship. Furthermore, results for the unit root test suggests that equations (Eq.(1) - Eq.(4)) contain variables that are integrated of different orders i.e. I(1) and I(0), therefore, the ADL approach by Kiviet and Phillips (1992) was followed. Kiviet and Phillips (1992) suggested test for cointegration that uses the lagged level dependent variable as the error correction term to correspond to the existence of long run relationship. As the ADL models encompass all the nested models, including Error Correction Model (ECM), the unrestricted dynamic ECM model presented by Kiviet and Phillips (1992) can be written in general form as in Eq. (6):

$$\Delta y_t = \boldsymbol{\alpha}' \Delta \boldsymbol{x_t} + \beta\, y_{t-1} + \boldsymbol{\theta}' \boldsymbol{x_{t-1}} + \epsilon_t \qquad \text{Eq.(6)}$$

Where y_t is the dependent and $\mathbf{x_t}$ is the vector of independent variables. In the above equation $\boldsymbol{\alpha}'$ represents the short run effect of changes in $\mathbf{x}$ on y. It is important to note that in ECM models, the long run effects are not readily available. The long run multiplier effects for the set of independent variables are calculated using the $\boldsymbol{\theta}'$ estimates[97]. Lastly, the coefficient of lagged dependent variable i.e. β indicates the error correction term and shows the extent of disequilibrium adjusted each period. In other words, (β−1) represents the rate, at which model achieves equilibrium in the long run. The value of the error correction term lies between zero and minus two ($\beta \in 0, -2$), where zero mean no long run relationship among the variables, while value greater than minus one ($\beta > -1$) represents over shooting (Kiviet and Phillips, 1992, pp. 359; Banerjee *et al.* 1998, pp. 269). Hence, any value of β below "−1" ($0 < \beta < -1$) indicates stability of the model.

Keeping in view the limited number of observations in this study, two-stage procedure was used for estimation. Firstly, for each of the health indicators, general ADL model was estimated (without the fiscal decentralisation variables) and test for cointegration was conducted to establish the basic relationship. Once evidence favours the existence of long run cointegrating relation, the fiscal decentralisation measures were incorporated in the ECM representation to deduce the short and long run effects. This

[97] Long run elasticities are calculated by dividing the coefficient of lagged level explanatory variable over the lagged level dependent variable i.e. $k = \boldsymbol{\theta}' / -\beta$, in accordance with Eq.(6) specification

procedure helps in mitigating chances of rejecting true cointegrating relationship, due to the large number of explanatory variables in limited data set. For each equation, time trend was also considered for inclusion to capture trend factor (if any). Moreover, following the rule of thumb for annual data, the general restricted ADL model was framed using two lags for all the variables. Lastly, it is important to mention that all the variables were expressed in log form (represented by the lower case letters) and the coefficient needs to be explained as elasticity.

In data scarce situation, it is very important to make best use of available data points. On the other hand, to get reliable results with autoregressive distributed lag (ADL) model, inclusion of appropriate lags is the most crucial step during estimation. Therefore, after finalising modelling procedure, for the empirical estimation of the stated relationship, the General-to-specific (*Gets*) model selection procedure was applied (Krolzig and Hendry, 2001; Hendry and Krolzig, 2003 & 2005). The *Gets* approach analysis starts with the estimation of plausible general ADL model. This is an iterative procedure where the *Gets* approach removes the insignificant variables and lags (if any) and at each stage of reduction, diagnostic checks are consulted to validate the reduction. This process continues till the final specification is reached where all critical variables are significant and diagnostic tests are satisfied.

Hence, once the congruent parsimonious 'specific' model is obtained (for the given health indicator), the Kiviet and Phillips (1992) test for cointegration was conducted to examine the existence of long run relationship. Upon the confirmation of long run relationship, at the second stage, similar approach was followed for the ECM model[98] where the fiscal decentralisation measures were now incorporated one by one. The algebraic representation for the ADL model (along with the ECM equations, if the long run relationship was established) for each health indicators can be found at Appendix I. Drawing upon the earlier contribution [from Hoover and Perez (1999); Krolzig and Hendry (2001) and Hendry and Krolzig (2003, 2005)]; Doornik (2009) developed an improved version of PC automation for '*Gets*' approach called 'Automatrics', which is used for estimation in this study.

To summarise, *Gets* approach, in this study, improves the analysis by providing congruent parsimonious model. The given procedure and the use of *Gets* approach at both stages (i.e. ADL and ECM estimation), helps in removing the redundant regressors and

[98] Which was based on the congruent parsimonious ADL model, obtained in first stage

lags (if any), which provides better degrees of freedom for the rest of the analysis. The proxies for fiscal decentralisation are then incorporated turn by turn to obtain their short run and long run effects. All variables used in the regression were expressed in log form (represented by the lower case letters). Various misspecification tests including error autocorrelation (AR), heteroscedasticity (ARCH, hetero), non-normality and functional form misspecification test (RESET) were applied to get reliable results.

3.6 EMPIRICAL RESULTS

Following the discussion about the estimation technique, section below provides estimation results for each of the health indicators, at the national level. Main focus of the discussion remains on the signs and significance of the variables and we will not go into the numerical details of each coefficient. To summarise the steps, first of all general economic model was developed to find out the determinants of different health indicators in Pakistan. This initial model was estimated with *Gets* approach to get parsimonious specific model, which was then investigated for the existence of long run cointegrating relationship using ADL specification. Following that once it was established that cointegration exists among the variables in the final 'specific' model, the effects of fiscal decentralisation proxies were analysed using the ECM representation (associated with the each ADL model). Finally this section concludes with the results interpretation and conclusion.

3.6.1 Results for Total Health Expenditure Model

This section comprises of the two parts. As the first stage, the existence of long run relationship is investigated for the health expenditure model. Once the cointegration is established, the next sub-section elaborates the signs and significance of the variables.

3.6.1.a Evidence for the existence of LR relationship

To analyse the long run relationship, empirical results for health expenditure model (Eq.(1)) are presented at Table 3.9 and 3.10. The general and specific ADL model, along with the results for cointegration test, is shown at Table 3.9. It can be noticed that the *Gets* approach results in the exclusion of one explanatory variable namely government expenditures (***ge***). In addition, GDP per capita (*y*) and population growth (***pgr***) lost their insignificant lags while in case of labour force participation rate (***lfp*** - proxing private health sector) and foreign aid (***aid***), only lags could achieve significance. Thus the final

specific ADL model for health expenditures regression contains ***y, lfp, pgr*** and ***aid*** along with the lagged levels of dependent variable i.e. ***hepc***.

For given specific model, the cointegration test-statistic "-5.64" is highly significant and indicates the existence of long run relationship between health expenditure and given variables. The *PcGive* unit root test (representing cointegration test by Kiviet and Phillips, 1992) is highly significant at 1 percent level of significance. Hence, with the given data and analysis, there is strong evidence for the existence of long run relationship between per capita total public health expenditure and the given explanatory variables. Last column in Table 3.9 shows the static long run solution for the 'specific' model, where values are adjusted for the lagged level dependent variable. It is important to note here that all the variables were highly significant except ***lfp***, which corresponds to the opposite signs on near-equal lagged level values in the specific model. For this reason, ***lfp*** could not achieve significance in the ECM model as well and was finally left out of the model[99]. Once there is enough evidence about the long run relationship and the redundant regressors are eliminated, it is now possible to add the fiscal decentralisation measures into the ECM representation of the specific ADL model to disentangle the short run and long run effects of fiscal decentralisation.

Table 3.10 contains result for the 'specific[100]' ECM models for ***hepc***, where results for each of the three fiscal decentralisation measures are presented in separate columns. The upper portion of the table shows the short run effects for the general determinants of health expenditures, followed by their lagged level effects in the second portion of the table, which implicitly contain the long run effects. Next are the short run and implicit long run effects for the variable of interest i.e. fiscal decentralisation measures. Whereas the lower part of the table homes the sample information and battery of diagnostic tests, that are satisfactory for all the three models. Furthermore, it is important to mention that although *Gets* approach was used, it was only allowed to select the general determinants from the model, making sure not to delete[101] the coefficients for the variable of interest (which were handled manually following the *Gets* approach). This procedure provides the opportunity to comment upon the signs and significance of the coefficients for fiscal decentralisation measures.

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[99] without ***lfp***, *PcGive* Unit root test is still significant and yields **-5.558*****

[100] Obtained with the *Gets* approach

[101] Keeping the status for respective fiscal decentralisation measures as *F:fixed* in *PcGive*, so as to analyse their short run and long run effects

As seen in Table 3.9, results for the respective ECM representation are also in conformity and validate the estimation procedure. The lagged level dependent variable i.e. ***hepc_1*** represents the error correction term and is highly significant with comparable estimates for three models. The error correction terms rang from "0.66" to "0.69" which indicates speedy recovery. This also validates the existence of long run relationship for the given set of variables and shows that with each period following a shock, ***hepc*** will converge to its long run steady state at the speedy rate.

3.6.1.b Coefficient interpretation for the health expenditure model

Once the given long run relationship between fiscal decentralisation and health expenditure is validated, this section contains discussion about the signs and significance of different determinants of health expenditure in Pakistan. To start with, Model 1 in Table 3.10 shows the effects of first fiscal decentralisation proxy i.e. provincial tax revenues (fd_{tax}), on per capita public health expenditures. It is important to note that this variable only appears to have negative short run effect, whereas the lagged level effect is insignificant, despite being positive. Hence higher tax collections at the local level leads to reduction in per capita health spending in the short run but there is no evidence for the long run effects. In the case of the second measure of fiscal decentralisation i.e. provincial local revenues (fd_{loc}), results are presented at Model 2. Despite producing comparing results for the other explanatory variables, the variable of interest i.e. fd_{loc} could not achieve significance for either short run or long run effects. These results are not unexpected as the local revenues at provincial level comprise of both the tax and non-tax revenues collected at the provincial level, and non-tax revenues can be considered as wind-fall gains/losses, hence unreliable. Therefore, local revenues could not capture the autonomy factor at local level. Lastly, the third measure of fiscal decentralisation was federal transfers to provinces (fd_{trans}) and Model 3 reports its effects on per capita health expenditures. Once again, fiscal decentralisation proxy has produced negative effect on dependent variable. Results suggest that as central governments in Pakistan started to transfer more resources to subnational levels, it has negatively affected health spending. The short run effects of fd_{trans} are insignificant while the implicit long run effects, represented by the lagged level effects, has produced highly significant negative coefficient of "-0.38".

Overall, fiscal decentralisation measures have negative relationship with the dependent variable i.e. per capita public health expenditures. Results suggest that greater level of fiscal decentralisation will have negative effects on the total consolidated health

expenditures and it shrinks in its overall volume. In first instance, this is quite unexpected result and reflects that increased level of fiscal decentralisation will further reduce the already meagre health resources. The situation reflects that SNGs in Pakistan are not spending as much as the federal government and there is need to assess its ultimate effects on the provision of health facilities. Results potentially reflect two scenarios; one is that SNGs has different focus and hence allocate resources to other social sector needs like water schemes, street paving and lighting, which can become visible in shorter period of time. On the contrary, this can be related to the positive outcome of fiscal decentralisation, which suggests that although SNGs might not have increased total health spending but it could have reduced any misuse of funds. In addition, SNGs might have achieved better targeting and 'cure before the breakout' strategy (for significant epidemic diseases[102]) which might have resulted in efficient allocation of the scarce resources under decentralised setup. However, there is no empirical evidence for it at this stage and the following sections of this study, which assess the effects of fiscal decentralisation on health outputs and health outcomes, will possibly make the situation clear.

Having discussed the fiscal decentralisation measures, other control variables are in accordance with the existing literature. Results for the lagged level effects indicate that the improvement in economic progress (***y***) will have positive impact on total health spending. This is according to expectation in developing country like Pakistan, which need more resources to achieve better quality of life. Similarly, in order to maintain/improve the existing health facilities, government has to take into consideration the population growth. Results suggest that population growth is positively related to the public health expenditures. This indicates effective planning on the part of the government because increased level of population has shown positive effect on the health expenditures. However, foreign aid will have negative effect upon public health spending in the long run. This is rather disappointing as governments seem to have substituted public funds with foreign funding instead of supplementing the existing resources (whenever these were available). Thus increase in foreign funding has negative effect on public health expenditure, which is obviously not a healthy trend. Within the given empirical setup, ***lfp*** failed to achieve significance and was dropped out of the analysis. Finally, it can be concluded that fiscal decentralisation will not lead to higher health spending in Pakistan and discussion in the next sections will help us in correctly assessing the situation.

[102] This response was noticed in Pakistan following floods and epidemic attacks such as Dengue fever

Table 3.9: Results for ADL Representation of Public Health Expenditure Model (Dependent Variable- Per capita Health Expenditures, *hepc*)

Variables		General ADL Model-1	Specific Model	Solved static long-run equation for *hepc*
Constant	Constant	-23.29*	-20.49***	-23.70***
Health Expenditures per capita	*hepc_1*	0.31	0.66***	----
	hepc_2	-0.62**	-0.52***	----
Economic prosperity (GDP per capita)	*y*	2.66***	2.59***	3.00***
	y_1	0.01	----	----
	y_2	0.43	----	----
Government spending	*ge*	0.42	----	----
	ge_1	-0.08	----	----
	ge_2	-0.05	----	----
Labour force participation	*lfp*	-1.48	----	-0.10
	lfp_1	0.51	-2.07**	----
	lfp_2	0.65	1.99**	----
Population growth	*pgr*	3.14	0.37*	0.43*
	pgr_1	-5.08	----	----
	pgr_2	2.86	----	----
Foreign Aid (by UNICEF)	*aid*	-0.15	----	-0.29***
	aid_1	-0.18	-0.25***	----
	aid_2	-0.18*	----	----
Trend	*t*	-0.04	-0.04	-0.05***
Number of observations		34	34	----
Number of parameters		19	9	----
PcGive Unit root test [#]		----	**-5.644*** **	----
AR 1-2 test		3.5397 [0.0593]	1.6733 [0.2097]	----
ARCH 1-1 test:		0.1987 [0.6588]	0.5391 [0.4682]	----
Normality test:		4.0666 [0.1309]	2.2298 [0.3279]	----
hetero test:		not enough observations	0.5635 [0.8710]	----
RESET test:		2.5774 [0.1308]	0.9936 [0.3856]	----

Significant at 1%=***, 5%=**, 10%=*

Note1: [#] *PcGive* Unit root test represents the Kiviet and Phillips (1992) test for cointegration

Note2: All variables were expressed in log form

Table 3.10: Results for ECM Representation of Public Health Expenditure Model (Dependent Variable- Health Expenditures in 1st diff, $\Delta hepc$)

Variables		Specific Model-1 for fd_{tax}	Specific Model-2 for fd_{loc}	Specific Model-3[#] for fd_{trans}
Constant	Cons	-15.17***	-8.48***	-9.49***
Health Expenditures	$\Delta hepc\_1$	0.37**	0.39**	0.19
GDP per capita	Δy	1.32**	----	----
	Δy_1	----	----	----
Labour force participation	Δlfp	----	----	----
	Δlfp_1	----	----	----
Population growth	Δpgr	6.15***	4.77***	3.34***
	Δpgr_1	-5.49***	-3.94***	-2.48**
Foreign Aid (UNICEF)	Δaid	----	----	----
	Δaid_1	0.13*	0.16*	----
Health Expenditures	$hepc\_1$	-0.67***	-0.69***	-0.66***
GDP per capita	y_1	1.73***	1.17***	1.35***
Population growth	pgr_1	1.37***	1.01***	0.59***
Foreign Aid (UNICEF)	aid_1	-0.25***	-0.25***	-0.03
Provincial tax revenues	Δfd_{tax}	-0.45**	----	----
	fd_{tax}_1	0.21	----	----
Provincial local revenues	Δfd_{loc}_1	----	0.17	----
	fd_{loc}_1	----	-0.12	----
Federal transfers to provinces	Δfd_{trans}	----	----	-0.21
	fd_{trans}_1	----	----	-0.38***
Trend	t	----	----	----
No. of observations		34	34	34
Number of parameters		12	11	11
PcGive Unit root test[103]		**-5.58*** **	**-4.92*** **	**-5.18*** **
AR 1-2 test		3.1739 [0.0635]	2.1106 [0.1461]	2.7692 [0.0856]
ARCH 1-1 test:		0.0691 [0.7943]	0.6230 [0.4357]	1.1618 [0.2891]
Normality test:		1.0978 [0.5776]	0.9153 [0.6328]	3.4957 [0.1741]
hetero test:		0.5718 [0.8726]	1.1130 [0.4315]	0.5345 [0.8945]
RESET test:		1.5234 [0.2422]	0.4363 [0.6522]	0.9405 [0.4063]

Significant at 1%=***, 5%=**, 10%=* ,
Note1: [#] Model 3 includes an outlier dummy for year 1995
Note2: All variables were expressed in log form

[103] As the *PcGive* unit root test provides the significance test for the lagged dependent variable only (which in the ECM representation is not the error correction term) therefore, the critical values and p-values used for the significance for the *PcGive* unit root test in Table 3.10 and 3.14 were obtained using the response surfaces in Ericsson and MacKinnon (1999), as implemented in the program ECMtest.xls (version 1.0) and discussed in Ericsson and MacKinnon (2002), pp. 316

3.6.2 Results for Public Health Facilities Model

Table 3.11 summarises the empirical results for the public health facilities model (Eq.(2)), discussing the effects of fiscal decentralisation on hospital beds availability to the public (***bedtp***). Table contains both the general and specific ADL model for ***bedtp*** and all the variables in general model are retained. Before analysing the results it is important to check for the existence of long run cointegrating relationship among the variables. Hence, the *PcGive* unit root t-test was conducted and the test-statistic (-2.29) was highly insignificant. This leaves us with no evidence for any long run relationship between the variables presented in Eq.(2)[104] and the empirical results may be spurious. As the basic assumption for the long run relationship is not fulfilled, therefore, the ECM model is not estimated and it is not possible to comment on the coefficients.

[104] Model was also tested by including the fiscal decentralisation proxies but results did not change

Table 3.11: Results for ADL Representation of Public Health Facilities Model (Dependent Variable- Hospital Beds to population ratio, *bedtp*)

Variables		General Model-1	Specific Model[#]
Constant	Constant	-3.71	-0.87*
Hospital Beds to population ratio	*bedtp* _1	0.80***	0.99***
	bedtp _2	0.16	----
Health Expenditures per capita	*hepc*	-0.03	----
	*hepc*_1	0.01	----
	*hepc*_2	0.07	0.07***
Government spending	*ge*	-0.07	-0.06**
	*ge*_1	0.02	----
	*ge*_2	0.03	----
Population growth	*pgr*	0.72	0.81**
	*pgr*_1	-1.44*	-1. 84***
	*pgr*_2	0.82*	0.83***
Urbanisation	*urb*	9.80*	7.63**
	*urb*_1	-11.45	-7.51**
	*urb*_2	2.65	----
Trend	*t*	-0.01	----
Number of observations		34	34
Number of parameters		16	10
PcGive Unit root test		----	**-2.29**
AR 1-4 test		4.3077 [0.0319]*	1.7573 [0.1959]
ARCH 1-4 test:		0.8647 [0.3594]	1.4029 [0.2450]
Normality test:		5.1019 [0.0780]	2.1963 [0.3335]
hetero test:		1.3847 [0.3876]	1.0491 [0.4624]
RESET test:		2.9720 [0.0602]	1.3144 [0.2889]

Significant at 1%=***, 5%=**, 10%=* ,

Note1: [#] Specific Model includes an outlier dummy for year 1990
Note2: *PcGive* Unit root test represents the Kiviet and Phillips (1992) test for cointegration
Note3: All variables were expressed in log form

3.6.3 Results for Public Health Services Model

Next model to discuss relates to the effects of fiscal decentralisation on health services (Eq.(3)), measured as 'Doctors per thousand people' (***doctp***). Results are presented in Table 3.12 that contain estimation results for both the general and specific ADL model for ***doctp***. Once again the *Gets* approach resulted in the removal of insignificant lags while all the variables were retained in the final specific model. However, model could not satisfy the Ramsey (1969) tests for the correct specification. Both the general and specific model suffers from the insignificant RESET test, raising concerns about the authenticity of linear regression for estimation. In both instances, null hypothesis for RESET test (Regression Specification Test) is rejected. The RESET test carries the null hypothesis of correct specification for the original model against the alternative that powers of $\hat{\mathbf{y}}_t$ (such as $\hat{\mathbf{y}}_t^2$, $\hat{\mathbf{y}}_t^3$...) have been omitted. By adding powers of linear combinations of **xs,** this test reports whether the original functional form (i.e. linear) is incorrect. Hence, its rejection here suggests that Eq.(3) [105] cannot be explained with linear model. Therefore, once again it is not possible to proceed with this model and it is not possible to explain empirical results estimated with the given methodology.

[105] Model was also tested by including the fiscal decentralisation proxies but results did not change

Table 3.12: Results for ADL Representation of Public Health Services Model (Dependent Variable- Doctors to population ratio, *doctp*)

Variables		General ADL Model-1	Specific Model-1
Constant	Constant	-10.55	-11.22***
Doctors to population ratio	*doctp* _1	1.13 ***	0.95***
	doctp _2	-0.26	----
Health Expenditures per capita	*hepc*	0.02	----
	*hepc*_1	-0.01	-0.06*
	*hepc*_2	-0.02	----
Labour force participation	*lfp*	0.37	0.49**
	*lfp*_1	-0.13	----
	*lfp*_2	-0.17	----
Urbanisation	*urb*	-14.74*	-18.89***
	*urb*_1	20.70**	21.93***
	*urb*_2	-2.87	----
Population growth	*pgr*	0.01	----
	*pgr*_1	-0.11	0.08
	*pgr*_2	0.22	----
Time Trend	*t*	-0.02	-0.02***
Number of observations		34	35
Number of parameters		16	8
AR 1-2 test		3.3265 [0.0619]	1.4728 [0.2493]
ARCH 1-1 test:		0.1831 [0.6715]	0.0009 [0.9757]
Normality test:		0.0261 [0.9870]	1.9518 [0.3769]
hetero test:		----	0.7498 [0.7050]
RESET test:		**3.2581 [0.0467]***	**24.000 [0.0000]** ***

Significant at 1%=***, 5%=**, 10%=* ,

Note: All variables were expressed in log form

3.6.4 Results for Health Outcome Model

For the health outcome model, estimation results are once again divided into two parts. Firstly, the existence of long run relationship is investigated for the health outcome model and upon the confirmation of the cointegration; the following sub-section elaborates the signs and significance of the variables.

