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Investigating the Impact of Fiscal Decentralisation on Health Sector: A Case of Pakistan

ABSTRACT

An important determinant of improved quality of life is the health sector. Pakistan, being a developing country, lags on various health indicators and therefore, this study discusses the health sector in Pakistan. As the health sector is a devolved subject, therefore, the study explores the impact of fiscal decentralization on important health sector indicators. National data ranging from 1974-2009 was used to analyse the important health indicators in Pakistan. Analysis indicates that the health sector remained neglected over the period. To a surprise, a negative long-run cointegrating relationship was found for federal transfers on health expenditures at the national level. Hence, provincial autonomy during the period of analysis could not bring the desired improvement in the health sector. Nevertheless, the study highlights that federal transfers to provinces do have social implications.

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Author's contribution in the article: 1- Conceived and designed the analysis, 2- Reviewed and compiled the literature, 3- Collected the data, 4- Contributed data or analysis tools, 5- Performed the analysis, 6- Wrote the paper, 7- Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

Devolution brings in local preferences in policymaking thus caters to the basic needs of a locality, locally. Local representatives being located near to the people are often considered more informed about local needs and territorial requirements as compared to the central planner. Therefore, received literature on the topic advocates that decentralisation would make the expenditures reflective of local needs, and thus improved social indicators are expected to take place. Local representatives from different jurisdictions could learn from the success stories. There is a 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 resource utilisation, capacitates the local population, and increases productivity by providing an 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 a delay in implementation and results in economic inefficiency due to the mismanagement of resources (Vo, 2010). To obtain fruitful results, a well-conceived system of checks and balances is explicitly mentioned in the literature, as the necessary condition.

Hence, despite initial discussion in the literature contemplating the role of decentralisation on economic growth (Ahmad, 2020; Davoodi & Zou, 1998; Thornton, 2007; Woller & Pillips, 1998; Xie *et al*., 1999; Zhang & Zou, 1998), the emphasis has now shifted away from the analysis of fiscal decentralisation (FD) and macroeconomic indicators (like economic growth, inflation, and budgets deficit and public debt). Researchers are now interested in the investigation of the human face of fiscal decentralisation i.e. its impact on education, health, sanitation, and alike local services (Khan *et al*., 2019; Ahmad, 2016; Ahmad *et al*., 2016).

With the emergence of Second-Generation Theories of Fiscal Federalism (SGFF), the discussion has diverted from direct positive effects (between FD and economic growth) to the potential hindrances attached, through which the impact of decentralisation can be compromised (Khan *et al*., 2019; Weingast, 2014; Vo, 2010).[1] Similarly, it is important to look at the indirect channels of decentralisation impacting service provision, which in turn could help to accelerate economic growth.

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. Moreover, subnational revenues raised through domestic resources make the local setup more responsible and relatively more answerable to local communities, hence is expected to result in greater efficiency. Hence, combining decentralisation theorem with local revenue-raising, local governments are assumed to channelize local resources to the social sector. In this connection, the health sector is the important sector that needs to be assessed for its connection with decentralisation, therefore, this study analyses the impact of fiscal decentralisation on health sector indicators in Pakistan.

2. MATERIAL AND METHODS

The available literature on the 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

[1] Like governance issues, corruption, capacity gap, race to the bottom, flypaper effect etc.

used to analyse the effects of decentralisation on the health sector. Focusing on Pakistan, this study estimated the effects of fiscal decentralisation on various health sector indicators, and results are assessed thereafter to infer accordingly.

Fiscal decentralisation at the local level is analysed both in the form 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 subnational governments (SNGs) in better targeting, while federal transfers enhance the provincial fiscal capability to serve the people.[2] In brief, the empirical investigation is dedicated to the analysis of the effects of fiscal decentralisation on the health sector in terms of both health spending and health outcomes.