3.6.1.a Evidence for the existence of LR relationship

Final analysis at the national level is for the health outcome model, where infant mortality rate (***imr***) was used to proxy health status in Pakistan. Before analysing the variable of interest i.e. fiscal decentralisation, the general model for ***imr*** was estimated (in accordance with Eq.(4)), to find out the long run cointegrating relationship between the variables. Results for the general model are presented in Table 3.13, the *Gets* approach results in the removal of labour force participation rate (***lfp***), being insignificant. Hence, in the case of infant mortality rate, the proxy for private health care affordability once again has failed to measure the desired effects. This indicates that there are other important factors which matter more for child healthcare. In the specific ADL model, other explanatory variables are highly significant and appear with the right sign except ***aid***. The *PcGive* unit root test (**-3.52**) is significant at 10 percent level of significance only but provides evidence of long run relationship for the given set of variables. Once an economical and improved model was obtained, the proxies for fiscal decentralisation were analysed turn by turn and model was re-estimated in ECM representation. Final results for infant mortality model including the fiscal decentralisation measures are presented next.

Table 3.14 reports 'specific' ECM models for the three proxies of fiscal decentralisation. The fiscal decentralisation proxies indicate provincial autonomy {(i) provincial tax revenues and (ii) provincial local revenues)} and fiscal capacity (i.e. federal transfers). The given specific models validate the existence of long run relationship in the ECM representation as well. The error correction terms represented by lagged level dependent variable (***imr_1***) is highly significant in all the three ECM models and appears within the range of "-0.21 to -0.14". As the error correction terms are below "-1" thus exhibits the stability of the estimated model. However, with such low values for the error correction terms, model shows slow speed of adjustment, indicating that health interventions takes long time to take effect. In addition, all the diagnostic tests are satisfied and we can rely on the results.

3.6.1.b Coefficient interpretation for the health outcome model

This section discusses the signs and significance of the explanatory variables in the health outcome model, once the cointegrating relationship is already confirmed. Table 3.13 shows that out of the three proxies of fiscal decentralisation, only $\boldsymbol{fd_{tax}}$ has produced significant short run effects in final specific Models 1. This indicates that if SNGs has more resources from the local resources, it will have significant short run negative effects on ***imr***. However, this setting does not yield any long run effects, as the lagged level effects ($\boldsymbol{fd_{tax}\_1}$) are insignificant. For the other two fiscal decentralisation measures, given empirical exercise could not suggest any significant results. Both the proxies for provincial local revenues ($\boldsymbol{fd_{loc}}$) and SNGs capacity ($\boldsymbol{fd_{trans}}$) remained insignificant both for the short run and long run effects. Thus, it can be concluded that fiscal decentralisation has failed to bring expected optimum outcome in health sector and hence, results are not very encouraging for Pakistan.

Analysing the model, the overall fit is good. Given misspecification tests are satisfied for all the models and other explanatory variables have produced expected signs for the implicit long run effects, represented by the lagged level effects. For all the three models, ***bedtp*** consistently retained negative sign, although it could not achieve significance in ECM model, despite being significant in ADL model. Another very important variable i.e. ***hepc*** retained statistically significant negative sign throughout and depicts that higher health spending results in improved health outcomes, as expected. Similarly, increased female literacy also helps in reducing infant mortality and ***fenrl*** appears with the right sign. Lastly, the coefficient of foreign aid per capita is problematic as it remained positive throughout the analysis. This, on one side, points towards the rent seeking behaviour on the part of the governments which seems to have replaced its public health spending with foreign aid. Generally foreign aid is advanced to supplement governments' efforts but the coefficient here tells us that it was not the case. However, there is chance that this positive sign might be indicating towards the reverse causality. The possibility cannot be ruled out that foreign aid only pours in when the health indicators of the country are not very encouraging and this might be a cause of its positive sign. One possibility to cross check this situation can be suggested as the use simultaneous equation model (SEM), however, we know SEM is not plausible in the limited data set like ours and it can lead to biased estimates in small samples. Therefore, this query is left for future research.

Table 3.13: Results for ADL Representation of Health Outcome Model (Dependent Variable- Infant mortality (per 1000 live births) , *imr*)

Variables		General ADL Model-1	Specific Model	Solved static long-run equation for *imr*
Constant	Constant	1.418**	0.735***	6.077***
Infant mortality rate	*imr*_1	0.914***	0.879***	----
	*imr*_2	-0.126	----	----
Hospital Beds to population ratio	*bedtp*	0.065	0.083**	-0.374*
	bedtp _1	-0.024	----	----
	bedtp _2	-0.081	-0.128***	----
Health Expenditures per capita	*hepc*	-0.0004	----	-0.134**
	*hepc*_1	0.002	----	----
	*hepc*_2	-0.009	-0.016***	----
Labour force participation	*lfp*	0.083	----	----
	*lfp*_1	-0.072	----	----
	*lfp*_2	-0.030	----	----
Foreign Aid (by UNICEF)	*aid*	0.009*	0.008***	0.142***
	*aid*_1	0.004		----
	*aid*_2	0.007	0.009***	----
Female primary school enrolment	*fenrl*	-0.021	-0.021*	-0.170***
	*fenrl*_1	-0.007	----	----
	fenrl _2	-0.024		----
Number of observations		34	34	----
Number of parameters		18	8	----
PcGive Unit root test		----	**-3.52***	----
AR 1-2 test		0.4249 [0.6620]	0.1377 [0.8721]	----
ARCH 1-1 test:		0.2468 [0.6270]	1.3548 [0.2530]	----
Normality test:		7.4015 [0.0247]**	0.0929 [0.9546]	----
hetero test:		----	2.1058 [0.0657]	----
RESET test:		0.19076 [0.6685]	0.4570 [0.6386]	----

Significant at 1%=***, 5%=**, 10%=*

Note1: *PcGive* Unit root test represents the Kiviet and Phillips (1992) test for cointegration

Note2: All variables were expressed in log form

Table 3.14: Results for ECM Representation of Health Outcome Model (Dependent Variable- Infant mortality (per 1000 live births) in 1st diff , Δ*imr*)

Variables		Specific Model-1 for fd_{tax}	Specific Model-2 for fd_{loc}	Specific Model-3 for fd_{trans}
Constant	Cons	1.390***	1.246***	0.901***
Infant mortality	Δ*imr*_1	----	----	----
Hospital Beds to population ratio	Δ*bedtp*	----	----	----
	Δ*bedtp*_1	----	----	0.098**
Health Expenditures per capita	Δ*hepc*	----	----	----
	Δ*hepc*_1	----	----	----
Foreign Aid (UNICEF)	Δ*aid*	0.006**	0.007**	0.007**
	Δ*aid*_1	-0.006*	----	-0.007*
Female primary school enrolment	Δ*fenrl*	----	----	----
	Δ*fenrl*_1	0.029**	0.040***	----
Infant mortality	*imr*_1	-0.215***	-0.191***	-0.145***
Hospital Beds to population ratio	*bedtp*_1	-0.015	-0.013	-0.044
Health Expenditures per capita	*hepc*_1	-0.005***	-0.005	-0.012***
Foreign Aid (UNICEF)	*aid*_1	0.019***	0.015***	0.018***
Female primary school enrolment	*fenrl*_1	-0.054***	-0.049***	-0.029**
Provincial tax revenues	Δfd_{tax}	-0.014**	----	----
	fd_{tax}_1	0.002	----	----
Provincial local revenues	Δfd_{loc}_1	----	0.003	----
	fd_{loc}_1	----	0.004	----
Federal transfers to provinces	Δfd_{trans}_1	----	----	0.002
	fd_{trans}_1	----	----	-0.003
No. of observations		34	34	34
Number of parameters		11	10	11
PcGive Unit root test		**-5.06*** **	**-4.36** **	**-3.76***
AR 1-2 test		0.0604 [0.9416]	0.1001 [0.9051]	0.6117 [0.5518]
ARCH 1-1 test:		0.0066 [0.9356]	0.0320 [0.8590]	0.0417 [0.8394]
Normality test:		4.8013 [0.0907]	0.8598 [0.6506]	5.8755 [0.0530]
hetero test:		1.0252 [0.4949]	0.5054 [0.9155]	1.3740 [0.2820]
RESET test:		1.9975 [0.1606]	2.4720 [0.1075]	0.4811 [0.6248]

Significant at 1%=***, 5%=**, 10%=*

Note1: *PcGive* Unit root test represents the Kiviet and Phillips (1992) test for cointegration

Note2: All variables were expressed in log form

3.7 DATA AND METHODOLOGY FOR THE ANALYSIS AT PROVINCIAL LEVEL

This section contains analysis for the provincial data. Due to difference in the nature of the data, different estimations techniques were adopted for provincial analysis. Using the provincial panel data, this section would focus on the quantification of the effects of fiscal decentralisation on health facilities at the provincial level.

3.7.1 Theoretical model and determinants of provincial health services indicators

Based on the economic rationale advanced by the earlier researchers, analysis can be extended to the provincial level. At the provincial level, it is important to quantify the effects of decentralisation on the provision of local health facilities. Initially, two important health sector indicators were considered for analysis i.e. Hospital Beds per 1000 population and Doctors per 1000 population. However, observations on the number of doctors, at provincial level, were not available for two[106] provinces hence it was not possible to assess health services. Therefore, hospital beds availability was used as the only dependent variable to provide evidence regarding the effects of fiscal decentralisation using the provincial data.

Keeping in view the data limitations, the model is kept simple and explicit. The set of most important explanatory variables included, the proxies for fiscal decentralisation (i.e. federal transfers and own source revenues- which were expressed as ratio to provincial total revenues), health expenditure (HE) at the provincial level and level of economic prosperity (provincial GDP). The provincial development spending were also considered during estimation, but was dropped later on due to insignificance. Provincial population was avoided in the empirical model for the reason that the dependent variable was expressed in per capita terms, hence this aspect was already taken into account. Finally, the general economic model for the relationship under consideration can be expressed as Eq.(7). Definitions of the variables are given in the table below while the subscripts ***t*** and ***i*** refers to time period and province, respectively, while ***j*** represents the given fiscal decentralisation proxies.

$$hbed_{it} = \alpha + \alpha_1 fd_{jit} + \alpha_2 hltexp_{it} + \alpha_3 pgdp_{it} + \varepsilon_t \qquad \text{Eq.(7)}$$

[106] Sindh and Balochistan

Table 3.15: Variable names, definitions and sources of data		
Variable	Name	Definition
Hospital Beds relative to population	*hbed*	Number of Hospital Beds per 1000 population
Provincial own source revenues	*ptax*	Provincial tax revenue ratio*
Federal transfers	*ftrans*	Federal transfers to each province ratio*
Health Expenditures	*hltexp*	Health expenditures by provincial governments ratio**
Economic prosperity	*pgdp*	Provincial GDP (at constant prices)
Provinces	*i*	Prov: 1 = Punjab Prov:2 = Sindh Prov: 3 = Khyber Pakhtunkhwa (KPK) ***
All variables were expressed in log form indicated by lower case letters		
Note 1: * expressed as ratio to provincial total revenues		
Note 2: ** expressed as ratio to provincial total expenditures		
Note 3: *** formally known as North West Frontier Province-NWFP		

3.7.2 Data and Methodology

This section summarises the data availability, its characteristics as well as the methodology adopted for the analysis at the provincial level.

3.7.2.a Data availability

For the provincial analysis, data set represents three out of four provinces of Pakistan. The three provinces include Punjab, Sindh and KPK, while Balochistan is left out of the analysis due to its troubled political history and unique demographic situation[107]. Data was collected from a number of sources including Provincial Development Statistics (various issues for Punjab, Sindh and KPK), State Bank of Pakistan (2005), World Bank Economic Reports (for Punjab and KPK), Pakistan Economic Survey (G.o.P., 2007), Provincial budget statements and Bengali and Mahpara (2006). Data covered the period consists of 22 annual observations, from 1980-2001. In fact, following the promulgation of 'Local government ordinance, 2001', the local government system for the third tier of government was implemented in Pakistan since 2002. The devolution plan allocated various spending responsibilities to the district levels (114 in total) and due to the ambiguity regarding data collection responsibilities, the data for provincial level spending is not systematically available thereafter. Hence, for the data we have, the time dimensions

[107] This province represents only 5.1 percent of the total population while it constitutes 44 percent of whole area of Pakistan, hence it faces severe cost disabilities as compared to the other provinces

'T' (22 years) was much longer than the cross-sectional dimension 'N' (3 provinces) of the panel. Therefore different econometric techniques were used to get reliable results.

3.7.2.b Estimation technique at the provincial level

Analysing provincial data for empirical estimation brought its own complications. Time series dimension of the data is very long as compared to the cross-sectional element that was only three provinces. With the small 'N' and long 'T' dimensions of the available data, it is not suitable to use the most popular techniques such as the IV estimator by Anderson and Hsiao(1982), the first difference GMM by Arellano and bond (1991) and the System GMM by Blundell and Bond (1998). These estimators hold its properties best for data sets which have large cross-sectional dimension 'N' then time series dimension i.e. 'T' (Baum, 2006, Bruno, 2005).

The long panel data set with large 'T' and small 'N' has different issues to focus on. Large 'T' inherently raises concern about the non-stationarity issues in the data that can lead to spurious regression. As a result, such panels need to be assessed for the cointegrating relationship among the variables, using the dynamic panel data analysis techniques. When the number of cross-sectional units is reasonably small than the time-series dimension, then the Seemingly Unrelated Regression (SUR) technique by Zellner (1962) is pointed out to be a good option (Pesaran, Shin and Smith, 1992). The SUR approach allows the contemporaneous error covariance to be freely estimated. When the error terms across different equations are contemporaneously correlated[108], the SUR estimator results in efficiency gains over the individual OLS estimation (Baum, 2006; Cameron and Trivedi, 2010). In this study, the SUR technique might be useful in gaining efficiency, because fiscal decentralisation occurs at the same time across provinces so there might be certain contemporaneous effects across provinces. Nevertheless, one serious issue is that when the cointegration technique is used, there should be no error autocorrelation. However, in the SUR estimation technique we have no clue about the nature of residual autocorrelation for the individual equations. Therefore, this method in its crude form was deemed not appropriate for estimating the cointegrating long run relationship between fiscal decentralisation and health facilities.

However, recently a number of new techniques emerged for the analysis of long panels e.g. the residual based cointegration models and the error correction mechanism (ECM) based models. The residual-based cointegration tests are however much criticised

[108] But errors should be IID within the individual unit regression

for the assumption of common factor restriction. As pointed out in Banerjee, Dolado and Mestre (1998) and Kremers, Ericsson and Dolado (1992), in the residual-based tests the long-run parameters for variables (in levels) are required to be equal to the short-run parameters (i.e. variables in differences). Once this assumption is not fulfilled, it can cause significant loss of power for residual-based cointegration tests. On the contrary, the ECM based cointegration tests are developed by using the structural, rather than residual, dynamics. Starting from the mid 1990's, different tests were developed for panel cointegration including Pesaran, Shin and Smith (1999) and Westerlund (1997). One of the distinctive advantage of ECM based tests is that these can be applied to data irrespective of the fact that the variables are I(1) or I(0).

Pesaran, Shin and Smith (1999) proposed Pooled Mean Group (PMG) estimator, where both the pooling of the data as well as averaging of the coefficients, are offered. This estimator allows for intercept, short-run dynamic effects and error variances to differ among the groups, however, the long run coefficients are constrained to be the same across the groups[109]. The significance of the error correction terms is taken as evidence of the cointegration for the given panel unit. On the other hand, Westerlund (2007) devised four new tests for panel cointegration, which were inspired from the Banerjee, *et al.*, (1998). These new tests were also based on ECM mechanism and the tests are so general that can accommodate unit-specific short-run dynamics, serially correlated errors, unit-specific "trend, intercept as well as slope parameters" and were reportedly able to tackle cross-sectional dependence (Westerlund, 2007). Under this technique, once the individual unit-specific regressions are estimated, the resulting information was used for the given four tests. Two group-specific tests are designed to test the alternative hypothesis that at least one individual unit is cointegrated, while the other two panel-specific tests deal with the alternative hypothesis that panel as a whole is cointegrated.

Given the nature of data, two estimation techniques namely Pooled Mean Group (PMG) estimator and Westerlund (2007) tests were used to investigate panel cointegration. Multiple estimation technique will help to overcome potential data issues and will be used for cross checking of the evidence.

[109] The PMG estimation assumes the slope homogeneity, which if rejected would render it inconsistent. On the contrary, Pesaran and Smith (1995) proposed the Mean Group (MG) estimator where separate models are fitted to each group and the coefficients from different groups are averaged. The MG estimator allows the intercept, slope and error variances to differ across the groups. Thus, the MG estimator is consistent if slope homogeneity does not hold. In such a scenario, the Hausman test is performed to identify the better model (Blackburne and Frank, 2007). For this study, the PMG emerged as better estimator.

3.7.2.c Unit root test for panel stationarity

As discussed, time dimension for the given provincial panel data set is quite long and it is important to find out about the data stationarity issue. To investigate panel unit root, a significant number of new methods were developed during 1990s. Earlier tests were restrictive in the sense that it imposed the slope homogeneity assumption for the pooled regression, nevertheless, tests that were developed later, has remained successful in relaxing these restrictive assumptions. In this respect, we adopt two well-known tests for stationarity developed by Pesaran (2007) and Maddala and Wu (1999). These tests are based on Augmented Dickey-Fuller estimation and are very flexible tests for panel unit root. The null hypothesis under these tests is that the panel has unit root while the alternative hypothesis is that some of the series are stationary. However, these tests do not specify the proportion of series that are stationary. Results for the provincial data suggest that the panel is first difference stationary.

3.7.3 Empirical Results

The results for Eq.(7), representing the health outcome model for the provincial data, are given below. Table 3.16 and Table 3.18 represent the results for two proxies of fiscal decentralisation and estimates are based on the Westerlund's Estimation technique, which uses ECM specification for Eq.(7). Similarly, the Pooled Mean Group (PMG) estimation results are presented in Table 3.17 and Table 3.19, to represent the effects of federal transfers and provincial own source revenues, respectively. Estimations were performed in Stata 10.1.

This exercise has produced interesting results. The regression estimates has produced similar signs for almost all the regressors throughout the models estimated, although the outcome for cointegration differs among the different methodologies. Results are consistent with national level analysis, as there is no evidence for long run relationship between health facilities and provincial own source revenues. Both the estimation techniques failed to provide evidence for the long run cointegrating effects of fiscal decentralisation, when proxied with provincial autonomy measure. Table 3.18 presents results for the Westerlund's panel cointegration test, where the all the four tests accepts the null hypothesis of no-cointegration for the model involving provincial tax revenues (as a measure of fiscal decentralisation). In addition, the error correction terms, represented by the lagged level dependent variable i.e. ***hbed_1***, for Sindh and Punjab are insignificant or nearly insignificant (Table 3.18). Similarly, results were obtained for the PMG estimator at

Table 3.19. The long run coefficient for ***ptax_1*** is statistically insignificant (along with the short run dynamics i.e. D1.***ptax*** for each province) at the PMG estimation technique. Hence once again we could find no long run relationship between provincial autonomy and health facilities at the provincial level as well (Table 3.19).

On the contrary, outcome is different for the second measure of fiscal decentralisation i.e. ***ftrans***. The Westerlund's estimator for the whole panel (Pt) rejects the null at 10 percent level of significance. Hence evidence exists for cointegrating relationship between provincial fiscal capacity and health facilities, as represented in Table 3.16. In addition, the error correction terms, represented by the lagged level dependent variable i.e. ***hbed_1***, are also significant for all the three provinces. Similar results were obtained in Table 3.17, where the PMG estimator shows evidence for long run cointegrating relationship, for the first two provinces (based on the significance of the error correction terms (_ec) for Punjab and Sindh).

Given the significant results for ***ftrans***, Table 3.16 and 3.17 are discussed in more details. Across the two estimation techniques, estimates for the error correction terms are comparable in magnitude and remained significant for the first two provinces i.e. Punjab and Sindh as shown in Tables 3.16 and 3.17. This is not the case for third province (Khyber Pakhtunkhwa-KPK) where the magnitude and significance of error correction term is not uniform across estimation techniques. Results are evident of the fundamental differences in the economic set up of the first two provinces and the third one. KPK province remained heavily dependent on the federal grants for budgetary support[110] and Rodden (2003) explains that when the lower tiers of government are transfers dependent, they might not adopt fiscal discipline. Rodden argues that local governments claim over and above the original spending requirements so as to secure higher transfers, which results in inefficiency. Similarly, Oates (1993) emphasised that although fiscal transfers are advocated for covering the regional inequalities, they carry certain risks as well. For example, too much reliance on grants leaves little incentive for the local governments to observe spending efficiency. And this seems to be true in the case of KPK province.

Having discussed the cointegration results, it is now possible to focus on the coefficient interpretation for explanatory variables. First of all, results for the Westerlund estimation technique are discussed (Table 3.16). Most interestingly, the variable of interest i.e. federal transfers (***ftrans_1***) has consistently produced positive sign for the provinces of

[110] In addition to its share in federal transfer

Punjab and Sindh. It shows that higher federal transfers will result in the improvement of health facilities in the given provinces and will result in an increase in hospital beds availability. Similar results were obtained for the measure of economic prosperity i.e. provincial GDP (***pgdp_1***) which was positive and significant for the two provinces only. It is important note that ***pgdp_1*** appears with the highest coefficient and thus presents its crucial role in the improvement of health infrastructure. Lastly, the provincial health expenditure has statistically insignificant long run effects on provincial health indicator in Punjab and Sindh province. Nevertheless, ***hltexp_1*** has correct positive sign when it achieves significance in the case of KPK province; according to Westerlund estimation (Table 3.16).

After discussing the results for Westerlund's estimation technique, the effects of federal transfers (***ftrans***) on public health facilities[111] (***hbed***) are discussed next by analysing the results for the Pooled Mean Group estimation, as presented at Table 3.17. Once again, the behaviour of the first two provinces is found different from the third province i.e. KPK. The error correction terms (_ec) for Punjab (-0.60) and Sindh (-0.84) are highly statistically significant and hence indicates stability of the model. It is also evident for fast recovery following any shock in the two provinces. Having discussed the stability of the model, the long run coefficients are discussed next. First of all, the proxy for fiscal decentralisation i.e. federal transfers to provinces (***ftrans_1***) is highly statistically significant and has positive long run effects on the public health facilities (***hbed***). Similar results are obtained for provincial GDP which has a positive and significant long run effects. One again the coefficient for ***pgdp_1*** is highest amongst all the coefficients, indicating its importance for better health facilities in the developing country like Pakistan. Lastly, the provincial health expenditures (***hltexp_1***) though is significant, it appears with the wrong sign.

Summary

Overall, what is the most crucial outcome of the overall analysis is that provinces are transfers dependent as only federal transfer (as measure of fiscal decentralisation) has come up with the significant long run effects, both at the national as well as the provincial level. It shows that provinces were not taping their revenue generation potential, either due to lack of incentive or due to limited constitutional authority. Results shows that provincial health outputs in the long run are affected only through federal transfers, indicating

[111] The availability of Hospital Beds per 1000 population-

provinces were transfer dependent for the provision of basic service like health. Whole process of decentralisation indicates towards the partial fiscal decentralisation in Pakistan. This situation might be resulting in efficiency loss because health sector is affected by the provincial capacity not the provincial autonomy; which should have been the case in the light of decentralisation theories. Brueckner (2009) showed that benefits of fiscal decentralisation would be lower under the partial fiscal decentralisation as compared to full fiscal decentralisation. Hence, more efforts are needed to avoid inefficiencies in resource allocation.

3.8 CONCLUSION

Fiscal decentralisation brings efficiency gains, however, the success of decentralisation can be judged from the improvement in the quality of life. Access to better health and education opportunities plays fundamental role in building societies, which ultimately translates into better economic results (because of improved human capital). Although there are various matters which can be affected by decentralisation including governance, resource utilisation, poverty, budget deficits and so on, but to assess whether or not local set up was considerate of public needs, we have to first look at its effects on basic needs of better life, like health and education. If fiscal decentralisation has produced better results in these two crucial sectors, we can say that it is effective. Therefore, this study analysed fiscal decentralisation for its effects on health sector.

Health sector in Pakistan remained neglected overtime and it was expected that, improvement in health sector, would be among the main targets of the subnational governments. Therefore, it was deemed important to pin point the effects of fiscal decentralisation on health sector in Pakistan. However, several difficulties were faced during estimation, ranging from the limited data, estimated figures for population, non-availability of data for private health sector, inability to cure potential reverse causality and the failure of estimation techniques. This indicates the complexity, especially for the analysis in the case of Pakistan and leaves us with several unexplained questions. Nevertheless, there are positive aspects available and a number of queries were resolved. The surprising fact relates to the negative effect of fiscal decentralisation in the case of health sector indicators in Pakistan. In country where government spends less than one percent of GDP on health sector, it was hard to expect any overwhelming results but fiscal decentralisation appearing with negative effects really reflect the need for remedial measures.

Results made it clear that health sector yet again is not in the basic focus even for SNGs. In both the cases, with higher tax revenues and federal transfers to provinces, funds availability to health sector seems to have suffered. We can think of efficiency gains and capping any loopholes in the systems, when funds are allocated through better informed local policy makers. Yet the negative effects of fiscal decentralisation on health spending, raises concerns about the overall commitment of SNGs. Unfortunately, due to the inconclusive estimates on health facilities as represented by hospital beds and doctors availability, it was not possible to confirm the earlier mentioned argument.

Lastly, although there are some positive effects in the case of health outcomes as shown at the national level analysis, however, these are neither too strong, due to potential econometric issues. Provincial analysis, despite its limitations, produces some encouraging results and indicates positive effect of fiscal decentralisation on the availability of hospitals facilities. In the case of two economically active provinces, decentralisation has resulted in better facilities. This indicates that the fundamental differences in the economic setup of provinces might be an impediment in gaining expected results. In brief, this study tried to analyse health sector in Pakistan to identify the effects of fiscal decentralisation on service provision. However, due to the complexities encountered during estimation, results cannot be termed very encouraging. There is some weaker evidence in the favour of partial fiscal decentralisation, provided that provinces are efficient (section 3.7.3). But to arrive at sound results there is need for more research and we leave the question of the effects of fiscal decentralisation on service provision to further research, when more data becomes available.

Results for Federal transfer as Determinant of Provincial Health Facilities

Table 3.16: Results for Westerlund ECM panel cointegration tests (Dependent variable-Hospital Beds per 1000 population i.e. *Dhbed*)

PUNJAB				
	Coefficient	Standard Error	z-stat	P > z
ftrans_1	0.094	0.034	2.78	0.005
hltexp_1	0.061	0.126	0.48	0.628
pgdp_1	0.930	0.264	3.52	0.000
_cons	35.613	10.598	3.36	0.001
trend	-0.022	0.006	-3.53	0.000
hbed_1	-0.666	0.188	-3.55	0.000
D1.ftrans	0.028	0.041	0.68	0.494
D1.hltexp	-0.059	0.080	-0.74	0.460
D1.pgdp	0.660	0.322	2.05	0.040
SINDH				
	Coefficient	Standard Error	z-stat	P > z
ftrans_1	0.088	0.041	2.15	0.032
hltexp_1	-0.100	0.077	-1.30	0.193
pgdp_1	0.589	0.205	2.88	0.004
_cons	8.270	6.000	1.38	0.168
trend	-0.007	0.004	-1.88	0.060
hbed_1	-0.968	0.333	-2.91	0.004
D1.ftrans	0.070	0.039	1.80	0.072
D1.hltexp	-0.079	0.056	-1.41	0.158
D1.pgdp	0.213	0.293	0.73	0.468
KPK				
	Coefficient	Standard Error	z-stat	P > z
ftrans_1	-0.023	0.040	-0.56	0.572
hltexp_1	0.398	0.132	3.02	0.002
pgdp_1	0.233	0.221	1.06	0.291
_cons	21.715	10.782	2.01	0.044
trend	-0.012	0.006	-1.95	0.051
hbed_1	-0.839	0.288	-2.92	0.004
D1.ftrans	-0.094	0.041	-2.29	0.022
D1.hltexp	0.275	0.086	3.20	0.001
D1.pgdp	0.034	0.205	0.17	0.868

Note: All variables were expressed in log form

Table 3.16: Results for Westerlund ECM panel cointegration tests (cont...)

Results for H0: no cointegration

With 3 series and 3 covariates

Statistic	Value	Z-value	P-value	Robust P-value
Gt	- 3.126	-0.838	0.201	0.150
Ga	-10.536	1.076	0.859	0.190
Pt	- 5.293	-1.090	0.138	0.090
Pa	- 9.554	0.594	0.724	0.210

Table 3.17: Results for Pooled Mean Group Regression

(Dependent variable-Hospital Beds per 1000 population i.e. *Dhbed*)

Panel Variable (i): prov	Number of obs	=	63
Time Variable (t): year	Number of groups	=	3
	Obs per group: min	=	21
	avg	=	21
	max	=	21
	Log Likelihood	=	155.2777

	Coefficient	Standard Error	z-stat	P > z	[95% Conf.	Interval]
LR-coefficients						
ftrans_1	0.105	0.018	5.74	0.000	0.0694	0.1413
hltexp_1	-0.109	0.053	-2.05	0.040	-0.2137	-0.0049
pgdp_1	0.786	0.107	7.37	0.000	0.5768	0.9947
year	-0.011	0.003	-3.82	0.000	-0.0159	-0.0051
SR-coefficients						
PUNJAB						
__ec	-0.602	0.176	-3.43	0.001	-0.9459	-0.2574
D1.ftrans	-0.052	0.033	-1.58	0.115	-0.1174	0.0127
D1.hltexp	-0.075	0.062	-1.21	0.226	-0.1954	0.0461
D1.pgdp	0.046	0.337	0.14	0.891	-0.6146	0.7070
_cons	8.176	3.810	2.15	0.032	0.7086	15.6427
SINDH						
__ec	-0.839	0.215	-3.91	0.000	-1.2596	-0.4187
D1.ftrans	-0.033	0.035	-0.94	0.346	-0.1027	0.0360
D1.hltexp	0.011	0.038	0.29	0.770	-0.0627	0.0847
D1.pgdp	-0.357	0.205	-1.74	0.082	-0.7589	0.0458
_cons	11.568	4.410	2.62	0.009	2.9240	20.2111
KPK						
__ec	-0.194	0.166	-1.17	0.243	-0.5203	0.1317
D1.ftrans	-0.083	0.041	-2.03	0.043	-0.1630	-0.0028
D1.hltexp	0.157	0.062	2.53	0.011	0.0354	0.2782
D1.pgdp	-0.149	0.187	-0.8	0.425	-0.5151	0.2172
_cons	2.742	2.555	1.07	0.283	-2.2645	7.7492

Note: All variables were expressed in log form

Results for Provincial Own Source Revenues as Determinant of Provincial Health Facilities

Table 3.18: Results for Westerlund ECM panel cointegration tests (Dependent variable-Hospital Beds per 1000 population i.e. *Dhbed*)

PUNJAB				
	Coefficient	Standard Error	z-stat	P > z
ptax_1	0.022	0.042	0.51	0.608
hltexp_1	0.026	0.146	0.18	0.858
pgdp_1	0.683	0.313	2.18	0.029
_cons	24.503	13.003	1.88	0.060
trend	-0.015	0.008	-2.00	0.045
hbed_1	-0.322	0.194	-1.66	0.097
D1.ptax	0.017	0.048	0.36	0.716
D1.hltexp	-0.035	0.103	-0.34	0.731
D1.pgdp	0.877	0.403	2.18	0.030
SINDH				
	Coefficient	Standard Error	z-stat	P > z
ptax_1	0.042	0.038	1.12	0.264
hltexp_1	-0.172	0.107	-1.61	0.107
pgdp_1	0.624	0.258	2.42	0.016
_cons	1.127	5.091	0.22	0.825
trend	-0.003	0.003	-1.17	0.241
hbed_1	-0.293	0.227	-1.29	0.196
D1.ptax	0.012	0.027	0.46	0.647
D1.hltexp	-0.158	0.071	-2.22	0.027
D1.pgdp	0.295	0.397	0.74	0.457
KPK				
	Coefficient	Standard Error	z-stat	P > z
ptax_1	0.042	0.037	1.14	0.252
hltexp_1	0.418	0.153	2.74	0.006
pgdp_1	0.385	0.258	1.49	0.135
_cons	25.259	10.319	2.45	0.014
trend	-0.015	0.006	-2.44	0.015
hbed_1	-0.832	0.291	-2.86	0.004
D1.ptax	-0.030	0.040	-0.75	0.456
D1.hltexp	0.245	0.087	2.80	0.005
D1.pgdp	0.264	0.219	1.21	0.228

Note: All variables were expressed in log form

Table 3.18: Results for Westerlund ECM panel cointegration tests (cont...)

Results for H0: no cointegration

With 3 series and 3 covariates

Statistic	Value	Z-value	P-value	Robust P-value
Gt	-1.939	1.522	0.936	0.800
Ga	-5.236	2.218	0.987	0.920
Pt	-2.886	1.467	0.929	0.780
Pa	-4.249	1.801	0.964	0.920

Table 3.19: Results for Pooled Mean Group Regression

(Dependent variable- Hospital Beds per 1000 population i.e. *Dhbed*)

Panel Variable (i): prov			Number of obs	=		63
Time Variable (t): year			Number of groups	=		3
			Obs per group: min	=		21
			avg	=		21
			max	=		21
			Log Likelihood	=		147.6054
	Coefficient	Standard Error	z-stat	P > z	[95% Conf.	Interval]
LR-coefficients						
ptax_1	0.039	0.050	0.79	0.432	-0.0582	0.1362
hltexp_1	-0.171	0.128	-1.34	0.181	-0.4218	0.0796
pgdp_1	1.053	0.270	3.90	0.000	0.5231	1.5827
year	-0.011	0.006	-1.66	0.097	-0.0232	0.0019
SR-coefficients						
Punjab						
__ec	-0.305	0.151	-2.01	0.044	-0.6014	-0.0082
D1.ptax	-0.013	0.033	-0.38	0.705	-0.0777	0.0526
D1.hltexp	-0.043	0.070	-0.61	0.539	-0.1802	0.0942
D1.pgdp	0.483	0.343	1.41	0.159	-0.1889	1.1548
_cons	3.655	3.806	0.96	0.337	-3.8057	11.1147
Sindh						
__ec	-0.390	0.136	-2.86	0.004	-0.6578	-0.1228
D1.ptax	-0.012	0.017	-0.68	0.498	-0.0451	0.0219
D1.hltexp	-0.026	0.046	-0.56	0.574	-0.1150	0.0637
D1.pgdp	-0.358	0.252	-1.42	0.156	-0.8525	0.1365
_cons	4.733	3.693	1.28	0.200	-2.5054	11.9723
KPK						
__ec	-0.033	0.192	-0.17	0.865	-0.4100	0.3445
D1.ptax	0.011	0.035	0.33	0.742	-0.0570	0.0799
D1.hltexp	0.145	0.068	2.13	0.033	0.0115	0.2780
D1.pgdp	0.033	0.193	0.17	0.864	-0.3443	0.4104
_cons	0.412	2.446	0.17	0.866	-4.3827	5.2061

Note: All variables were expressed in log form

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Annex I

Appendix II

i) Per capita health expenditure (Hepc) equation

a. ADL representation

$$hepc_t = \alpha_0 + \delta t + \sum_{e=1}^{m} \beta_e hepc_{t-e} + \sum_{h=0}^{n} \beta_h y_{t-h} + \sum_{i=0}^{p} \beta_i ge_{t-i} + \sum_{j=0}^{q} \beta_j lfp_{t-j} + \sum_{k=0}^{r} \beta_l pgr_{t-l} + \sum_{l=0}^{s} \beta_m aid_{t-m} + \varepsilon_t \quad (1.a)$$

b. ECM representation

$$\Delta hepc_t = \nu + \delta t + \sum_{e=1}^{m} \beta_e \Delta hepc_{t-e} + \sum_{f=1}^{n} \beta_f \Delta y_{t-f} + \sum_{h=0}^{q} \beta_i \Delta pgr_{t-i} + \sum_{j=0}^{r} \beta_j \Delta aid_{t-j} + \sum_{k=0}^{s} \beta_k \Delta fd_{it-k} + \gamma_1 hepc_{t-1} + \gamma_2 y_{t-1} + \gamma_3 pgr_{t-1} + \gamma_4 aid_{t-1} + \gamma_5 fd_{it-1} + \varepsilon_t \quad (1.b)$$

ii) Public health facilities (Bedtp) equation

a. ADL representation

$$bedtp_t = \alpha_0 + \delta t + \sum_{e=1}^{m} \beta_e bedtp_{t-e} + \sum_{f=0}^{n} hepc_{t-f} + \sum_{h=0}^{p} \beta_h ge_{t-h} + \sum_{i=0}^{q} \beta_i pgr_{t-i} + \sum_{j=0}^{r} \beta_j urb_{t-j} + \varepsilon_t \quad (2.\ a)$$

iii) Public health services (Doctp) equation

a. ADL representation

$$doctp_t = \alpha_0 + \delta t + \sum_{e=1}^{m} \beta_e doctp_{t-e} + \sum_{f=0}^{n} \beta_f hepc_{t-f} + \sum_{h=0}^{p} \beta_h lfp_{t-h} + \sum_{i=0}^{q} \beta_i urb_{t-i} + \sum_{j=0}^{r} \beta_j pgr_{t-j} + \varepsilon_t \quad (3.a)$$

iv) Infant Mortality (Imr) equation

a. ADL representation

$$imr_t = \alpha_0 + \sum_{e=1}^{m} \beta_e imr_{t-e} + \sum_{h=0}^{p} \beta_h bedtp_{t-h} + \sum_{i=0}^{q} \beta_i hepc_{t-i} + \sum_{j=0}^{r} \beta_j lfp_{t-j} + \sum_{k=0}^{r} \beta_k aid_{t-k} + \sum_{l=0}^{r} \beta_l fenrl_{t-l} + \varepsilon_t \quad (4.a)$$

b. ECM representation

$$\Delta imr_t = \nu + \delta t + \sum_{e=1}^{m} \beta_e \Delta imr_{t-e} + \sum_{f=1}^{n} \beta_f \Delta bedtp_{t-f} + \sum_{h=1}^{p} \beta_h \Delta hepc_{t-h} + \sum_{j=0}^{q} \beta_i \Delta aid_{t-i} + \sum_{k=0}^{r} \beta_k fenrl_{t-k} + \sum_{l=0}^{s} \beta_k \Delta fd_{it-k} + \gamma_1 imr_{t-1} + \gamma_2 bedtp_{t-1} + \gamma_3 hepc_{t-1} + \gamma_4 aid_{t-1} + \gamma_5 fenrl_{t-1} + \gamma_6 fd_{it-1} + \varepsilon_t \quad (4.b)$$

CHAPTER 4 FISCAL DECENTRALISATION AND ITS LINK TO EDUCATION SECTOR

4.1 INTRODUCTION

Millennium Development Goals highlighted the need for improved education and health sectors because of their enormous impact on the quality of human life. Better health and education facilities ensure greater economic opportunities for the individuals while state can also benefit from better quality of human capital. Due to the market imperfections and existence of externalities attached with social spending, involvement of public sector is considered mandatory for the provision of basic public goods. However, with the ever increasing human needs and scarce public sector resources, spending on social indicators are nowadays critically evaluated to pin point their effectiveness. Higher public spending on health and education is not, in itself, an effective instrument to remedy any imbalances. Setting proper goals, targeting right areas of focus and using the scarce resources efficiently are considered to increase the effectiveness of public resource utilisation. The reason is, poor budget management, especially in the developing countries, appears to be one of the major reasons for the sub-optimal outcomes in the case of public spending (World development report, 2003).

In this era, where nations are striving hard for growth and development, human capital is widely acknowledged as the engine of economic growth. In order to improve human capital, governments have to invest in the education and health sectors. In this scenario governments have two possible ways to achieve this, firstly, they can either invest more money or secondly they can look for policy appropriation. Constrained by resources, policy makers more often aim to optimise the utilisation of scarce resources and ideally endeavours for efficient use of public money. Among the competing social sectors, government spending on health and education by far remains the most important of all. Spending on health and education sector is believed to enhance economic growth, improve human capital, reduce poverty and helps in achieving better income equality (Romer, 1986; Lucas, 1988; Barro, 1991; Chu *et al.*, 1995; Tanzi and Chu, 1998; Baldacci *et al.*, 2008). Decentralisation, in this context becomes critical as it focuses on improved service provision and better resource utilisation. Advocacy for decentralisation is based on efficient allocation due to better awareness of local needs and preferences. In this context, decentralisation is relevant to the study of education because of the ever rising demand for learning and education in the current dynamic world, which is now predominantly based

on knowledge and innovation. Therefore, education, as like the health sector, becomes the centre of attention for the decentralisation reforms. With drive for decentralisation, policy makers try to achieve better targeting with greater transparency and hence local authorities are increasingly entrusted with various decentralised tasks including the education services.

In this piece of research, our aim is to estimate the effects of fiscal decentralisation[112] on different indicators related to education sector. We base the analysis on the literature which suggests that taking the policy making near to the people helps in spotting and executing what people need the most. Galiani *et al.* (2008) presented a good summary of the literature on the education decentralisation and summarise that various studies presented positive association between decentralisation and educational preferences. To discuss a few, Faguet (2004) concluded that local government has better information regarding the distinct preferences for education which leads to positive results. Behrman and King (2001) also reported harmonisation between household decisions and steps taken under decentralised set up. Similarly, studying the case of Argentina, Eskeland and Filmer (2007) found a positive association between school autonomy and pupil's performance. Jimenez and Sawada (1999) summarised that decentralisation resulted in greater participation of parents in schools decision making in El Salvador. Similarly, Galiani and Schargrodsky (2002) found that decentralisation improved overall school performance. In a study on panel data of Swiss cantons, Barankay and Lockwood (2007) found that higher degree of decentralisation results in higher educational attainment. Moreover, Arze del Granado *et al.* (2005), found a positive association between fiscal decentralisation and education expenditures. Falch and Fischer (2012) conclude that decentralisation of government spending results in higher tests scores. Likewise, discussing the case of Chile, Parry (1997) reported that education decentralisation has led to the balancing of responsibilities between the central and local governments.

Nevertheless, not a single policy comes without preconditions and hence cannot bear fruits without the enabling environment. Galiani *et al.* (2008) pointed out that the positive effects of decentralisation rests on the preconditions such as bridging the information asymmetries over heterogeneous preferences, increased local participation, and greater accountability of service providers to their clients. Therefore, there are chances that decentralisation may not cause improvement or even deteriorate the situation if local

[112] Fiscal decentralisation is being currently the most viable form to empirically measure and compare the theoretical concept of Decentralisation across the world

communities lack ability to raise voice, faces elite capture (Bardhan and Mookherjee, 2005) or if the local governments suffers from the capacity issues to efficiently carry out and administer public services (Smith, 1985). Hence, there are risks which can limit the positive effects of fiscal decentralisation and therefore rigorous empirical evidence is essential to be sure about the contribution of fiscal decentralisation in education sector.

As discussed, for a theory to prove worthwhile, it needs reliable empirical support from the data. Despite the available literature on the topic, there is need for further empirical evidence to quantify the effects of fiscal decentralisation on the education outcomes and the situation asks for rigorous empirical analysis (Hanushek, 2002). Predominantly, the available empirical evidence on education sector is based on the country specific studies using the primary survey or national level secondary data sources. Though there are studies that reported results for the cross-section and panel of different countries however, these are few in number. One of the basic reasons for limited research is often cited as the absence of comparable data across nations. Nevertheless, with the release of more consistent and improved data sets, it is now possible to assess the effects of fiscal decentralisation on basic education indicators using the cross country data from different regions of the world.

Hence, there is need to update research on the issue by using the cross country evidence, which is not great at the moment. In this study, we will analyse the impact of fiscal decentralisation on the education sector using a rich panel data from 78 countries which covers different regions of the world. Main focus of the research is to identify the effects of fiscal decentralisation on education indicators like the education expenditures, the student enrolment rate and the quality of education (proxied with teacher-pupil ratio). We are also interested to disaggregate the effects of different sources of subnational revenues and to investigate how these influence the effectiveness of local setup.