2.1 Theoretical Model and Determinants of Public Health Expenditures

This study builds upon the models and analysis developed in the existing literature (including Uchimura & Jütting, 2009; Jiménez & Smith, 2005; Jiménez-Rubio, 2011 a, b; Khaleghian, 2004; Robalino *et al*., 2001) and applies it for Pakistan. Given the literature, the health sector indicators can be analysed for their relationship with decentralisation.[3] The basic hypothesis in these studies is that health outcomes are determined by the political, economic, social, and demographic characteristics of the country. The section below explains each equation in greater detail.

(i) Health Input Equation

Pubic health care expenditure is the prime input in ensuring basic health facilities. It has an important bearing on the existing health facilities while it also determines their future availability. Therefore, we will start with per capita total health expenditure which can be modeled as equation (1).[4]

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

where Hepct is the per capita consolidated health expenditure, denoting the basic health input. Equation (1) will isolate the immediate effects of fiscal decentralisation on the health sector. Along with fiscal decentralisation, other determinants of health expenditures include the overall level of economic prosperity, general government expenditure policy, population demographics, and foreign aid. Lastly, ε_t represents the error term in each equation while the subscript t denotes time i.e. t = 1, 2, . . . , 36.

The discussion below summarises each of the explanatory variables for its effect on total per capita health expenditures (*Hepc*), as indicated in Equation (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).

Fiscal Decentralisation (FD): As the main focus of the study is to analyse the effects of fiscal decentralisation, provincial local revenues (i.e. Provincial tax and Provincial non-tax revenue) and federal transfers were used (as a ratio to total government revenues) to assess its effects (Ahmad, 2020). The theory of decentralisation suggests that efficiency gains can be achieved through localisation and it can help in the provision of public goods by 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 a large number of influences on the health sector, one cannot rule out the possibility of either positive or negative

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

[3] 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).

[4] Including both the current expenditure and development expenditure

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 the decentralised setup is not interested in higher spending but instead achieves better targeting, avoids unnecessary spending, eliminates duplication of services, and can cap any loopholes in the spending chains, decentralisation can have a negative effect on the overall health spending. Therefore, fiscal decentralisation contains important information and is expected to summarise the behaviour of subnational governments, over time, 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 the government's commitment to the health sector.

Labour-force Participation Rate (*Lfp*): This variable is a proxy for the affordability of the people. We assume that if there are more people able to work in the economy (that is operating at the natural rate of unemployment) this can probably increase the chances to afford to pay for the private health facilities.[5]

Population Growth Rate (Pgr): The demographic characteristics of the country also play an important role in determining total health expenditure. If population growth is on the rise, the government has to increase its unavoidable spending otherwise, the availability of health facilities, on average, will deteriorate.[6]

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 need 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 equation (1) that elaborated the 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 the 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 more elaborately.

(ii) Health Outcome Equation

Finally, the 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 the health sector in Pakistan. Equation (2) summarise the situation as below.

$$imr_t = \alpha_{21} + \beta_{21} Hepc_t + \beta_{22} FD_t + \beta_{23} Bedtp_t + \beta_{24} Lfp_t + \beta_{25} Aid_t + \beta_{26} Fenrl_t + \varepsilon_{2t} \quad (2)$$

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

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

[6] Expenditure on lady health workers program, mother/childcare centres and immunisation campaigns

ensuring appropriate vaccination and achieving better food and hygiene for children, 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 discussed before.

***Bedtp*:** is used to proxy the health infrastructure facilities in Pakistan and is represented by the hospital bed 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 lack of data, the labour force participation is used as a proxy for affording private health facilities.

Aid: International donors contribute to various programs that are aimed at the 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 a very important role in ensuring better food and hygiene situations for and from 'to-be mothers' and it has a 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.

To sum up, the given health sector indicators will enable us to find out the effects of fiscal decentralisation on the health sector in Pakistan, overtime.

2.2. Data Availability

For this study, the national data set consists of times series observation for 36 years i.e. from 1974-2009.[7] Data were collected from many sources including the World Bank, Pakistan Economic Survey (GoP), State Bank of Pakistan (2005, 2010), and Annual Budget Statements. Table 1 summarise the definitions and sources of the stated variables.