The study is organised as follows. Section 2 covers the major studies and summarises the available literature on the education and its determinants. Section 3 presents data and methodology which contains economic model along with hypothesis and discusses the theoretical linkages of education indicators with their determinants especially with its link to fiscal decentralisation. Sections 3 also summarises the data and explain the methodology adopted for estimation. Section 4 presents the empirical results while section 5 describes the results and discussion section. Section 6 finally concludes the study.

4.2 LITERATURE REVIEW

As a starting point, it is always essential to consider available literature to learn in better way, identify the areas of focus and be aware of the potential issues. Following section presents brief review of literature on the determinants of education sector indicators.

4.2.1 Determinants of Education Expenditures/Enrolment

There are number of studies which have used different types of data sets to assess important determinants of education sector. We will broadly discuss the important variables that were used to explain various education indicators. In studies discussing social indicators, given relationship is normally expressed in various functional forms and estimated with different econometric techniques. This procedure sometimes results in different signs and significance therefore we will not discuss those details for the control variable. Basic aim of this section is to identify general determinants of different education indicators and be aware of the potential issues which can be experienced during estimation.

To start with, Baldacci *et al.* (2008) analysed the link between social spending, human capital and growth. They used rich panel data from 118 developing countries covering the period from 1971-2000[113]. Controlling for the governance and non-linearity, paper reported positive and significant relationship between education spending and education capital. The education capital was denoted by a composite indicator of primary and secondary school enrolment rate. This study used fixed-effect model (LSDV) as the baseline model, while the FGLS, 2SLS and system GMM were used as alternative estimators to check the robustness of the results. Results suggested that a percentage point increase in education spending increase enrolment rate by 6 percentage points in the immediate five year period while it will add another 3 percentage point lagged effect thereafter. Authors also made an interesting note that in countries with poor governance, the impact of education spending is left half of those which have better governance.

Rajkumar and Swaroop (2008) focus on the link between public spending and governance to assess its impact on different outcomes. They used two proxies for governance i.e. level of corruption and the quality of bureaucracy to determine the efficacy of public spending on human development indicators in education and health sectors. This

[113] Authors used five year averages for estimation but they indicated that education data was not available for all the years and they managed to use the available data for averages.

study was based on annual data from 57 countries for years 1990, 1997 and 2003 while OLS and 2SLS techniques were used for the estimation. Authors pointed out the potential endogeneity issue between public spending and social outcomes and suspected that the two might be jointly determined. However, results for 2SLS[114] broadly confirmed the OLS results indicating that public spending is determined exogenously. Authors used the inverse measure of education non-attainment as the dependent variable for the education sector[115]. The education non-attainment was indicated by the proportion of those who fail to complete an adequate level of primary school education. They found that in the absence of good governance, public spending loses its effectiveness. Study indicates that public spending on primary education increases primary education attainment in countries with good governance while it had virtually no impact on education outcomes in countries that suffer from poor governance.

Stasavage (2005) studied the determinants of two important education indicators i.e. total public spending on education and public spending on primary education. They used OLS and fixed effects model to estimate the relationship. Basic aim of the study was to analyse the effects of democratisation/multiparty system on education spending. Study used unbalanced panel data for 44 African countries and covered the period during 1980-1996. Author finds that multiparty competition had a positive and statistically significant effect on the education spending. Similar results were found for the per capita GDP which had positive relationship. It is however, important to note that foreign aid had negative and statistically significant impact on education spending which points towards the endogeneity issue. In brief, the results contained certain surprising signs which raise concern about the estimation results.

Gupta *et al.* (2002) produced an important study to analyse the effects of public spending on education attainment. The dependent variable i.e. education attainment was measured in four different ways i.e. gross enrolment rate in primary and secondary education, gross enrolment in secondary education, persistence to Grade 4 and drop-out rate at primary level. This study used cross-sectional data for 45 developing and transitional economies and estimation was carried out with OLS and 2SLS techniques. This study also discussed potential endogeneity between education spending and enrolment

[114] Instruments for the public spending on education included the dummy variables for countries with British common law, French civil law, German civil law, Scandinavian civil law, Socialist law and Islamic law

[115] to get consistent with the results for health measure i.e. child mortality; that was also explained in the study

rate, therefore, 2SLS[116] technique was adopted. Authors carried out several robustness checks with different specification and finally concluded that results did not suffer from endogeneity issues. Study concludes that higher public spending on education is associated with improvements in access and attainment of education. Finally results suggest that 5 percentage point increase in government spending on primary and secondary education gives more than 1 percentage point rise in gross secondary enrolment. These estimates were much lower than what the author found later in a joint study i.e. Baldacci *et al.*, (2008).

Fernandez and Rogerson (2001) analysed data from USA for 48 states over the period 1950-1990 with a special focus on the period 1970-1990. They used five years interval data in levels and in first differences while OLS was used for estimation. Real current expenditure on public primary and secondary education (per student) was defined as the dependent variable and it was concluded that the two major determinants of public education spending are personal income and number of students in average daily attendance.

In an important study on Pakistan, Holmes (2003) analysed the demand for child schooling in Pakistan. Based on the primary data for 1991, this study found evidence of censoring and sample selection bias in survey data analysis. This research shows that the sample selection procedure and methodology adopted for the analysis of schooling demand can significantly alter the results (by introducing significant bias). Based on the insights from this paper, Holmes infer that while analysing years of schooling (i) currently enrolled children should be treated differently from those who have completed their schooling and (2) student's decision to leave home and to attend school must not always be assumed independent. As a remedy, this study opts for the censored ordered probit technique for the analysis whereas the dependent variable was years of schooling for children aged 5–25 years (by gender). Within the set of independent variables both the age and age-squared were included to assess the nonlinear relationship between age and schooling. As expected, parental education came out to be an important determinant of schooling demand with boy's education being more affected by father's education while mother education increases the schooling demand for girls. Moreover, household wealth and average male wages also positively affected the education attainment. Deficiency of basic facilities like

[116] Instruments included aid per capita, aid in percent of government expenditures, military spending in percent of government expenditures, share of unallocated education spending and total government spending to explain the share of public education spending

sewage put negative effect on schooling demand. Finally this study finds that distance to middle and secondary school has a negative effect on schooling demand.

Miller (1996) presented an interesting insight in a study for determinants of public education spending. He considered an interesting model where both the parents and elderly were treated as the possible interest groups who can respectively affect public educational spending positively and negatively. The reason lies in the fact that the preferences of the two groups differs. Parents are usually more worried about their children's education while elderly faces different challenges and they might have different focus as well like asking for increased public health services. Author analysed the education expenditures (at the state and local level) using data from 48 states in USA covering the period from 1960-1990. This study finds support for the interest group model as the public spending on education was found to be positively associated with the rise in number of parents in the electorate. The important determinants were identified as the number of adults with children, the number of citizen with age 65 and above, state's median income, percentage of adults with high school qualification, public as well as private school enrolment and the number of people employed in public education. Total voting age population was used as the denominator for most of the indicators to evaluate the interest group hypothesis and to assess group's ability to influence policy making. Study concludes that interest group model was at work and parents positively influenced the public education funding while the elderly population had a negative impact.

Schmidt and McCarty (2008) used more recent panel data from 48 states of USA for the period 1980-2000 but they analysed the state and local education spending from a different perspective. They tried to evaluate how past income and aid, as well as the future income expectations affect the education spending. Importantly, they argued that when the panel data contains long time dimension, it can normally result in non-stationary behaviour and thus the simple elasticity estimates are not robust to specification. Therefore, data in first differences was used to get consistent estimates. Apart from the above mentioned variables, the other important determinants of state and local education spending were found to be the; state's per capita income; student fraction of the state's population (6-17); and demographic characteristics (including the fraction of the state's population i.e.; high-school educated; below the poverty line; elderly (over-64); living in urbanised areas; ethnically Asian, or ethnically Caucasian). Authors found that future income has an important bearing on the state's current expenditures. However, it was found that the current education spending is not influenced by the present or past aid.

To sum up, the discussion above makes us aware of the important variables and their inter-linkages in education sector. Here we had a mix of studies based on different data sets and thus identified the potential estimation problems that were attached with these. To explain different education indicators the most important variables can be summarised as per capita income, proportion of school age population, age distribution, demographic characteristics and governance. With this background we can now frame the discussion towards our matter of concern i.e. to study the effects of fiscal decentralisation on education sector.

4.2.2 Effects of Fiscal Decentralisation on Education

Previous section contains discussion about different education indicators and their determinants but we need to know more. It is important to find out which tier of government is more efficient and can effectively realise essential educational goals. Apart from few studies which looked into the matter there is not much research available on the effect of decentralisation on educational outcomes. Decentralisation is multifaceted phenomenon and its success depends upon a number of factors. Among others, these factors include the extent to which functions are allowed to decentralise, clarity in the guiding policies, capacity of the stakeholders and resource availability at the local level (Chikoko, 2009). Caillods (1999), asserts that ambiguity in decision making negatively affects educational planning.

Effects of decentralisation on education sector can be analysed in two ways depending on the nature of analysis. In fact, decentralisation is normally practiced in two ways in education sector; (a) by giving people more say in the schools management system and (b) by decentralising the education system to the lower level of government and empowering them with effective policy making. Former approach normally result in establishing teacher-parent boards, introducing school-based management by locally elected/nominated school boards and similar practices which increases local participation in deciding how schools should run. Hence, in order to analyse such kind of decentralisation, researchers normally need primary data and use surveys for both the quantitative and qualitative analysis. Whereas, the later concept focuses on the role of local government for its effects on the overall education spending and educational quality and in this study we will follow this strand of research. Analysis of such kind of decentralisation approach not only match the overall theme of the study but it also helps in assessing the effects of shifting policy making from upper tier of the government to the lower tier. The

section below presents some of the studies that discussed the link between fiscal decentralisation and education indicators.

Falch and Fischer (2012) analysed the effects of decentralisation on student performance by studying the national average student test scores in Mathematics and Natural Science (the dependent variable). Authors try to examine the relationship between school quality and public sector decentralisation. They used unbalanced panel data from 25 OECD countries over the period 1980-2000 and fixed effects model was adopted for empirical estimation. Authors reported that decentralisation of government spending has positively affected student performance. More interestingly they argued that these effects need not to be mediated through levels of educational spending and mere administrative effects of decentralisation can result in efficiency gains. They found robust positive effect of decentralisation on student performance.

In a paper by Galiani *et al.* (2008), authors analysed the effects of school decentralisation on quality of education in Argentina. Interestingly, this study claims that although decentralisation produced positive impact on student test scores yet poor were not among those who benefited. Main reason was shown as the poor's inability to voice and defend their preferences. Thus positive effects of decentralisation were asymmetrically distributed and rich were the ones who benefited the most. Results for this study were based on the information from 3,456 public schools that was collected over the period 1994-1999. The standardised Mathematics and Spanish tests scores (for the fifth-year secondary school students) were used to indicate student performance. The set of independent variables included the number of years since the school had been decentralised, per capita provincial GDP, fiscal deficit/surplus as a percentage of provincial GDP and provincial unemployment. Fixed effects model was used for estimation using the school, province and time fixed effects. Authors suggested that while decentralising, government should take measures to empower poor communities so as to make them able to benefit from the improved service delivery under decentralised setup.

Marlow (2000) examined the effects of school spending and school structure on the student's performance. This study was based on data from 54 counties in California and found that greater competition among schools improve student performance. However, study could not found any significant relationship between higher education spending and student performance. Similarly, effects of state spending were also not statistically significant. Dependent variables were defined as spending on education, measures of

student performance (test scores for reading, maths and writing), and teacher–student ratio while important independent variables were; per capita income, student share of the population, state and federal share of education funding, Herfindahl index (to measure public school competition), and population density. Seemingly unrelated regression (SUR) estimation technique was adopted for estimation. As counties were situated in the same state and hence affected by the state's policies and shocks in the similar fashion, hence, SUR was expected to result in efficiency gains by taking into account the contemporaneous correlation in errors. Empirical results indicated that higher concentration of public school led to monopoly and resultantly schools were able to get higher funding in California. However, it is important to note that rise in overall and state education funding were not translated into better student performance.

Busemeyer (2007) analysed the impact of fiscal decentralisation on various types of public spending including the education sector and argued that competition among local governments result in higher spending on education. Author provides a decent review on the promises and perils of fiscal decentralisation and uses data from the 21 OECD countries for the period 1991-2001. Study tests the hypothesis that whether higher level of fiscal decentralisation results in higher spending on regional public goods. For this purpose different types of educational spending were analysed including: total public education spending, spending on primary and secondary education and spending on tertiary education. 'Own tax revenue' for sub-national governments was used to represent fiscal decentralisation. In addition, other independent variables included per capita GDP, the ratio of population share of aged 65 (and above) to the population aged 5 to 29, the public social spending and veto dummy for federal government powers. Equations were expressed in two ways; a restricted ADL model while the second specification was the error correction mechanism (ECM) form to separate the long run effects from the short term influences of the independent variables. Study concludes that educational expenditures increases with higher level of fiscal decentralisation and local governments compete to provide better facilities to attract tax payers from other regions.

The study by Verbina and Chowdhury (2004) discussed the determinants of per capita education spending in the Russian Federation that was in its transition period at that time. Authors analysed data from only two years (1999-2000) but they covered 88 regions. Important determinants consisted of the regional revenue, student-population ratio, population density and regional dummies. It is important to note that although study did not reflect upon the effects of decentralisation but still by analysing the impact of regional

revenues on educational expenditures, this study found a positive effect. Moreover, authors declared that education is a normal good in Russia. They also found positive effects for student-population ratio and results suggested that one percentage point increase in average student-population ratio increases the educational spending by a half percentage point. Population density was found to have negative effect on educational spending and authors associated it with developed infrastructure and/or economies of scale.

Stated above are few of the studies that discussed the effects of fiscal decentralisation on educational outcomes. To summarise, literature suggests that when people are equipped to benefit, fiscal decentralisation has a positive and significant effect on the education sector. However, effects were not uniform for the poor and non-poor which indicate the possibilities of elite capture. This reflects that while focusing on decentralisation it is also important to consider the pre-requisites of the policy and to cover its shortcomings. Table 4.1 below presents a brief summary for some of the important studies.

Table 4.1: Summary of empirical studies on the determinants of education sector indicators

Research Study	Countries and period analysed	Estimation technique	Dependent variable(s)	Explanatory variables
Busemeyer (2007)	OECD 1991-2001	LSDV with panel-corrected standard errors	Total public education Spending; Spending on primary and secondary edu.; and Spending on tertiary edu. (all in either percent of GDP or in per student terms)	Significant Variables: Fiscal decentralisation; Public social Spending; GDP per capita; the ratio of population share of aged 65 (and above) to the population share of aged 5 to 29; dummies Broadly insignificant Variables: *nil*
Arze del Granado, Martinez-Vázquez and McNab (2005, WP[#])	Cross-country, 45 countries from 1973-2000	OLS, Fixed effects, Random effects and quasi-maximum likelihood	Ratio of education expenditures to total public expenditures	Significant Variables: Fiscal decentralisation ; population; population density; GDP per capita; and budget balance; dummy for industrialised countries Broadly insignificant Variables: *differs across models*
Falch and Fischer (2012)	OECD, unbalanced panel data of 25 countries over the period 1980-2000	Fixed effects model	Student test scores (national average of the scores in Mathematics and Natural Science tests)	Significant Variables: Decentralisation lagged (1 period); GDP per capita; Social spending * Decentralisation; Dummy for the only OECD PISA test Broadly insignificant Variables: Population size; Government consumption spending as percent of GDP ; Government consumption * Decentralisation; Social spending as percent of GDP ; Social spending * Decentralisation; Primary education spending per pupil as percent of GDP
Verbina and Chowdhury (2004)	88 regions in the Russian Federation for years 1999 and 2000	GLS random effect model	Per capita expenditures on education	Significant Variables: Total regional revenue; student-population ratio; Population density; regional and time dummies Broadly insignificant Variables: *nil*
Morekwa and Schoeman , (2006, Conf. P[#])	Africa, panel of 28 countries for years 1995-2004	OLS	Public education spending	Significant Variables: Real GDP per capita; government spending to GDP; Population less than 14 years; population density; Urbanisation; IMF dummy; Interaction term (IMF*Government spending to GDP) Broadly insignificant Variables: Political stability; Public debt

Table 4.1: Summary of empirical studies on the determinants of education sector indicators (cont...)

Stasavage (2005)	Africa, unbalanced panel of 44 countries for the period 1980-1996	OLS, Fixed effects model	Total public spending on overall education and public spending on primary education	Significant Variables: Real GDP per capita; multiparty competition; Foreign Aid as percentage of GDP; percentage of rural population and percentage of population under 15 Broadly insignificant Variables: Election years
Gupta *et al.* (2002)	Cross sectional data for 45 developing and transitional countries (1993-1994)	OLS, 2SLS	Education attainment i.e. gross enrolment rate in a) primary and secondary education b) in secondary education; persistence to Grade 4 and drop-out rate at the primary level	Significant Variables: Public spending on education as a ratio to GDP; Allocations to primary and secondary education as a share of total education spending; Per capita GDP (in PPP terms); Share of population aged 0-14 years; Urbanisation; Child nutrition (proxied by child mortality), Dummy variables for regions Broadly insignificant Variables: *differs across models and estimation techniques*
Rajkumar and Swaroop (2008)	57 countries, annual data for 1990, 1997 and 2003	OLS and 2SLS (with random effects)	Education failure/education non-attainment as presented by proportion of those who failed to complete an adequate level of primary school education	Significant Variables: Per capita GDP (in PPP terms); Income inequality; Dummy for East Asia; Interaction terms a) Index of corruption x Share of public primary education spending in GDP; b) Quality of bureaucracy x Share of public primary education spending in GDP Broadly insignificant Variables: Share of public primary education spending in GDP; Adult illiteracy rate; Independent measures of governance (index of corruption or quality of bureaucracy); Income inequality; Predominantly Muslim; Ethno-linguistic fractionalisation; Degree of urbanisation; Percentage of population aged 6 to 12; Dummy for years 1997 and 2003
Holmes (2003)	Pakistan, primary data from Pakistan Integrated Household Survey-1991	Censored ordered probit analysis	Years of schooling for children aged 5–25, by gender	Significant Variables: Age; Age squared; Mother's education; Father's education; Value of land and property/100,000; Muslim; Rural; sewage facilities; Distance to middle and secondary schools; Average female wage; Average male wage; dummies for Balochistan and NWFP Broadly insignificant Variables: Distance to primary school; dummy for Sindh

Table 4.1: Summary of empirical studies on the determinants of education sector indicators (cont...)

Schmidt and McCarty (2008)	USA, 21 years panel data (1980-2000) for 48 states	OLS, Fixed effects, Random effects, Non-linear least square technique	State and local Education spending per capita	Significant Variables: State's per capita income; derived future income term; Student fraction of the state's population (6-17); and demographic characteristics (including the fraction of the state's population that is; high-school educated, below the poverty line, elderly-over 64, living in urbanised areas and ethnically Asian or Caucasian) Broadly insignificant Variables: Federal aid for Education; General(unrestricted) federal aid; Reform dummy i.e. a court-ordered reform of state's education finance system; fraction of state's population that is college educated
Fernandez and Rogerson (2001)	USA, panel of 48 states for years 1950-1990	OLS with data in level and in first differences	Real per student current expenditure on public primary and secondary education	Significant Variables: Real personal income; No. of Students in average daily attendance; Fraction of population over 65 Broadly insignificant Variables: Fraction of population of school age (5-17)
Marlow, Michael (2000)	California, Cross-sectional data from 54 counties, using data from different years	Seemingly Unrelated Regression (SUR)	Education spending as percentage of personal income	Significant Variables: Per capita income, Student share of the population; Federal share of education funding; Herfindahl index score Broadly insignificant Variables: Population density; State share of education funding; Percentage of Black students; Percentage of Hispanic student; Percentage of Asian student
			Teacher-Student ratio and reading, writing, and math scores	Significant Variables: Education spending per pupil; Per capita income; population density; Federal share of education funding; Percentage of Black students; Percentage of Hispanic student; Herfindahl index score; Median education levels of county residents Broadly insignificant Variables: Student share of the population; State share of education funding; Percentage of Asian student
Miller (1996)	USA, 48 states 1960-1990 (with 10 years gap)	Fixed and random effects model	State and local spending for public Education (per adult)	Significant Variables: Number of adults with children/total voting age population; No. of aged 65+/total voting age population; State median income; % adults who completed high school; Public enrlmt/voting age pop.; Private enrlmt/voting age pop.; No. of people employed in public education/voting age pop. Broadly insignificant Variables: % voted for Dem. President; % teachers in public schools who are members of the National Education Association

[#]WP: Working paper, [#]Conf. P: Conference paper

4.3 DATA AND METHODOLOGY

Having discussed some of the recent literature on the topic, this section contains information about the variables and mechanism that relates fiscal decentralisation to education sector. The section below elaborates the hypothesis, empirical model, data coverage, data properties and the estimation techniques used for the empirical analysis in this study.

4.3.1 Background

This study aims to re-examine the link between fiscal decentralisation and education indicators by using up-to-date data evidence. We can observe that governments around the world are investing in education because of its long run social and economic returns. As described by O'Connor (1973[117]), government bear education and health expenses so as to increase productivity in the economy with better skilled and productive labour force. Baldacci *et al* (2008) smartly put together several studies which analysed the effects of education on economic growth and it is now well-established that education boosts economic growth (Barro, 1996a, 1996b; Barro & Sala-i-Martin, 1995; Levine & Renelt, 1992; Mankiw, Romer, & Weil, 1992; Sala-i-Martin, 1997). Coulombe *et al.* (2004), reports that a country with 1% higher than average literacy scores, experiences 1.5 percentage points increase in per capita GDP growth. Hence, education sector really matters for economic output. Moreover, there are social implications attached to these spending as these affect the quality of life. We know that certain goods and services are allocated through public sector because of their non-divisibility and/or these are collective in consumption (Musgrave and Musgrave, 1973). In addition, public sector involvement is also advocated because free markets might not lead to equitable distribution of public goods. Hence, as education sector share these properties and fall in the same category, therefore, the role of government sector is very important.

In this perspective, fiscal decentralisation can play an important role as it aims toward the improved service provision and is theoretically believed to yield better results. With the decentralised administrative infrastructure, it is relatively easier to accommodate diverse local demands as against the centralised allocation, which might suffer from insufficient information, and for this reason decentralisation results in better allocation of scarce resources. There are various ways in which decentralisation affects the development

[117] cited in Devine, 1985

outcomes of a country i.e. by affecting its political, fiscal, and economic systems (Kalirajan and Otsuka, 2012). Fiscal decentralisation also makes the policy makers accountable through local elections which improves transparency. So, with decentralisation[118], it is reasonable to assume that it will have positive effects on educational performance along with other sectors. Although, there is some empirical support available for this link, yet, further research is always desirable. Therefore, in this study we will analyse the hypothesis that fiscal decentralisation improves education indicators. Moreover, cross country panel data analysis will also help to discriminate among the effects of different decentralisation policies.

4.3.2 Hypothesis:

In this study the focus is to examine the hypothesis given below which rests on the assumption that fiscal decentralisation improves the allocation of resources and will achieve better results in education sector. Main hypothesis regarding the effects of Fiscal decentralisation in this study are given below:

1. **Fiscal decentralisation positively affects the education sector:** Increased level of fiscal decentralisation helps in efficient resource allocation and presumably translates public demand into required actions. The coefficients for fiscal decentralisation measures will identify whether or not fiscal decentralisation has produced significant effects and whether those effects improved educational facilities.

2. **Different decentralisation policies results in distinct outcome:** The analysis of rich cross country evidence will help us to analyse that whether it is only the resources at local level that matters or different sources of local revenues can in fact result in different outcome. During the analysis, the pattern of the two measures of fiscal decentralisation i.e. subnational tax revenues and federal transfers to subnational governments would be observed to examine whether these produce similar results or they differ in effects for education sector. This comparison will through light on the effectiveness of different sources of subnational revenues.

[118] Provided that issues like regional inequalities, elite capture, leviathan government and capacity issues are taken care of

The given hypotheses testing will not only help in examining the effects of fiscal decentralisation on education sector but it will also make a clear distinction among the available fiscal decentralisation policies, if any. The comparison of the effects of local tax revenues and federal transfers at the subnational level will potentially help us in comparing the effects of local autonomy versus that of partial fiscal decentralisation (Brueckner, 2009).

4.3.3 Empirical Model

Unlike the health sector, where we could find comparable outcomes relatively easily (like infant/child mortality and immunisation), it is very difficult to get equivalent measures for the education sector. There are significant differences across countries in terms of; the starting age for education, duration at the primary and secondary schools and above all there are differences in the quality of education; therefore, it is very difficult to get an agreed-upon indicator for educational outcome in the literature. Nevertheless, by examining the most obvious indicators there is still possibility to analyse the link between fiscal decentralisation and education sector and to deduce reasonable results. Therefore, based on the availability of the data, two important indicators were used to analyse the education sector.

First of all, in order to examine the effects of fiscal decentralisation on education sector, the most obvious choice appears to be the education spending. Education spending is the basic input for improvement of education and its analysis will bring to light the immediate response of the local governments towards education sector in the short run. However, evidence from an input indicator alone would not be enough and it is important to analyse how a policy affects the output/outcome variable for a specific sector. For the given reason, in this study, school enrolment qualifies as a good proxy for an output variable. However, with the available data, it was not possible to analyse school enrolment. In fact, the sample we have for this study is dominated by countries (OECD) that are characterised with compulsory education policies. In addition, OECD countries have better social protection schemes in place as compared to the rest of the world therefore these countries have achieved almost 100% mark in school enrolment, leaving little variation for empirical analysis. Nevertheless, teacher-student ratio provides us with a reasonable outcome measure to proxy quality of education and hence it was analysed to figure out the effects of fiscal decentralisation.

It is important to mention here that 'test scores' are regarded as the most obvious outcome measure for education sector; therefore, the availability of PISA tests scores presents its potential to be considered for examining the effects of fiscal decentralisation on education outcome. To provide some background, the Programme for International Student Assessment (PISA) assesses the 15-year-olds for competence in reading, mathematics and science. The positive aspects of PISA tests scores includes that these tests are carried out concurrently in all the countries and are based on the assessment of general competence instead of being the curriculum based exams. The PISA tests are conducted after every three years since 2000; however the number of participating countries varied each time. The first PISA test was conducted for 43 countries in year 2000, followed by 41 countries in 2003 while 57, 75 and 66 countries were assessed in years 2006, 2009 and 2012, respectively (OECD, 2013). Nevertheless, despite it being a better indicator for measuring education output, data is mainly (consistently) available for the OECD-countries only and observations are only available with three year gaps. For these reasons we could not use this indicator for analysis in this study; where the emphasis is to investigate effects of fiscal decentralisation on education sector in both the OECD and Non-OECD countries.

Consequently, to analyse the effects of fiscal decentralisation, two measures were used to represent the developments in education sector; proxied with the Public Education Expenditure per student and Teacher-student ratio. Both of the education sector measures represent the primary level, because it is the primary education which provides basis for further intellectual development. Besides, it is important to note that within the different stages of education, the social rate of return is highest for the primary education (Psacharopoulos, 1994; World Bank, 1995). Following the insight from the literature on education related macro data studies, important control variables can be identified as per capita income, government spending policy, the population demographics and access to better infrastructure. In addition, we will obviously include the fiscal decentralisation measures to first identify its impact on education indicators and secondly to investigate whether the effects remain the same amongst the given decentralisation policies or it differs for distinct decentralisation measures.

Finally, to estimate the given relationship we use following two equations:

$$(EE/St)_{it} = \alpha_{1i} + \beta_{11}Y_{it} + \beta_{12}FD_{jit} + \beta_{13}GE_{it} + \beta_{14}Pop(05-14)_{it} + \beta_{15}Pop(65+)_{it} + \beta_{16}Urb_{it} + \varepsilon_t$$

Eq.(1)

$$(T/St)_{it} = \alpha_{2i} + \beta_{21}FD_{jit} + \beta_{22}\left(\frac{EE}{St}\right)/Y_{it} + \beta_{23}Pop(05-14)_{it} + \beta_{24}Dep_{it} + \beta_{25}Urb_{it} + \varepsilon_t$$

Eq.(2)

Where ***i*** refers to country, ***t*** refers to time while in the case fiscal decentralisation ***j*** refers to the three fiscal decentralisation measures. The above equations provide basic models that would be used to assess the effects of fiscal decentralisation on the given education indicators. In Eq.(1), **EE/St** represents public education expenditure per student (at primary level) while in Eq.(2), the teacher-student ratio as indicated by **T/St** is used to proxy education quality. Here it is important to mention that the World Bank provides a more elaborate measure for education expenditure i.e. the "public education expenditure per student as ratio to GDP per capita {**(EE/St)/Y**}", which provides better measure for international comparison. However, as we are investigating the important determinants of education spending, of which GDP per capita is one of the important determinant, therefore, education expenditure per student (in real terms) was used by factoring out the GDP per capita[119]. As the second equation does not suffer from the same issue therefore we used "education expenditure per student as ratio to GDP per capita" among the explanatory variables to explain the teacher-student ratio. Moreover, it is important to note that education expenditure depends upon such factors which simultaneously affect education quality as well therefore we end up with a recursive model[120] for the second equation. Table 4.2 provides basic definitions for each variable along with the sources of

[119] However, the results presented in this paper remain mostly consistent even for the education spending per student as ratio to GDP per capita. In that setting, we need to exclude the GDP per capita from the set of explanatory variables to avoid the endogeneity issue. The reason is that with the inclusion of GDP per capita as explanatory variable, there are chances that any shock affecting the per capita GDP will also affect the dependent variable, which contains the same as the denominator, and this can potentially lead to confusion and would raise specification issues

[120] Where the Expenditure per student/ GDP per capita (primary) is instrumented with the same set of explanatory variables as given in Eq.(1) except the GDP per capita.

data while the discussion below elaborates basic rationale for the inclusion of different explanatory variables.

Y: GDP per capita is the most important explanatory variable in the social sector studies in economics. It is commonly used to capture the level of development in countries and for this study GDP per capita is expected to yield a positive and significant effect on the education expenditures.

FD: Fiscal decentralisation is our main variable of interest. We expect that informed policy making will result in better resource allocation and it will positively affect social sector indicators like education. Three measures were used to proxy fiscal decentralisation i.e. share of subnational tax revenue, share of subnational total revenues and the vertical grants. These different measures will help to distinctly identify the effects of different sources of subnational government's finance on their performance. Different sources of subnational government's revenues are assumed to have distinct incentives for the local governments and the research question here is that whether it is the resources or the empowerment that enhances local government efficiency.

GE: Government expenditure is another important explanatory variable to explain the current education expenditure per student. Government expenditures are expressed as percentage of GDP and will capture the effect of government's spending behaviour on education sector. This measure will identify the preferences of governments in power and will tell us that whether their policies are deviating from or enhancing funding for the education sector.

Pop (05-14): Percentage of population in age bracket 5 to 14 was used to proxy the school age population in the country. This measure will illustrate the educational needs in the society, which if not accurately assessed, will put pressure on the existing resources. Thus, Pop (05-14) is expected to appear either as insignificant or with a negative sign for the educational funding and quality.

Pop(65+): Percentage of population aged 65 and above was used to characterise the interest group hypothesis as proposed by Miller (1996). Higher proportion of elderly in a society is assumed to divert public spending towards other sector like health so this variable is expected to have negative effect on education spending.

Urb: Population at urban stations has access to better infrastructure facilities as compared to the rural population. Thus it is expected to have positive effect on teaching quality as

exhibited by teacher-student ratio however; its sign for public education spending depends on the available facilities at the urban stations. For the education spending, on one side, urbanisation can improve enrolment due to better access opportunities, which will result in higher funding demand. On the contrary, existence of economies of scale can result in lower per capita expenditures. Therefore, the sign and significance for urbanisation in this study is expected to produce good insight into the matter.

Dep: Dependency ratio is used to proxy affordability of the household in our sample of different countries. If there is higher proportion of dependent population in a country, it may result in lower education demand and people in the poor countries might not be able to send their children to schools. Quite the reverse, this can also result in increased dependence on public sector because those who cannot afford private education will switch to the public education institutes and this can increase demand for public education facilities. Once again, sign for this variable contains important information and will provide guidance towards the correct conclusion on the educational quality (in different economic settings).

Table 4.2: Variable Names, Definitions and Sources of Data

Variable	Name	Definition
Expenditure per student, primary (in real US $, 2000) *	EE/St	Public education expenditure (current) per students at primary level, expressed in real US dollars for base year 2000
Expenditure per student, primary (% of GDP per capita) *	$\left(\frac{EE}{St}\right)/Y$	Public education expenditure (current) per students at primary level, expressed as a percentage of GDP per capita
Teacher-student ratio, primary*	T/ St	Number of teachers available relative to the number of students enrolled (at the primary level)
GDP per capita*	Y	GDP per capita (in constant U.S. dollars)
Government spending *	Ge	General government expenditures expressed as percentage of GDP
Urbanisation *	Urb	Percentage of total population living in the urban areas
Dependency ratio *	Dep	Ratio of dependents (i.e. people younger than 15 or older than 64) to the working-age population (i.e. those with ages 15-64), shown as the proportion of dependents per 100 working-age population
Population of age 65 and above *	Pop(65+)	Percentage of total population that are of ages 65 and above
Population of age 05-14 **	Pop(05_14)	Percentage of total population that are of ages 05 to 14
Subnational Govt. Share of Tax Revenue (% of Total Govt. Tax Revenue)*	Fd_{tax}	Subnational tax revenues as percentage of total government tax revenues i.e. *(tax rev_SG + tax rev_LG)* divided by *(tax rev _CG + tax rev _SG + tax rev _LG)* [#]
Subnational Govt. Share of Revenue (% of Total Govt. Revenue)*	Fd_{tpr}	Total Subnational revenues as percentage of total government revenues i.e. *(total rev _SG + total rev _LG – grants from SG to LG)* divided by *(total rev_CG + total rev_SG+total rev _LG)*
Vertical Grants as Share of Subnational Govt. Revenue *	Fd_{trans}	Total subnational transfers as percentage of subnational total revenues i.e. *(grants_SG + grants_LG – grants from SG to LG)* divided by *(total rev_SG + total rev _LG)*

Sources of data:

* World Development Indicators (WDI), World Bank

** Health Nutrition and Population (HNP) Statistics, World Bank

Note: [#] CG=Central government, SG= State Government, LG=Local government

4.3.4 Data

While dealing with the cross country panel data, concerns might arise about combining data from different countries that have great variation in economic and local government structure. Research studies with international data are often criticised for combining data from heterogeneous countries where response to different policies can be different. Even in this study, countries differ not only in education sector but also in decentralisation and its implementation. Nevertheless, these concerns are overshadowed by the advantages of panel data like; greater number of observation, making use of information from both the within and between variation and ease to generalise results. Analysis from single country studies obviously are country specific and results are difficult to generalise. Moreover, availability of improved econometric techniques has made it possible; to cover for the cross country heterogeneity and deduce reasonable results. The discussion below contains detailed information about the data availability and other relevant matters.

4.3.4.a A Note on the construction of Fiscal Decentralisation Measures

This study is based upon up-to-date panel data from 78 developed and developing countries, thus benefits from the newly released fiscal decentralisation indicator's data. The updated version of the dataset was released by World Bank in October, 2012[121] and is derived from the International Monetary Fund's Government Finance Statistics (GFS). GFS provides detailed elaboration of the revenues and expenditures for the three tiers of government and thus provides a good overview of the fiscal and administrative arrangements for different countries (World Bank, 2012).

The given data set for fiscal decentralisation indicators provides data for the period 1972-2010 (although with gaps[122]) and covers all the important definitions of fiscal decentralisation that are currently suggested in the literature. In this study the revenue approach was adopted for the analysis and different fiscal decentralisation indicators related to subnational revenues are analysed. Before proceeding to empirical estimation it is important to discuss the variable of interest in detail. The World Bank dataset provided data in two different accounting methods i.e. 'Accrual' and 'Cash'. Historically, data for Government Financial statistics were recorded in the Cash accounting method where time

[121] Previously, the data set had limited coverage for countries while observations were only available till 2001
[122] Although the data used for this study is unbalanced and has missing values issue however, we did not opt to create imputed values for the missing observations because it can lead to measurement errors

assigned to flows is when cash is received or disbursed. However, since 2001 countries started to switch to the Accrual accounting method and started to report data on accrual basis, where the time assigned to the flow is when it is created (World Bank, 2012). Nevertheless, the shift from Cash to Accrual method can mostly be noticed in the developed world as the developing countries either still continues to report data on Cash basis or the shift from cash to accrual accounting method started in later years. Because of the difference in definition – that how the money disbursed would be recorded in a certain year – there is slight difference between the figures from the two reporting methods and the data cannot be readily combined as one series.

As is obvious, number of observations for the fiscal decentralisation data varies according to the two accounting methods. Figures for the accrual basis generally start from year 1999/2000 and continue to date while the historical figures are reported in cash accounting method. Though, overlapping years can be found around year 2000 where figures are reported in both series, it is however not always the case. Moreover, upon inspection, for some countries the figures reported in the two accounting methods are pretty close while, for others they seem to fall apart. So in order to combine the two series, the only way is to analyse the data for each country separately and accordingly decide on the consistency. To avoid any loss of data, we decided to combine the two data series which will not only increase the number of observations but it also mitigates chances for the potential sample selection bias. This was important because data reporting on accrual method presumably indicates the developed nature of the country and countries, which have better accounting system, shifted to accrual accounting method quickly. Hence, the two data series for each fiscal decentralisation measure were combined. In fact, we were faced with four different scenarios for each fiscal decentralisation measure to consider i.e.

a) Data is only reported on Cash basis. In this situation the same values were kept in the combined series without any treatment.
b) Data is only reported on Accrual basis. In this case, once again figures were included in the combined series without any treatment. The reason is that accounting method in itself cannot affect the resource availability to the subnational levels and the only difference two methods contain is difference in the recording time of transaction. Therefore, by default the two series should report similar trend over the long run.

c) Data is reported in both the Cash and Accrual basis and there is an overlap. In this scenario, the two series were combined by converting the series to the cash base and we used data splicing technique for this purpose.

d) Data is reported on both the Cash and Accrual basis but there is no overlap and figures in the two methods lies next to each other in consecutive years. For example, data on subnational tax revenues for USA was reported on Cash basis till year 2001 while for year 2002 and onwards data was only available on the Accrual basis. In such a case, accrual series was extended backwards by one year, assuming the same value for the previous year in order to create an overlap. Hence accordingly the two series were combined with each other with the data splicing method[123].

To provide an overview, Tables A4.1 – A4.4 in Annex–I present the data availability situation for each region. It can be observed that data reported on cash basis has more data points. On the other hand, the accrual method provides the most recent data for the last 10 years and as stated earlier it is not optimal to lose either of the data points. Tables A4.1 and A4.2 also presents the summary statistics for the combined data series of fiscal decentralisation measures.

4.3.5 Data Characteristics and Availability across Countries

Until now there are a number of efforts made to assess the effects of fiscal decentralisation on service provision, mainly the health and education sector. Most of these studies, however, are either country specific or have discussed the developed/OECD countries due to better data availability. The cross country studies that used data from developing countries are few in number. For most of these studies, data availability played an important role in sample selection and thus generalisation of results is not straight forward. As discussed earlier, in 2012, the World Bank launched an updated version for the fiscal decentralisation indicators data with improved data coverage from 1972-2010;

[123] In order to combine the two series, data splicing was carried out in manner similar to the 'change of base year' for GDP series. As discussed above, once we obtain an overlap among the two series, the data splicing is carried out by finding the first available data point in the 'accrual' data series and dividing it by the last available 'cash' figures for the same year-the year where we had an overlap. This step provides us with the unique multiply factor for each variable series which was then multiplied with the given 'accrual' data series for each country to convert these figures to the 'cash' accounting base. By this method, we bring the two series to the same base and produce a combined series for each fiscal decentralisation measure with the 'cash' accounting base.

though its coverage is not universal[124]. Nevertheless, these issues are not new to the panel data. On the positive side, while the availability of new enriched data set provides an opportunity to extend research on the topic and helps in re-examining the evidence with improved data.

Overall, the new fiscal decentralisation dataset provides information for 96 countries while data for Pakistan was included from the national sources; due to the special interest and to achieve consistency with the whole theme of the study. However, due to the limited data availability for the education indicators we end up with 78 countries (including Pakistan); for which we had data for both the education sector and fiscal decentralisation. This situation leaves us with the unbalanced data set where for some countries there were gaps within the series as well. The main sources of gaps are the missing values in education indicators' data followed by few gaps within the fiscal decentralisation measures. Hence, although data availability for the rest of the macroeconomic and social indicators is complete; missing values within the dependent variable and in the variable of interest leaves us with unbalanced panel data. Table 4.3 presents the descriptive statistics for the variables considered for this study.

[124] It is important to note that data availability differs among countries, and even within countries the missing observations exaggerates the issue for different indicators

Table 4.3: Descriptive statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
Subnational Govt. Share of Tax Revenue	overall	18.03	13.86	0.16	58.74	N = 824
	between		14.36	0.18	54.84	n = 69
	within		2.82	1.00	33.36	T-bar = 11.94
Vertical Grants as Share of Subnational Govt. Revenue	overall	44.39	20.11	1.39	92.72	N = 811
	between		20.73	4.04	87.51	n = 72
	within		7.96	16.76	75.96	T-bar = 11.26
Subnational Govt. Share of Revenue	overall	25.68	13.91	0.82	98.27	N = 746
	between		15.07	0.82	68.79	n = 66
	within		4.15	-13.19	55.16	T-bar = 11.30
Expenditure per student, primary (% of GDP per capita)	overall	18.63	8.20	0.60	61.64	N = 864
	between		8.29	3.51	58.48	n = 78
	within		4.75	-12.09	44.89	T-bar = 11.08
Expenditure per student, primary (constant 2000 US $)	overall	29.88	27.87	0.19	136.66	N = 862
	between		23.84	0.25	88.90	n = 77
	within		10.90	-44.35	86.85	T-bar = 11.19
Pupil-teacher ratio[125], primary	overall	19.70	8.71	8.68	82.80	N = 630
	between		12.18	8.68	69.50	n = 70
	within		2.61	6.41	33.00	T-bar = 9
GDP per capita	overall	14171.7	11002.8	292.09	55807.4	N = 864
	between		10038.7	340.02	40100.6	n = 78
	within		4239.7	1591.2	40493.9	T-bar = 11.08
Government spending	overall	18.72	5.49	4.71	43.41	N = 862
	between		5.28	4.71	36.34	n = 78
	within		2.18	10.10	30.32	T-bar = 11.05
Population of age 05-14	overall	15.55	4.68	8.77	29.63	N = 864
	between		5.91	9.23	29.23	n = 78
	within		1.83	8.05	21.12	T-bar = 11.08
Population of age 65 and above	overall	11.88	4.37	2.51	22.69	N = 864
	between		5.07	2.52	21.06	n = 78
	within		1.08	7.31	15.62	T-bar = 11.08
Urbanisation	overall	69.01	17.12	13.01	97.39	N = 864
	between		18.73	14.06	96.27	n = 78
	within		2.65	56.97	79.63	T-bar = 11.08
Dependency ratio	overall	54.57	10.88	37.53	105.52	N = 864
	between		15.44	38.90	104.79	n = 78
	within		4.70	34.66	81.55	T-bar = 11.08

[125] Represented in reverse order to provide better understanding

4.4 EMPIRICAL QUANTIFICATION

With such wide-ranging data sets both the benefits and risks are attached. Benefits can be counted as better coverage across countries and time, which provides rich information and allow for comparison among different economic blocks. On the other hand, issues can be outlined as difference in coverage which results in unbalanced panels, missing observations for available countries and non-stationarity caused by long panels. However, important of all is the persistence of differences that exists among the countries as these differ in level of; development, governance, endowments, basic infrastructure and public preferences; to name a few. Yet panel data approach is considered ideal to gather evidence related to policy analysis. Panel data analysis can take into account the unobserved individual country effects, which is not the case with cross sectional analysis (Islam, 1995). On the contrary, results from country specific studies cannot be generalised. Hence, panel studies are favoured for broad policy analysis because panel data methods can cover greater variation and thus provide a comprehensive picture.

Now there are number of estimation techniques available for the panel data sets which can take into account the cross country heterogeneity. But above all the first issue that arises is to decide whether the individual cross country effects are "fixed" or "random". With the fixed effects model we assume that country specific effects influence the explanatory variables while the later approach takes these effects as uncorrelated and therefore considers them random. To an extent, it is always a very strong assumption to ignore the country effects, nevertheless, it depends on the research question which determines whether the individual effects can play a significant role or not. Data sets with large N (cross section) and small T (time) dimension is also considered not to have enough information to estimate the individual country effects. But luckily we have such statistical tools which can help us in deciding what is right. Furthermore, with the panels containing long data series there are greater chances of serial correlation within the error term. Therefore, looking at the nature of the available data, test for the existence of serial correlation were also conducted. Normally researchers resort to use the five years averages to solve the serial correlation issues and to avoid short run fluctuations in the data however, with the unbalanced panel data, characterised with incomplete coverage for the included countries, this is not what we could consider.

Before proceeding to estimation, it is important to examine the data characteristics so as to find out the appropriate estimation technique. First of all, looking at the available

data it was important to test the serial correlation for the given equations and results confirmed that there is serial correlation within the errors. In addition, panel heteroscedasticity test was also conducted which established that errors were not having constant variance. Hence, we need an estimation technique that is suitable when errors exhibit autocorrelation as well as heteroscedasticity. Moreover, given this information Hausman Specification Test needs to be conducted for Eq.(1) and Eq.(2) in order to determine whether to use Fixed effects (FE) or Random effects (RE) model for estimation and evidence later suggested that results for Random effects model are efficient and consistent.

Based on the information from the two tests, we are interested in such an estimation technique which can not only handle the serial correction issues, cater with random effects for heterogeneous countries but can also yield better results with unbalanced panel data which has missing observation issues. As we know there are a number of panel data methods which can be used in different scenario but the one to fit best in our situation can be pointed out as the Baltagi and Wu (1999) method of estimation, which is programmed in Stata as "xtregar". This method can fit panel data models where the disturbance term is first order autoregressive and can provide results for both the fixed effects within estimator and the Generalised Least Squares (GLS) estimator for random effects model. As a robustness check, we will also use the general GLS estimator (programmed as "xtgls" in Stata). This estimator too takes into account the panel heteroskedasticity and account for the panel specific error autocorrelation. The only issue is that "xtgls" does not take into account the gaps (missing observation issue) while calculating the error autocorrelation.

Hence, the modelling strategy for Eq.(1) is to estimate it with Baltagi and Wu (1999) method and we will report both the Fixed and Random Effects results along with the results for "xtgls". However, as Eq.(2) contains an endogenous variable i.e. education expenditure therefore, two Instrumental Variable (IV) methods were used to estimate it. Firstly, the two stage least square (2SLS) estimation technique was used where the endogenous variable was instrumented with the same set of explanatory variables as in Eq.(1), except the GDP per capita. Secondly, as we are using the panel data, to solve the endogeneity issue we can instrument education expenditure with its own lagged value. The lagged education expenditure values are assumed to be independent of the contemporaneous errors, therefore, such IV methodology would solve the endogeneity issue. Lastly, keeping intact the essence of panel data, countries with only one observation were dropped during estimation and data points ranges between a minimum of 2 to a

maximum of 36 for different countries. Following the given estimation scheme, next section presents the estimation results. It is important to mention that all the variables used in the estimation were expressed in log form and the coefficients represent elasticity.

4.5 RESULTS AND DISCUSSION

Empirical results for the analysis of different fiscal decentralisation measures on education expenditure and teacher-student ratio are presented in Tables 4.4 to 4.10. Overall results are in accordance with expectation and provide valuable insight. In addition to the evidence from the Hausman test, estimates for the fixed effects and random effects are quite close and further justifies the use of Random effects model. The Baltagi and Wu (1999) and 2SLS results are discussed in more detail being the baseline estimation while GLS estimates provide the robustness check for both the equations. Basic results mainly remained consistent across different estimation techniques which suggest that results are robust.

4.5.1 Education Expenditure Equation

Tables 4.4 to 4.6 report empirical result for the education expenditure and contains result for the overall sample as well as its decomposition into the OECD and Non-OECD countries. The effects of fiscal decentralisation were captured with three measures i.e. subnational tax revenues, subnational total revenues and federal transfers to the provinces. Empirical evidence makes it clear that different fiscal decentralisation stance has different implications for the decentralised set up. Table 4.4 presents results for the first measure of fiscal decentralisation and it shows that a rise in subnational tax revenues increases education spending per student and it has a positive and significant impact. We got comparable and consistent results across different estimation techniques. This finding was true for the total sample and for the OECD countries. The baseline regression suggests that a percentage increase in subnational tax revenues increases per pupil education spending by 0.08 percent in the case of total sample for 59 countries. The coefficient was almost double in the case of OECD countries where, according to the baseline regression, a percentage increase in subnational tax revenues are supposed to result in 0.16 percent increase in per pupil government spending. However, the subnational tax revenues were not significant for the Non-OECD countries sample despite having a positive sign.

Similarly, the second important measure of fiscal decentralisation i.e. subnational total revenues also posted similar results (Table 4.4). Result suggests that an increase in the

total resources at the local level has a positive effect over the education expenditure per pupil. According to the baseline regression results, a percentage point increase in total revenues at the subnational government level causes 0.08 percent increase in per pupil education spending for the total sample while the effect was 0.22 percent for the OECD countries. It is important to note that despite having positive coefficient there was no evidence that the coefficients were statistically significantly different from zero in the case of Non-OECD countries. This suggests that local governments at the Non-OECD countries are not better equipped to take appropriate decision or they are lacking appropriate finances. This can also be related to the effectiveness and governance issues however we have no empirical evidence (due to data limitations) to suggest that. Once again results suggested that any increase in local revenues is not translated in to higher education spending per student in Non-OECD countries.

Finally the third measure of fiscal decentralisation i.e. federal transfer to subnational government has produced negative and weakly significant results (only in the GLS estimation) for the relationship between fiscal decentralisation and education spending per pupil (Table 4.5 and 4.6). However, results are insignificant in the baseline regression and federal transfers appear with significant coefficient only in the GLS estimation for all the three samples. Although it seems a bit surprising but it was not unexpected. Federal transfer to lower tiers of government indicates their cost disabilities and thus shows vertical imbalances. Vertical imbalance indicates the dependence of local governments over federal transfers and these can come with strings attached. By discussing federal transfers we are talking about the partial fiscal decentralisation where the central government collects revenues and subnational governments are entrusted with spending. Thus federal transfer from the centre may or may not go to the social sectors, if these are not sector specific. Again results were similar for the total sample and for OECD countries where the dependence of federal transfers has produced negative coefficients for education expenditure per pupil. Nevertheless, transfers in the case of Non-OECD countries has positive coefficient which points towards the resource starved subnational governments in the relatively poor Non-OECD countries. This supports the earlier argument that subnational governments lack appropriate resources to improve their essential spending for the social sectors. GLS results show that one percent increase in federal transfer to the subnational governments improves per student educational expenditure by 0.03 percent in the Non-OECD countries. Hence, results support the hypothesis that different fiscal decentralisation policies contain dissimilar effects for the local governments.

In addition to the variable of interest, empirical estimation produced interesting results for the rest of the important explanatory variables as well. Per capita GDP has consistently posted positive and significant effects for all the three data sets and across different models containing the three fiscal decentralisation proxies. It is important to note that an increase in the country's GDP has a greater impact on education spending in the case of Non-OECD countries as compared to the OECD countries. In the similar fashion, general government expenditure has a positive and significant impact on the per pupil education spending which indicates that governments are not deviating resources from this important social sector. This variable captures important information and shows government's commitment that even when governments expand their general expenditures it does not affect the education spending. For the third important explanatory variable i.e. proportion of population aged 65 and above, results were not consistent across models. In this study we could not find significant support for the interest group hypothesis (as discussed by Miller, 1996) and the coefficient remained positive although mainly for the total sample as results were not robust across different subsets of data. In the case of the decomposed sample for OECD countries and Non-OECD countries, this proxy mainly failed to achieve significance except only one instance in each sample in three Tables.

In order to determine education spending population of school going age is also very important. Proportion of school age population in the country affects per student needs for education spending. Once again the decomposition of data set into different data sample improves our understanding of results. According to the results from the OECD countries, proportion of school age population (05-14) is statistically insignificant for all the three models accommodating the three fiscal decentralisation proxies. This suggests that governments in OECD countries are well prepared in advance and takes care of the future educational needs of the country. As the total sample was dominated by OECD countries in terms of data points, therefore we can see similar results there as well. However, this is not the case for the Non-OECD countries where an increase in the proportion of school age population negatively affects per pupil education spending. It points out lack of in-time policy making which hints towards bad governance. On the other hand, this might also be indicating scarcity of resources plus high proportion of school age population due to higher unchecked birth rate. In addition, with a significant numbers of children that are out of school, in fact any drive for enrolment can also potentially result in a negative effect on available resources. However, results suggest that this variable matter most for the Non-OECD countries. Lastly, urbanisation helps in reduction of per pupil public educational spending needs which suggest that governments spending per student

are higher at the rural stations as compared to the urban areas where governments enjoy economies of scale. Although the significance for urbanisation was not universal, it yields comparable coefficients whenever significant.

4.5.2 Education outcome Equation for Teacher-student ratio

Since, the educational quality is represented by a ratio between the number of teachers and students at the primary stage; hence, it can be affected by both the changes in numerator as well as the denominator. However, it is reasonable to assume that any shift in resources or policy making from the centre to the lower tiers will presumably not cause a reduction in the number of available teachers. This is strongly the case in Non-OECD countries where the teacher-student ratio needs to be improved instead. Therefore, in this study the major impetus for change in the ratio is sensed to be the variation in student enrolment. Hence, results should reflect the government preparedness to provide the newly enrolled student with the required number of teachers to avoid any negative effect[126]. As in this study, we present the ratio where the number of teachers is divided by the number of students at primary level, therefore, a higher[127] numerical value for the series will represent a better situation relative to the smaller value. Nevertheless, it is not very easy to explain the positive or negative effect because a negative effect might still reflect an increase in enrolment (which is a positive output for a policy reform). The concern is that if this rise in enrolment is not matched by required number of teachers, we can regard this as an adverse effect on quality of teaching. On the contrary, a positive coefficient would suggest higher number of teachers available for students that reflect an improvement in teaching quality.

As discussed for the education expenditure equation, similar empirical setting was used for the educational quality measure as well and three fiscal decentralisation indicators were used with three different subsets of data. Tables 4.7 presents the 2SLS results for the teacher-student ratio equation as presented in Eq.(2) and is explained as the baseline regression. As is already discussed, education expenditures per pupil and education quality are influenced by nearly the same set of independent variables; therefore, the 2SLS and IV methods were used to solve the endogeneity issue. In the 2SLS estimation, education expenditure was now presented with a relatively more comprehensive measure i.e. per pupil education spending as ratio to per capita GDP. This measure is assumed to proxy the extent of education spending in a more elaborate manner while we assume the similar set of explanatory variables to explain it as expressed in Eq.(1) except the GDP per capita and

[126] Instead of reduction in number of available teachers
[127] Which will indicate the availability of higher number of teachers per student

the pop65(+), where pop65(+) was dropped due to the non-robustness in the earlier results. Once again, the Hausman specification test suggests that random effects model should be used. In addition to the 2SLS baseline regression (with random effects), the GLS[128] estimator was used to estimate the instrumental variable approach where the per pupil education expenditure (as ratio to per capita GDP) was lagged by one and two years to avoid endogeneity issue. Tables 4.8 to 4.10 present results for the GLS estimation while these also contain the 2SLS fixed effect results. By and large, results are comparable across the two estimation technique and comparison provides decent robustness check.

We will start the discussion by analysing the effects of local autonomy on educational quality. Results in Table 4.7 suggests that the increase in subnational tax revenues has a negative and significant effect on dependent variable, which means that local autonomy increases number of student per teacher. Results indicate that for the total sample a percentage increase in subnational tax revenues causes "**-0.03"** percentage points change in number of teacher per students. Despite having the lowest coefficients of all significant variables, apparently, in the first impression it is disappointing to know that local autonomy results in lower educational quality, but, we can also infer that local governments are relatively more focussed on the enrolment. It would be reasonable to say that local governments though focus on higher enrolment; they are not prepared to maintain or improve the education quality by providing appropriate number of teachers, subsequently. Results remained consistent for total sample and for Non-OECD countries. However, it is important that coefficient for subnational tax revenues turns insignificant for the OECD countries which is exactly according to the expectation. Due to the developed nature of the OECD countries, it is apparent that these countries have better planning capabilities and they successfully devise and execute long run plans, therefore the transition from centre to local governments has no significant effect on education quality. In addition, with the near 100 percent enrolment rate they are better positioned to estimate the future needs and finance it. The same is not true for Non-OECD countries which actually drive the results in the total sample as well.

For the second important measure of fiscal decentralisation i.e. subnational total revenues, similar results can be noticed causing an increase in the number of students per teacher as countries achieve higher degree of fiscal decentralisation (Table 4.7). However, this time results are insignificant in the baseline regression for total sample and for OECD countries. Estimates are statistically significant according to the relatively weaker GLS

[128] taking care of heteroskedasticity and panel specific AR1

estimator (Table 4.8, 4.9). Nevertheless, the Non-OECD countries posted a negative and significant coefficient in both the 2SLS and IV regression, suggesting that fiscal decentralisation results in more students per teacher, leaving the teacher-student ratio to suffer (Table 4.7, 4.10). Once again coefficients are quite small, showing that a percentage change in subnational total revenues causes 0.06 percent change in the teacher-student ratio in Non-OECD countries.

Table 4.7 also summarise results for the third indicator of fiscal decentralisation measuring vertical imbalances i.e. federal transfers to subnational level. Once again we obtained a negative and significant effect of fiscal decentralisation on educational output, leaving the educational outcome worse off. This time results are significant for all the three data sets which is a surprising for the OECD countries. One explanation however is that in the developed countries local governments receive sector specific targeted funds and for the education sector, local governments receive transfers per student. Therefore, proxy for federal transfers might be picking the effect of higher enrolment as local governments has an incentive for higher enrolment even in the developed countries.

After discussing the variable of interest, we can now discuss the other explanatory variables and results are quite encouraging. First of all the education expenditure proxy has a positive and statistically significant coefficient across different models for fiscal decentralisation indicators and in all the three data sets. According to the expectation, results suggest that higher education spending per pupil leads to improvement in education quality. Education expenditure appears with a universal significance across different estimation techniques as well. In all three data sets, education spending appears with significantly higher coefficients in 2SLS relative to the GLS regression (which contains the lagged effects for education spending, as instruments). However, it should not be ignored that the use of lagged values for per pupil education spending (as percentage to GDP per capita) causes loss of almost 100 data points in total sample.

Another important variable with almost universal significance across different models is the urbanisation. Urban stations provide better education quality with more teachers per student as compared to the remote areas of the country and it is true for both the OECD and Non-OECD countries. It is important to note that the effects are much prominent in the Non-OECD countries which indicate that urban stations in the less developed countries provides relatively much better facilities than the rural areas as compared to the developed countries where the difference is not as great. Moreover, in the

regression containing federal transfers, inference for urbanisation were driven by Non-OECD countries as its coefficient remains insignificant for the total sample and the OECD countries sample.

Another important determinant of educational quality includes the proportion of school age population. It is expected that as the proportion of population aged between 05-14 increases, it will put a stress on the existing infrastructure and the empirical results predict the similar pattern. Most importantly this variable also captures school enrolment; suggesting that with the increase in school age population whether or not these kids finally end up going to school. This variable is difficult to explain for its effects on educational quality because of the greater disparity in the coefficient estimates from 2SLS and IV method. Coefficients are much higher in the GLS estimation for IV technique as compared to 2SLS and it can be observed for all of the three data sets. Therefore, instead of focusing on its coefficient we would just explain the negative coefficient which suggests that rise in number of school age population probably leads to higher enrolment and thus cause lower teaching quality, which is however not very convenient result for the OECD countries sample.

Lastly, the dependency ratio was represented by proportion of dependent population (elderly and children) to the total working age population. This variable captures important effects especially for the Non-OECD countries. Main reason for the inclusion of this variable was somehow to capture the effect of poverty which is more relevant to Non-OECD countries as most of the OECD countries have the social security system in place. And therefore, this explanatory variable creates disturbing situation in the total sample and for OECD countries sample where despite being significant, it switches sign between the 2SLS and IV-GLS method (Table 4.7, 4.8, 4.9). However, in the case of Non-OECD countries, where this variable matters the most, it remains consistent in sign, although achieve significance in the IV-GLS method only. Tables 4.8 to 4.10 indicates the IV-GLS estimation which exhibits that an increase in the proportion of dependent population have a negative relationship with school enrolment and therefore results in less children going to school. Hence, with the increased poverty/limited resources, enrolment goes down which improves the teacher-student ratio as we can see from the positive coefficient. This suggests that higher dependency ratio encourages avoidance of school instead of shifting from private to public sector schools, which would have an opposite effect as can be seen for the OECD sample results (Table 4.7).

4.6 CONCLUSION

For every government it is of paramount importance to envisage the short run and long run effects of its policies. The short run efforts are normally focused on appropriation of the funding needs and to carryout administrative reforms while the long run motivation is towards the ultimate outcome of the policy reform. In this kind of situation, education expenditure would ideally capture the short run effect of fiscal decentralisation policy on education input, the enrolment rate should provide a good measure for assessing the educational output of decentralisation reforms while the educational quality, proxied with teacher-student ratio here, would ultimately provide a better outcome measure. Unfortunately, we could not use enrolment rate as the dependent variable because of the near 100 percent enrolments in the OECD countries which is the dominant part of the sample. Nevertheless, we do not face similar issues for teacher-student ratio, which is a comprehensive measure for the education outcome. Teacher-student ratio illustrates the preparedness of the government to ensure educational quality i.e. by providing appropriate resources that are in line with enrolment needs.

This study provides empirical evidence on the distinct effects of different fiscal decentralisation policies. The subject for discussion in this study was the education sector and we found that different sources of subnational revenues have different effects for education expenditures and education quality. The most important finding is that when subnational governments are financed through own tax revenues, they are more efficient and they increase the education funding and enhances enrolment. Thus we found stronger support for localisation when it is financed through own revenues. As far as the total revenues of subnational governments are concerned they also has a positive effect but the sources of financing matters as we got different results for the effects of federal transfers especially in education spending. Hence lower tiers of the government are not spending as much as the federal government when they start to receive a greater share from the centre.

Another important finding was that different results were produced for the OECD and Non-OECD countries and it highlights the fundamental differences in the economic and political structures of the two. The most important distinction appeared to be the difference in the composition of subnational revenues. Disaggregated results provide a clue that local governments might have more own source resources in the OECD countries, whereas for the Non-OECD countries, only the increase in federal transfers warrants a rise in education spending. The situation is reverse in the case of OECD countries where federal transfers appear with a negative effect for education spending.

In the case of education quality in the form of teacher-student ratio, emphasis of the local government appears to be tilted towards the student enrolment and they lag behind in maintaining the appropriate numbers of teachers intact. The effects are more prominent for the Non-OECD countries where most of the countries are still trying to achieve universal enrolment. Thus when using large international panel, it is advisable to search for the distinct drivers in different regions by disaggregating the data sets. In brief, this study provides evidence that decentralised set up reflects upon and cater with the social needs. Moreover, while curing the regional cost disabilities, government should also workout appropriate checks and balances so that the federal transfers do not cause inefficiency.

Hence, in order to achieve Millennium Development Goals (MDG), government can use different policy instruments and fiscal decentralisation is one of the important policies. Especially, fiscal decentralisation is of importance to the relatively less developed countries which are still lagging behind on major MDG goals. Analysis of education sector provides us with required evidence that local governments are able to assess local demands and needs in a correct manner and has a positive effect on the education sector, which is encouraging. Education spending and enrolment appears as important goals for the local governments while they need to improve the quality as well. Federal transfers although bridges the resource gaps however, it does not contain the required incentives as does the local resource generation that makes the local governments responsible and answerable to the tax payers. Hence to achieve better results, local governments should be encouraged and motivated towards higher local resource generation while improved governance, better institutions and local election can help reduce the corruption and inefficiency as it makes the local representative capable and answerable.

To sum up, expenditure on education provides a crude indication of the focus of decentralised set up for the short run. Results suggest that effects of different fiscal decentralisation indicators are not uniform. Use of different fiscal decentralisation proxies has helped us understand that these can affect the local government effectiveness. In addition, the effects of fiscal decentralisation differ among the OECD and non-OECD countries.

Shortcomings

One of the major shortcomings for this study is the inability to take into account the effect of governance as discussed by Baldacci *et al.*, (2008) and Rajkumar and Swaroop (2008). Governance and institutions play an important role in the effectiveness of

government's policies and it has even greater importance when we discuss effectiveness of local governments. Although we got differing results for OECD countries and for Non-OECD countries, which we relate to the difference in development, nevertheless, it can well be related to the difference in the level of governance. Institutions in developed countries are capable of better implementation and have superior coordination. Data for governance indicators, though, was available from the World Bank but it was available only from 1996, which had severe implication for kind of data we were dealing with. It would have limited the sample size and we might have been subject to sample selection bias, as data was not available for all the years and all the countries. Similarly, data on the governance indicators from International Country Risk Guide is available[129] only from 1984 which will also limit the sample size. Thus, its absence will remain a weak point for the analysis. Future research can look into the possibilities to cover this shortcoming and enrich the analysis. Furthermore, due to lack of data we could not look into the role played by the private sector in education as well. Lastly, as test scores are considered a true outcome variable for education sector, with the updated fiscal decentralisation indicators data, the availability of PISA test scores for OECD countries invites future research.

[129] Plus it is also not available free of charge

Results for the effects of Fiscal Decentralisation on Education Expenditure (All variables are in log form)

Table 4.4: Baseline Regression Results for Education Expenditure (Dependent Variable-Education expenditure per student)#

Sample	**Total Sample**			**OECD countries**			**Non-OECD countries**		
	1	2	3	4	5	6	7	8	9
GDP per capita	0.850***	0.840***	0.886***	0.723***	0.701***	0.731***	1.051***	1.005***	1.036***
	(20.45)	(21.79)	(19.94)	(10.59)	(10.40)	(8.65)	(15.53)	(15.94)	(15.47)
Government	0.509***	0.478***	0.416***	0.648***	0.532***	0.393**	0.536***	0.511***	0.507***
spending	(5.72)	(5.31)	(4.50)	(3.80)	(2.96)	(2.03)	(5.59)	(5.74)	(5.53)
Population of age	0.574***	0.590***	0.511***	0.312	0.581**	0.316	0.174	0.063	0.190
65+	(4.26)	(4.76)	(3.71)	(1.11)	(2.12)	(1.03)	(0.88)	(0.35)	(1.04)
Population of age	-0.050	-0.004	-0.095	-0.084	0.046	-0.016	-0.673**	-0.747***	-0.625**
05-14	(-0.33)	(-0.02)	(-0.54)	(-0.40)	(0.21)	(-0.07)	(-2.47)	(-2.83)	(-2.40)
Urbanisation	-0.042	0.141	-0.070	0.160	0.242	0.228	-0.334*	-0.021	-0.302
	(-0.26)	(1.04)	(-0.42)	(0.54)	(0.81)	(0.65)	(-1.69)	(-0.14)	(-1.59)
SNG Share of Tax	0.080***			0.159***			0.023		
Revenue	(2.69)			(3.89)			(0.62)		
Federal transfers		-0.014			-0.098			0.029	
to SNG		(-0.36)			(-1.42)			(0.73)	
SNG Share of			0.083*			0.221***			0.060
Revenue			(1.95)			(2.86)			(1.38)
Constant	-7.741***	-8.239***	-7.455***	-7.218***	-7.257***	-7.278***	-5.492***	-5.952***	-5.710***
	(-9.82)	(-10.90)	(-8.81)	(-4.85)	(-4.54)	(-4.37)	(-4.70)	(-5.31)	(-5.04)
Total Obs.	811	799	736	538	503	451	273	296	285
Countries	59	62	58	27	27	26	32	35	32
Avg Obs.	13.746	12.887	12.690	19.926	18.630	17.346	8.531	8.457	8.906
Max Obs.	36	35	35	36	35	35	32	30	30
Autocorrelation coefficient	0.43	0.42	0.41	0.32	0.31	0.30	0.73	0.71	0.31
Wooldridge F- test for autocorrelation	9.915 [0.0028]	10.265 [0.0023]	7.659 [0.0079]	2.761 [0.1096]	2.258 [0.1460]	1.638 [0.2133]	14.162 [0.0009]	15.034 [0.0006]	10.828 [0.0029]
Likelihood-ratio test for Heteroscedasticity	719.98 [0.0000]	746.87 [0.0000]	668.18 [0.0000]	527.60 [0.0000]	567.33 [0.0000]	431.79 [0.0000]	268.45 [0.0000]	271.83 [0.0000]	280.08 [0.0000]
Hausman test chi2(6) (P-value)	3.42 [0.9987]			9.01 [0.1731]			11.40 [1.000]		

Random effects model estimated with Baltagi and Wu (1999), Min Obs.=2, legend: b/t (Cluster robust standard errors were used along with AR1 errors) , * p<0.1; ** p<0.05; *** p<0.01

Table 4.5: Robustness check for the Education Expenditure in Total Sample (Dependent Variable-Education expenditure per student)

Sample	Total Sample					
Estimation Technique	Fixed Effects[#]	GLS with Panel Specific AR(1)	Fixed Effects[#]	GLS with Panel Specific AR(1)	Fixed Effects [#]	GLS with Panel Specific AR(1)
	1	2	3	4	5	6
GDP per capita	0.597***	1.029***	0.482***	1.014***	0.646***	1.010***
	(7.51)	(53.75)	(6.40)	(53.34)	(7.07)	(47.16)
Government spending	0.175	0.591***	0.089	0.567***	0.046	0.550***
	(1.51)	(13.37)	(0.71)	(11.84)	(0.36)	(10.40)
Population of age 65 +	0.413*	0.325***	0.698***	0.369***	0.481*	0.422***
	(1.74)	(5.09)	(3.29)	(5.33)	(1.87)	(5.79)
Population of age	-0.853***	-0.025	-0.911***	-0.043	-0.836***	0.041
05-14	(-5.70)	(-0.28)	(-5.50)	(-0.39)	(-4.22)	(0.36)
Urbanisation	-0.512*	-0.270***	-0.253	-0.221***	-0.557*	-0.264***
	(-1.76)	(-3.95)	(-0.87)	(-4.93)	(-1.69)	(-3.37)
SNG Share of Tax Revenue	0.153***	0.056***				
	(3.03)	(4.02)				
Federal transfers to SNG			0.004	-0.034*		
			(0.07)	(-1.84)		
SNG Share of Revenue					0.112	0.086***
					(1.56)	(5.81)
Constant	-0.065	-8.050***	-0.039	-7.824***	-0.118	-8.293***
	(-0.99)	(-20.05)	(-0.58)	(-17.19)	(-1.58)	(-16.37)
Total Obs.	752	811	737	799	678	736
Countries	59	59	62	62	58	58
Avg Obs.	12.746	13.746	11.887	12.887	11.690	12.690
Max Obs.	35	36	34	35	34	35

[#] Estimated with Baltagi and Wu (1999), Min Obs.=2, legend: b/t (Cluster robust standard errors were used along with AR1 errors), * p<0.1; ** p<0.05; *** p<0.01

Note: All variables were expressed in log form

Table 4.6: Robustness check for the Education Expenditure in Split Sample (Dependent Variable-Education expenditure per student)

Sample	OECD countries						Non-OECD countries					
Estimation Technique	Fixed Effects [#]	GLS with Panel Specific AR(1)	Fixed Effects [#]	GLS with Panel Specific AR(1)	Fixed Effects [#]	GLS with Panel Specific AR(1)	Fixed Effects [#]	GLS with Panel Specific AR(1)	Fixed Effects [#]	GLS with Panel Specific AR(1)	Fixed Effects [#]	GLS with Panel Specific AR(1)
	1	2	3	4	5	6	7	8	9	10	11	12
GDP per capita	0.535***	1.056***	0.436***	1.024***	0.513***	1.056***	0.994***	1.105***	0.882***	1.078***	0.956***	1.105***
	(5.32)	(22.97)	(4.74)	(20.54)	(4.61)	(19.55)	(6.74)	(56.66)	(6.23)	(52.85)	(6.80)	(52.29)
Government spending	0.741***	0.633***	0.831***	0.597***	0.593**	0.532***	0.378***	0.582***	0.297**	0.572***	0.304**	0.585***
	(3.31)	(7.18)	(3.28)	(6.13)	(2.02)	(5.52)	(3.08)	(15.97)	(2.33)	(12.03)	(2.52)	(14.30)
Population of age 65 +	0.038	-0.092	0.329	0.079	0.192	0.119	-0.492	0.136*	-0.315	-0.029	-0.360	0.044
	(0.10)	(-0.59)	(0.85)	(0.43)	(0.43)	(0.86)	(-1.29)	(1.94)	(-0.96)	(-0.40)	(-1.06)	(0.65)
Population of age 05-14	-0.853***	-0.025	-0.871***	-0.043	-0.818***	0.169	-1.184***	-0.600***	-1.439***	-0.767***	-1.235***	-0.662***
	(-4.69)	(-0.15)	(-4.16)	(-0.21)	(-3.23)	(0.93)	(-3.38)	(-5.81)	(-4.87)	(-6.65)	(-3.84)	(-6.43)
Urbanisation	-0.490	-0.335*	-0.395	-0.227	-0.461	-0.397*	-0.839*	-0.440***	-0.456	-0.209***	-0.714*	-0.388***
	(-1.10)	(-1.92)	(-0.84)	(-1.14)	(-0.88)	(-1.91)	(-1.85)	(-8.63)	(-1.20)	(-5.47)	(-1.68)	(-6.73)
SNG Share of Tax Revenue	0.151**	0.140***					0.103	-0.020				
	(2.12)	(5.49)					(1.60)	(-1.46)				
Federal transfers to SNG			-0.012	-0.075**					0.033	0.034*		
			(-0.12)	(-2.38)					(0.55)	(1.71)		
SNG Share of Revenue					0.155	0.221***					0.049	0.002
					(1.14)	(8.17)					(0.70)	(0.15)
Constant	-0.090	-7.326***	-0.064	-7.073***	-0.120	-8.102***	0.180***	-5.679***	0.145***	-5.724***	0.098**	-5.580***
	(-0.78)	(-7.64)	(-0.49)	(-5.87)	(-0.81)	(-8.11)	(3.80)	(-13.77)	(3.21)	(-14.18)	(2.02)	(-13.51)
Total Obs.	511	538	476	503	425	451	241	273	261	296	253	285
Countries	27	27	27	27	26	26	32	32	35	35	32	32
Avg Obs.	18.926	19.926	17.630	18.630	16.346	17.346	7.531	8.531	7.457	8.457	7.906	8.906
Max Obs.	35	36	34	35	34	35	31	32	29	30	29	30

[#] Estimated with Baltagi and Wu (1999), Min Obs.=2, legend: b/t(Cluster robust standard errors were used along with AR1 errors), * p<0.1; ** p<0.05; *** p<0.01

Note: All variables were expressed in log form

Results for the effects of Fiscal Decentralisation on Education Quality (All variables are in log form)

Table 4.7: Baseline Regression Results for Education Quality (Dependent Variable-Teacher-student ratio)[#]

Sample	**Total Sample**			**OECD countries**			**Non-OECD countries**		
	1	2	3	4	5	6	7	8	9
Exp. per pupil (% of	0.255***	0.366***	0.318***	0.257**	0.409**	0.444*	0.108**	0.253***	0.168***
GDPpc)	(4.27)	(4.27)	(4.34)	(2.42)	(2.35)	(1.88)	(2.21)	(3.16)	(3.70)
Population of age 05-14	-0.664***	-0.583***	-0.627***	-0.651***	-0.451*	-0.409	-0.443***	-0.391***	-0.459***
	(-8.29)	(-6.15)	(-7.01)	(-4.14)	(-1.82)	(-1.40)	(-4.99)	(-4.09)	(-5.06)
Dependency ratio	-0.099	-0.167	0.050	-0.405**	-0.716***	-0.524*	-0.060	0.033	0.058
	(-1.08)	(-1.64)	(0.42)	(-2.43)	(-2.96)	(-1.75)	(-0.52)	(0.26)	(0.49)
Urbanisation	0.205**	0.118	0.275***	0.106	0.273	0.784*	0.337**	0.272**	0.258*
	(2.56)	(1.57)	(2.89)	(0.65)	(0.89)	(1.79)	(2.50)	(2.29)	(1.92)
SNG Share of Tax Revenue	-0.029**			-0.008			-0.055***		
	(-2.12)			(-0.37)			(-3.30)		
Federal transfers to SNG		-0.080***			-0.154***			-0.045*	
		(-3.23)			(-3.14)			(-1.67)	
SNG Share of Revenue			-0.029			-0.030			-0.058***
			(-1.12)			(-0.39)			(-2.68)
Constant	-2.233***	-1.912***	-3.378***	-0.702	-0.612	-4.222*	-3.114***	-3.732***	-3.358***
	(-4.13)	(-3.39)	(-4.66)	(-0.77)	(-0.35)	(-1.69)	(-3.89)	(-5.05)	(-4.25)
Total Obs.	588	585	529	366	344	297	222	241	232
Countries	58	59	55	26	25	24	32	34	31
Avg Obs.	10.138	9.915	9.618	14.077	13.760	12.375	6.938	7.088	7.484
Max Obs.	32	32	32	32	32	32	31	30	30
Hausman test chi2(5)	3.71			2.31			62.37		
(P-value)	[0.5925]			[0.8053]			[0.9989]		

[#] 2SLS results for Random effects estimation

Min Obs.=2, legend: b/t(Cluster robust standard errors were used), * p<0.1; ** p<0.05; *** p<0.01

Note: All variables were expressed in log form

Table 4.8: Robustness check for the Education Quality in Total Sample (Dependent Variable-Teacher-student ratio)

	Total Sample								
Estimation Technique	2SLS with Fixed Effects 1	GLS with Panel Specific AR(1) 2	GLS with Panel Specific AR(1) 3	2SLS with Fixed Effects 4	GLS with Panel Specific AR(1) 5	GLS with Panel Specific AR(1) 6	2SLS with Fixed Effects 7	GLS with Panel Specific AR(1) 8	GLS with Panel Specific AR(1) 9
Exp. per pupil (% of GDPpc)	0.278***			0.383***			0.330***		
	(4.21)			(4.02)			(4.12)		
Exp. per pupil (% of GDPpc), L1.[#]		0.080***			0.093***			0.070***	
		(5.10)			(5.59)			(4.52)	
Exp. per pupil (% GDPpc), L2. [##]			0.111***			0.142***			0.103***
			(6.98)			(8.02)			(6.90)
Population of age 05-14	-0.664***	-0.758***	-0.904***	-0.589***	-0.941***	-0.866***	-0.624***	-0.938***	-1.019***
	(-7.47)	(-23.52)	(-17.00)	(-5.45)	(-23.02)	(-15.91)	(-6.26)	(-22.93)	(-21.17)
Dependency ratio	-0.100	0.237***	0.401***	-0.175	0.419***	0.455***	0.078	0.337***	0.512***
	(-0.98)	(3.94)	(4.96)	(-1.53)	(7.61)	(4.95)	(0.60)	(5.78)	(6.56)
Urbanisation	0.120	0.101**	0.122***	-0.015	0.040	0.291***	0.279	0.113***	0.121***
	(0.86)	(2.43)	(2.80)	(-0.09)	(1.23)	(7.14)	(1.41)	(2.58)	(2.69)
SNG Share of Tax Revenue	-0.045***	-0.030***	-0.013						
	(-2.73)	(-3.14)	(-1.20)						
Federal transfers to SNG				-0.098***	-0.003	0.015			
				(-3.37)	(-0.34)	(1.37)			
SNG Share of Revenue							-0.067**	-0.040***	-0.051***
							(-1.96)	(-3.72)	(-4.05)
Constant	-1.861**	-2.363***	-2.801***	-1.250	-2.438***	-4.038***	-3.398***	-2.252***	-2.801***
	(-2.51)	(-9.24)	(-12.04)	(-1.32)	(-10.36)	(-15.55)	(-2.95)	(-8.89)	(-10.57)
Total Obs.	588	475	422	585	467	418	529	428	381
Countries	58	49	43	59	49	44	55	48	44
Avg Obs.	10.138	9.694	9.814	9.915	9.531	9.500	9.618	8.917	8.659
Max Obs.	32	30	29	32	29	29	32	29	28

[#] L1.=*Lagged by one year,* [##]L2.=*Lagged by two years*

Min Obs.=2, legend: b/t(Cluster robust standard errors were used along with AR1 errors), * p<0.1; ** p<0.05; *** p<0.01, Note: All variables were expressed in log form

Table 4.9: Robustness check for the Education Quality in Sample of OECD countries (Dependent Variable-Teacher-student ratio)

	OECD countries								
Estimation Technique	2SLS with Fixed Effects 1	GLS with Panel Specific AR(1) 2	GLS with Panel Specific AR(1) 3	2SLS with Fixed Effects 4	GLS with Panel Specific AR(1) 5	GLS with Panel Specific AR(1) 6	2SLS with Fixed Effects 7	GLS with Panel Specific AR(1) 8	GLS with Panel Specific AR(1) 9
Exp. per pupil (% of GDPpc)	0.244**			0.373**			0.308**		
	(2.47)			(2.45)			(2.31)		
Exp. per pupil (% of GDPpc), L1.[#]		0.045*			0.064***			0.064***	
		(1.85)			(2.69)			(2.68)	
Exp. per pupil (% GDPpc), L2.[##]			0.111***			0.112***			0.115***
			(4.55)			(4.14)			(3.93)
Population of age 05-14	-0.645***	-1.187***	-1.138***	-0.434*	-1.260***	-1.233***	-0.354	-1.257***	-1.211***
	(-4.09)	(-22.28)	(-21.07)	(-1.74)	(-25.25)	(-24.10)	(-1.47)	(-23.34)	(-18.15)
Dependency ratio	-0.422**	0.539***	0.517***	-0.750***	0.302***	0.373***	-0.684**	0.351***	0.328***
	(-2.47)	(5.28)	(5.46)	(-3.09)	(2.68)	(3.54)	(-2.54)	(3.15)	(3.00)
Urbanisation	0.135	-0.105*	-0.100	0.390	-0.051	0.002	1.178**	0.204***	0.303***
	(0.76)	(-1.67)	(-1.61)	(1.07)	(-0.65)	(0.04)	(2.47)	(2.87)	(4.70)
SNG Share of Tax Revenue	-0.008	0.012	0.021						
	(-0.33)	(0.70)	(1.20)						
Federal transfers to SNG				-0.156***	-0.068***	-0.081***			
				(-3.17)	(-3.68)	(-4.39)			
SNG Share of Revenue							0.043	-0.046**	-0.055***
							(0.52)	(-2.08)	(-2.66)
Constant	-0.723	-1.545***	-1.833***	-0.894	-0.448	-1.122***	-5.277**	-1.844***	-2.425***
	(-0.76)	(-3.76)	(-5.48)	(-0.47)	(-0.83)	(-2.72)	(-2.21)	(-3.83)	(-5.60)
Total Obs.	366	306	276	344	291	264	297	250	223
Countries	26	23	21	25	23	21	24	22	20
Avg Obs.	14.077	13.304	13.143	13.760	12.652	12.571	12.375	11.364	11.150
Max Obs.	32	29	29	32	29	29	32	29	28

Min Obs.=2, [#] L1.=*Lagged by one year,* [##]L2.=*Lagged by two years*

legend: b/t(Cluster robust standard errors were used along with AR1 errors), * p<0.1; ** p<0.05; *** p<0.01, Note: All variables were expressed in log form

Table 4.10: Robustness check for the Education Quality in Sample of Non-OECD countries (Dependent Variable-Teacher-student ratio)

	Non-OECD countries								
Estimation Technique	2SLS with Fixed Effects 1	GLS with Panel Specific AR(1) 2	GLS with Panel Specific AR(1) 3	2SLS with Fixed Effects 4	GLS with Panel Specific AR(1) 5	GLS with Panel Specific AR(1) 6	2SLS with Fixed Effects 7	GLS with Panel Specific AR(1) 8	GLS with Panel Specific AR(1) 9
Exp. per pupil (% of GDPpc)	0.067			0.225**			0.151***		
	(1.30)			(2.52)			(3.10)		
Exp. per pupil (% of GDPpc), L1.[#]		0.089***			0.048**			0.131***	
		(4.63)			(2.29)			(5.91)	
Exp. per pupil (% GDPpc), L2.[##]			0.087***			0.070***			0.117***
			(3.76)			(3.02)			(4.82)
Population of age 05-14	-0.431***	-0.933***	-0.888***	-0.383***	-0.880***	-0.852***	-0.440***	-1.000***	-0.836***
	(-4.47)	(-15.74)	(-15.16)	(-3.73)	(-11.31)	(-11.20)	(-4.53)	(-13.28)	(-13.02)
Dependency ratio	-0.084	0.377***	0.299***	0.031	0.303**	0.149	0.023	0.588***	0.337***
	(-0.59)	(4.52)	(2.95)	(0.21)	(2.46)	(1.28)	(0.17)	(4.95)	(2.79)
Urbanisation	0.365	0.234***	0.382***	0.271	0.334***	0.384***	0.154	0.329***	0.498***
	(1.47)	(5.38)	(5.63)	(1.14)	(4.74)	(5.47)	(0.64)	(4.94)	(7.25)
SNG Share of Tax Revenue	-0.070***	-0.029***	-0.042***						
	(-3.92)	(-3.15)	(-3.04)						
Federal transfers to SNG				-0.040	0.035**	0.066***			
				(-1.34)	(2.18)	(4.18)			
SNG Share of Revenue							-0.077***	-0.050***	-0.041**
							(-3.23)	(-2.73)	(-2.08)
Constant	-2.944**	-2.957***	-3.339***	-3.619***	-3.331***	-3.133***	-2.676**	-4.084***	-4.183***
	(-2.24)	(-12.28)	(-9.05)	(-3.03)	(-7.87)	(-8.42)	(-2.12)	(-11.39)	(-9.86)
Total Obs.	222	169	146	241	176	154	232	178	158
Countries	32	26	22	34	26	23	31	26	24
Avg Obs.	6.938	6.500	6.636	7.088	6.769	6.696	7.484	6.846	6.583
Max Obs.	31	30	28	30	29	28	30	29	28

Min Obs.=2, [#] L1.=*Lagged by one year,* [##]L2.=*Lagged by two years,*

legend: b/t(Cluster robust standard errors were used along with AR1 errors), * p<0.1; ** p<0.05; *** p<0.01, Note: All variables were expressed in log form

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Annex I

Table A 4.1: Descriptive statistics for fiscal decentralisation measures, OECD countries

Variable		Mean	Std. Dev.	Min	Max	Observations
Accrual Method						
Subnational Govt. Share of Tax Revenue	overall	30.48	12.23	1.37	57.76	N = 247
	between		14.69	1.52	56.35	n = 25
	within		2.20	21.92	40.04	T-bar = 9.88
Vertical Grants as Share of Subnational Govt. Revenue	overall	41.17	18.88	8.51	79.67	N = 247
	between		18.64	9.33	75.02	n = 25
	within		4.85	26.22	58.79	T-bar = 9.88
Subnational Govt. Share of Revenue	overall	31.56	11.95	1.37	57.76	N = 201
	between		14.69	1.52	54.28	n = 23
	within		1.48	27.45	38.37	T-bar = 8.74
Cash Method						
Subnational Govt. Share of Tax Revenue	overall	20.82	14.45	1.29	58.74	N = 326
	between		15.30	4.21	54.84	n = 22
	within		2.42	12.51	28.13	T-bar = 14.82
Vertical Grants as Share of Subnational Govt. Revenue	overall	43.94	18.33	9.54	86.66	N = 298
	between		18.43	10.94	79.49	n = 23
	within		5.86	18.05	74.71	T-bar = 12.96
Subnational Govt. Share of Revenue	overall	29.39	12.14	1.70	57.21	N = 295
	between		13.91	1.80	51.99	n = 24
	within		2.65	12.47	37.99	T-bar = 12.29
Combined series						
Subnational Govt. Share of Tax Revenue	overall	20.67	14.37	0.80	58.74	N = 538
	between		16.14	1.61	54.84	n = 27
	within		3.09	5.69	36.00	T-bar = 19.92
Vertical Grants as Share of Subnational Govt. Revenue	overall	43.57	18.94	8.51	90.56	N = 503
	between		17.75	9.83	77.51	n = 27
	within		6.49	20.32	70.41	T-bar = 18.63
Subnational Govt. Share of Revenue	overall	29.48	12.08	5.40	57.76	N = 451
	between		13.91	5.53	54.28	n = 26
	within		2.52	12.56	38.08	T-bar = 17.35

Table A 4.2: Descriptive statistics for fiscal decentralisation measures, Non-OECD countries

Variable		Mean	Std. Dev.	Min	Max	Observations
Accrual Method						
Subnational Govt. Share of Tax Revenue	overall	20.22	11.75	1.03	47.11	N = 97
	between		13.74	1.08	45.82	n = 17
	within		1.65	14.90	24.60	T-bar = 5.71
Vertical Grants as Share of Subnational Govt. Revenue	overall	46.64	14.88	8.26	78.00	N = 95
	between		16.96	9.56	78.00	n = 15
	within		4.31	31.19	57.78	T-bar = 6.33
Subnational Govt. Share of Revenue	overall	24.07	18.71	1.57	98.27	N = 96
	between		17.72	1.70	68.79	n = 15
	within		9.21	-14.80	53.55	T-bar = 6.4
Cash Method						
Subnational Govt. Share of Tax Revenue	overall	11.38	10.60	0.16	48.13	N = 213
	between		11.98	0.18	47.55	n = 37
	within		1.90	5.48	19.39	T-bar = 5.76
Vertical Grants as Share of Subnational Govt. Revenue	overall	46.22	23.09	1.39	92.72	N = 232
	between		23.34	4.04	87.51	n = 40
	within		10.60	18.59	76.31	T-bar = 5.8
Subnational Govt. Share of Revenue	overall	17.93	11.35	0.82	48.96	N = 216
	between		13.07	0.82	47.83	n = 36
	within		2.86	8.90	31.13	T-bar = 6
Combined series						
Subnational Govt. Share of Tax Revenue	overall	13.05	11.32	0.16	48.13	N = 286
	between		12.13	0.18	46.75	n = 42
	within		2.25	-3.97	22.29	T-bar = 6.81
Vertical Grants as Share of Subnational Govt. Revenue	overall	45.72	21.85	1.39	92.72	N = 308
	between		22.49	4.04	87.51	n = 45
	within		9.92	18.09	77.30	T-bar = 6.84
Subnational Govt. Share of Revenue	overall	19.86	14.51	0.82	98.27	N = 295
	between		14.72	0.82	68.79	n = 40
	within		5.82	-19.00	49.35	T-bar = 7.37

Table A 4.3: List of countries along with the maximum data points for any estimation

OECD countries (observations)		Non-OECD countries		
Australia(16)	Japan(5)	Argentina(7)	Georgia(1)	Nicaragua(1)
Austria(35)	Luxembourg(20)	Armenia(3)	Guatemala(1)	Pakistan(16)
Belgium(23)	Malta(4)	Azerbaijan(2)	Honduras(1)	Panama(1)
Denmark(29)	Netherlands(32)	Belarus(1)	Hungary(27)	Paraguay(1)
Finland(34)	New Zealand(14)	Bolivia(7)	India(8)	Peru(11)
France(36)	Norway(33)	Botswana(1)	Iran, Islamic	Poland(8)
Germany(5)	Portugal(29)	Brazil(3)	Rep.(9)	Romania(5)
Greece(2)	Spain(28)	Bulgaria(9)	Jamaica(2)	Senegal(2)
Iceland(16)	Sweden(21)	Cape Verde(2)	Jordan(1)	Serbia(3)
Ireland(35)	Switzerland(18)	Chile(19)	Kenya(1)	Slovak
Israel(32)	United	China(3)	Korea, Rep.(4)	Republic(13)
Italy(14)	Kingdom(31)	Colombia(7)	Latvia(11)	Slovenia(7)
	United States(17)	Congo, Rep.(2)	Lesotho(3)	South
		Costa Rica(4)	Lithuania(7)	Africa(11)
		Cyprus(3)	Malaysia(8)	Swaziland(3)
		Czech Republic(16)	Mauritius(9)	Thailand(28)
		Dominican Republic(1)	Mexico(9)	Tunisia(1)
		El Salvador(6)	Moldova(4)	Uganda(3)
		Estonia(10)	Morocco(7)	Zambia(2)

Table A 4.4: List of countries that joined OECD later

S.No.	Name	Data start year	Data Available till	Maximum Observations	Joined OECD
1*	Czech Rep.	1993	2009	16	1995
2*	Korea	2006	2009	4	1996
3*	Poland	2002	2009	8	1996
4**	Chile	1974	2009	19	2010
5**	Estonia	1997	2008	10	2010
6**	Slovenia	1992	2003	7	2010
7**	Israel	1974	2009	32	2010
8#	Hungary	1981	2009	27	1996
9#	Mexico	1989	2000	9	1994
10#	Slovak Rep.	1996	2009	13	2000

Note1: * These countries were declared as OECD countries because the dominant portion of data was collected when they were already at the OECD forum

Note2: ** These countries were declared as Non-OECD countries because of their joining dates in the OECD and data was collected when they were not the members of OECD

Note3: # Lastly, these countries were kept as Non-OECD countries because of their accession to OECD organisation falls in-between the data collection period and on average they had the similar number of observation before and after joining the OECD forum. It was considered suboptimal to divide a single country data into two parts and it will also lead to double counting

CHAPTER 5 CONCLUSION & RECOMMENDATIONS

5.1 CONCLUSION

Pakistan is a developing country with sixth largest population in the world. With more that 180 million people to feed, Pakistan faces serious challenges to keep its economic and social indicators on track. As a developing country, Pakistan needs to catch the development path faster so as to provide jobs to those who are entering labour market. In other words, higher economic growth is needed to offset the population explosion and to improve living standards. On another important front, Pakistan is ranked 146th out of 187 countries in human development by the UNDP's Human Development Report, 2013. This exhibits that country is lagging behind on basic necessities of human life i.e. health and education. We know that economic growth provide the macroeconomic assessment of country's progress while the basic services of health and education determine the quality of life. In this context, one of the important policies that might relieve the country and improve the situation in Pakistan is Fiscal Decentralisation and therefore this topic was chosen for the discussion.

In this study, we mainly discussed the effects of fiscal decentralisation on three important dimensions of development including the economic growth, the health sector and the education sector. Main objective of the study was to analyse the overall effects of fiscal decentralisation and to distinctly identify policy instruments which can enhance SNG's effectiveness in serving the local people. The issue of resource distribution among federal and provincial governments is not straightforward and has always proved to be a complex issue, which need dynamic deliberation. There is vast literature available on the topic and researchers have now broadly agreed upon its positive returns.

Over the period, policy makers are trying to benefit from the positive effects of fiscal decentralisation while minimising the potential hazards. The main question that arises is "what is the best way to decentralise?" The simple answer can be, by empowering the lower tiers of the government regarding local decision making, capacitate these to carry out their assigned functions and make local politicians responsible so as to efficiently lead the country in the future. However, the counter argument is that delegating revenue raising powers to the lower levels result in efficiency loss as central government has better capacity to levy and collect taxes, and centralised provision also yields economies of scale. Therefore, the corresponding argument is that revenue collection assignments should not

be delegated, instead what local government needs are the funds and fiscal capability to serve local people. Hence, the second concept leads to the partial fiscal decentralisation where central government takes the revenues raising responsibilities and resources are then reallocated among the federal and provincial governments. This approach is also advocated for ensuring equity and making it possible to cover cost disabilities among the federating units. The question worth asking is whether any one of the two policies would be enough to achieve and ensure better standard of living in the country over the long run. The answer certainly lies in the effects of the two policies on the economic and social indicators. In this context this piece of research provides an opportunity to revisit this important topic and assess evidence from both the single country case and by looking at the newly available, unexplored international cross-country data.

In this study we analysed the effects of different sources of SNGs autonomy and their fiscal capacity and assessed their distinct effects on the economic growth, health and education indicators. This study further bifurcate the immediate consequences of fiscal decentralisation policies from their long run implications. This procedure improves our understanding about policies, which are assumed to bring change in the long run. The use of cointegration technique identified policies which, in fact, were only having the short run effects, without resulting in any lasting returns. This information will help the policy makers to create a balance among different approaches of decentralisation, while devising policies.

Moreover, it is worth mentioning that this study used different kinds of data evidence and tried to gather and verify evidence with the use of appropriate econometric techniques. We have used annual observations at the national level as well as gathered and analysed provincial data. Finally, analysing the recently available international panel data and disaggregating the sample into OECD and Non-OECD countries provided better understanding of the results and uncover the fact that similar policy can result in dissimilar effects in different economic regions. Thus this study brings together evidence from different kinds of national, provincial and cross-country data and used appropriate econometric methodologies to fit each instance properly. This effort finally resulted in highlighting the importance of different policy instruments for fiscal decentralisation and highlighted their effectiveness in different economic settings.

For the first essay, results lets us know that in order to get higher economic growth, the channel through which fiscal decentralisation can have an effect, is the provincial

autonomy. The SNGs tax revenues posed positive long run effect on the economic growth in Pakistan. Federal transfers, although had a positive effect, were only significant in the short run. Hence, first essay tells us that for higher economic growth, SNGs should be capacitated, incentivised and driven towards higher domestic tax collection. This will make the SNGs efficient, innovative and responsible which will ultimately be translated into higher economic growth.

Second essay highlights the need for the guiding role of central government. Results suggests that both the fiscal decentralisation instruments i.e. higher SNG's revenue autonomy and greater flows of federal transfers are not improving the allocation to health sector, which after all is a basic necessity for improvement in the sector. This might be due to the continuity of ignoring this important sector throughout the history of Pakistan, as average health spending in Pakistan during the study period remained only at 0.78 percent of GDP; which is miserable for a country with huge population. Results stressed the need for sector specific transfers in health so as to ensure adequate supply of basic health services to the people. The lower health spending at local level can be explained by looking at the socio-political environment in Pakistan. As health reforms takes long time to be felt therefore local politicians, looking for their re-election, instead deviate funds to projects like roads, street paving, sanitary lining and other infrastructure facilities which become readily visible and are easy to use for exploiting the less educated voters. Thus, federal government should provide broad policy guidelines and ensure in transfers formula that provinces are spending at least as much as central government did before and do not decrease the already meagre health sector resources. However, it is encouraging to note that provincial autonomy helps in achieving lower infant mortality. Although, only the coefficient for provincial autonomy is significant in the short run out of the three fiscal decentralisation proxies, we still found evidence for the desired role of SNGs in creating awareness by using their local standing in the people.

The role discussed for federal government is further supported by the provincial data analysis in the second essay. Although, we could not achieve encouraging results for federal transfers at the national level, provincial analysis highlighted the fundamental differences within the country. It can be noted that, at provincial level federal transfers helped in the provision of better health facilities i.e. more hospital beds to population in the

economically active provinces of Punjab and Sindh[130]. In the two provinces, higher federal transfers actually indicated to have positive implications for the hospital beds availability to the local people. We found opposite results for the fiscally dependent province i.e. KPK. Analysis of disaggregated data set along with the analysis of different fiscal decentralisation policies helped us in finding better policy implications. Thus, inclusion of sector specific transfers should be given due weight while deciding federal transfers so as to suit the specific political economy conditions of Pakistan.

Lastly, the third essay looks at another important sector i.e. education, that has important implications in determining the quality of life and has its effects on the economic growth in this globalised world of learning and innovation. Though unavailability of the desired data for education sector in Pakistan added to the data issues that we had for this study, the availability of newly released World Bank's Fiscal Decentralisation Indicators dataset turned this into an opportunity to incorporate international evidence into this study. Availability of comparable fiscal decentralisation estimates from a single source helped us in identifying the effects of our variable of interest in different economic setting and added diversity to this study.

Analysing a huge unbalanced panel dataset for 59 countries though brought certain issues, nevertheless, thanks to the growing research in panel data econometrics, we were able to find adequate estimation techniques to cover for the potential issues and benefit from new data evidence. Thus, the effects of fiscal decentralisation were analysed for the education sector using a rich cross-country panel data for different economic regions of the world. The sample was analysed in full, for OECD countries and for Non-OECD countries, separately. This setting helped us in finding out that same policies can have differing effects, broadly depending upon the extent of enabling environment.

It was noted that the proxy for provincial autonomy had a positive and significant effect on education spending in OECD countries while federal transfers had a negative effect. On the contrary, it was only the federal transfers which had a weakly significant but positive effect in Non-OECD countries that can also be interpreted as resource starved local governments in the less developed countries. Moreover, as education quality was proxied with teacher-pupil ratio, which is more a problem in the less developed countries, therefore, empirical results were more consistent for the Non-OECD countries.

[130] The two provinces collectively contributed to 84.5 percent to the country's GDP in 2009 (Wikipedia accessed on 08-04-2013-
http://en.wikipedia.org/wiki/List_of_Pakistani_provinces_by_gross_domestic_product)

Interestingly, we have found that in less developed countries fiscal decentralisation results in lower teaching quality. This can be explained by the fact that while focusing on higher enrolment (as less developed countries have yet to achieve the universal primary enrolment), local governments fails to keep intact the required number of teachers. This results in more students per teacher, putting pressure on the existing resources. Thus we can say that targeted fund transfers are necessary to ensure better utilisation of scare resources and to achieve the major targets. In addition, SNGs should be entrusted with higher own tax collection because as soon as the optimal level is achieved, it can have the desired effect on education sector indicators as happened in the case of OECD countries.

In brief, this study identified several issues in fiscal resource distribution mechanism of Pakistan. The most important issue was that the National Finance Commissions adopted single criterion (population) resource redistribution formula which could not prove worthy; the reason is that federal transfers failed to achieve its desired effects i.e. to enhance SNG's efficiency. Despite inadequate local autonomy, it is the SNGs autonomy that can result in positive effects for economic growth. Hence, while deciding the federal transfers, important targets for economic and human development as well as the long run societal needs were ignored and the overall results has summarised the consequences.

In this study, not only the short run effects of fiscal decentralisation were separated from its long run implications but we also identified the effectiveness of local autonomy versus that of federal transfers, as sources of SNG's revenues. It is now clear that fiscal decentralisation is a long run phenomenon and it needs reasonable time before its positive effects can be noticed, provided that enabling environment is available. The empirical analysis provided evidence that the effects of fiscal decentralisation can be different in the short and long run time. Identification of the short run effects will help the policy makes to mitigate any immediate consequences of the policy change while they expect the long run positive economic contribution of fiscal decentralisation. In addition, this study also identified that there are certain fiscal decentralisation instruments which could only have a short run effect. To our knowledge, this is among the very few studies that differentiated and discussed this dimension in greater detail.

Furthermore, this study analysed different sources of SNGs revenues and assessed the effectiveness of available fiscal decentralisation policies. It was noted that only the increase in provincial autonomy has had a long run positive association with economic

growth. The other sources of provincial revenues either remained insignificant or they only had short run (yet positive) effect on economic growth. Thus, empirical results made it clear that it is the channel of efficiency enhancement which can bring positive long run economic gains in Pakistan. Hence, in order to ensure higher economic output, it is the efficiency, not the higher resources alone that can bring change in the long run. Moreover, we can say that the provincial domestic revenue generation has not yet achieved its growth consistent optimum level and an increase in revenue raising capabilities of SNGs will stimulate economic growth.

On the other hand, we found no evidence for federal transfers to cause any long run positive implications for the economic growth. This reflects that the adoption of single resource distribution criterion with no consideration for efficiency, has failed to influence economic performance of the country in the desired way. The proportion of federal transfers in SNGs revenues also makes it clear that in Pakistan the focus remained on the partial fiscal decentralisation mechanism while little consideration was given to capacitate the SNGs. Thus, the required attention to incorporate the efficiency aspects in the resource distribution formula was lacking. Brueckner (2009) advocated that inappropriate SNG's autonomy would result in suboptimal outcomes of fiscal decentralisation. The fact remains that federal transfers led to provincial dependence in Pakistan as it did not contain the required incentives for gaining higher efficiency.

5.2 RECOMMENDATIONS

After having a detailed discussion regarding different aspects and attached consequences of fiscal decentralisation policy, it can be concluded that fiscal decentralisation should have both the elements of competition as well as cooperation. Though the given aspects are somewhat contrary but if we are eyeing towards a balanced growth, where government assumes the responsibility for providing an acceptable level of basic services to the people, a balance should be brought between the two sides of federalism. On one side, decent revenue raising responsibilities should be given to the SNGs to enhance efficiency, productivity and to make them answerable to the people. While on the other hand, cooperation should be extended to the people living in disadvantaged areas to achieve equity. It is however of utter importance that those federal transfers should not turn the SNGs into rent seekers. Transfer from the centre should represent a well-conceived blend of criteria, which does not develop complete dependence and always has the element of efficiency and competition involved.

Moreover, empirical result has made it clear that associated benefits of fiscal decentralisation depends upon the unique political, social and economic conditions of the country. One policy can not only differ in its effects among different countries but it can also have dissimilar short run and long run implications. Thus, if there are chances for abuse of power at the local level, targeted funds allocation can be a good idea. We know that in less-developed countries, SNGs are relatively more prone to elite capture; these are the places where poor might not be heard and in addition, people are also less educated on average to envision their real long run needs. In this scenario, federal government and international development partners should provide the broad policy guidelines by ensuring a resource transfers mechanism where, though, lower tiers of the government are still responsible for service provision but the real needs of the people are not ignored.

Another important dimension of the discussion is that lower tier of government should be elected through popular voting system. This will have at least two benefits. First aspect is related to the increase in efficiency; by providing better choice to people due to competition among politician for their (re)election, which will ultimately result in better services and economic opportunities for the local community. The second aspects relates to the increased transparency which will lead to the efficient allocation of federal transfers and own source revenues as elections will make the local politicians answerable to local people. It is relatively easy for the local people to scrutinise small local spending as compared to the huge development funds that national or provincial politicians receive for allocation in large geographical areas. Similarly, local politicians are accessible to the local people to get comments, suggestions and critique about certain projects and their performance; the aspect which is difficult to imagine in the case of appointed public servants or national and provincial politicians. Strengthening the local government system will also help by providing basic political training to the people to assume future responsibilities at the national level. This will also provide the country with new generation of emerging politicians from the disadvantaged class to control for and mitigate chances of elite capture at any level of the government.

In brief, a well-designed fiscal decentralisation mechanism can help in achieving better economic and social returns through the increased participation of economically active, productive and innovative economic agents. We can conclude the discussion with certain key policy recommendation.

5.2.1 General Recommendations

1. The whole discussion implies that fiscal decentralisation should be considered as an important policy option for its potential to influence economic and social indicators.

2. Section 3.7.3, 4.5.1 and 4.5.2 elaborates that distinct fiscal decentralisation policies are effective in different settings. Therefore, to ensure balanced growth in a welfare maximising society, both instruments of fiscal decentralisation i.e. the provincial autonomy and federal transfers should be used simultaneously.

3. Sections 2.4.3 and 3.7.3 also hints that SNGs should be capacitated and given required incentives to encourage local revenue generation, which results in greater efficiency and is assumed to help in avoiding rent seeking behaviour.

4. In the less-developed countries, as societies are characterised with lower education, they might not be able to accurately identify their long run requirements. Therefore, until local people are ready to lead, sector specific targeted funds should be transferred to the lower tiers for the interim periods (sections 3.6.1).

5. Federal transfers might not be helpful in enhancing efficiency but these help in achieving equity and providing people with basic needs (Section 3.7.3). Therefore, these are important but while focusing on social side of federal transfers, government should also try to mitigate chances of rent seeking behaviour.

5.2.2 Specific Recommendations for Pakistan

1. Provincial governments should be made responsible by clearly defining the roles of each tier of the government and extending the required human and financial resources to ensure planning and development autonomy and to enable SNGs to devise indigenous development plans (section 1.4).

2. Provincial governments should be encouraged for higher local revenue collections to make the lower tiers of the government responsible and to lessen the instances of externalising their costs to others. Once capacitated, rent seeking behaviour on the part of provincial governments should be discouraged, where they ask for readily available funds without exploiting their own potential; hence SNGs should be made accountable (section 1.4).

3. Targeted funds should be transferred for the neglected sectors like health and education, which has a lasting effect on the quality of life and also play an important role in determining future income flows for the country and individuals.

4. An elected local government system is of absolute importance in the context of Pakistan. Elected third tier of the government is necessary to ensure allocative efficiency and it would help in better allocation of federal transfers (which has currently shown limited impact in the first two essays).

5. The general review of relevant literature on fiscal federalism suggests that resource distribution formula should be designed in a way that not only cover the cost disabilities (to achieve equity) but also contain incentives to remain productive. To assess the development needs of SNGs, different measures should be considered while devising the resource transfer formula e.g. level of; infrastructure, poverty, backwardness, inappropriate revenue raising opportunities and inverse population density[131]. One the other hand, to encourage efficiency certain portion of the divisible pool should be allocated according to revenue generation efficiency (matching grants should be given for achieving revenue growth targets or generating extra revenue from own resources) and observing hard budget constraints. Hence, federal transfer formula should be broadened in a calculated manner and steps should be taken to solve the discrepancies at provincial level while resolving the cost disabilities.

6. A permanent and specialised body for the National Finance Commission should be established which resume the responsibility for smooth and judicious Intergovernmental resource distribution. This body should be responsible to analyse the social needs and economic potential of different regions in the country and to give recommendations accordingly. This set up should also be responsible to evaluate the effects of different fiscal decentralisation policies and come up with appropriate resource distribution criteria. Collection and compilation of timely and good quality data should also fall in the domain of this body. This will enable researchers to analyse the effects of related policies and it will also facilitate well-informed policy making.

[131] This should include both the densely populated and sparsely populated areas