Table 1: 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)*	GoP 1995, 2010, PSYB, 2009
Provincial own source revenues	*Fdtax*	Provincial tax revenue ratio**	SBP (2005); GoP (Various issues)
Provincial local revenues	*Fdloc*	Provincial tax + non-tax revenue ratio**	-do-
Federal transfers	*Fdtrans*	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 a ratio to GDP)	-do-
Labour force participation	*Lfp*	Labour force participation rate	WDI, World Bank, GoP (Various issues)

[7] Due to the 18th amendment, coupled with 7th NFC award in 2010, there is structural break in the data. The Provinces enjoy unprecedented provincial autonomy following 2010, therefore the period for undertaking long run analysis is restricted till 2009 to single out the impact of fiscal decentralisation given the consistent constitutional framework

Table 1 *Continued*…

Urbanisation	*Urb*	The ratio of urban to the 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-
Infant mortality	*Imr*	Infant mortality rate per 1000 live births	WDI, World Bank
Female literacy	*Fenrl*	Female primary school enrolment (in thousands)	SBP, 2005

Note: * expressed in real terms using the GDP deflator,[8] ** Fiscal decentralisation measures were expressed as a ratio to total government revenues

2.3 Unit Root Test

The ADF test results are presented in Table 2, containing the set of variables that were used in this study. For each variable, a 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 2: ADF Results for Variables under Consideration

Variable	τ - ADF with Constant	τ - ADF with Constant and Trend	Variables	τ - ADF with Constant
He	-2.542(1)	-----	Δ *he*	-3.715**
fdtax	-2.850(2)	-----	Δ *fdtax*	-5.254**(1)
fdloc	-2.767(2)	-----	Δ *fdloc*	-3.946**(2)
fdtrans	-0.9914	-----	Δ *fdtrans*	-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**
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. ESTIMATION

The cointegration technique is used to investigate the long-run relationship between public health indicators and fiscal decentralisation. As the data span is 36 annual observations only, therefore, 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 suggest that equations 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.

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

Keeping in view the limited number of observations in this study, a two-stage procedure was used for estimation. Firstly, for each of the health indicators, the general ADL model was estimated (without the fiscal decentralisation variables) and a cointegration test was conducted to establish the basic relationship. Once evidence favours the existence of long-run cointegrating relations, the fiscal decentralisation measures were incorporated in the ECM representation to deduce the short and long-run effects. This procedure helps in mitigating chances of rejecting a true cointegrating relationship, due to a large number of explanatory variables in the limited data set. For each equation, time trend was also considered for inclusion to capture the trend factor (if any). Lastly, it is important to mention that all the variables were expressed in log form.

In a data-scarce situation, it is very important to make the best use of available data points. Therefore, the General-to-specific (Gets) model selection procedure was applied (Krolzig & Hendry, 2001; Hendry and Krolzig, 2003 & 2005). 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 a long-run relationship. Upon the confirmation of the long-run relationship, at the second stage, a similar approach was followed for the ECM model where the fiscal decentralisation measures were then incorporated one by one.[9] Drawing upon the earlier contribution from (Hoover & Perez, 1999; Krolzig & Hendry, 200; Hendry & 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. Various misspecification tests including error autocorrelation (AR), heteroscedasticity (ARCH, *hetero*), non-normality, and functional form misspecification test (RESET) were applied to get reliable results.

4. EMPIRICAL RESULTS

The focus of the discussion remains on the signs and significance of the variables. This section presents the empirical results, its interpretation, and conclusion.

4.1. Results for Total Health Expenditure Model

As discussed, this section comprises of two parts. As the first stage, the existence of a 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.

4.1.a Evidence for the Existence of LR Relationship

The first stage results for the general and specific ADL model are not presented here and we only report the final ECM results as shown in Table 3. The Gets approach results in the exclusion of one explanatory variable namely government expenditures (*ge*). 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 a given specific model, the cointegration test-statistic "-5.64" is highly significant and indicates the existence of a 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 a 1 percent level of significance. Hence, with the given data and analysis, there is strong evidence for the existence of a long-run relationship between per capita total public health expenditure and the given explanatory variables. 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 (Equation 3) of the specific ADL model to disentangle the short-run and long-run effects of fiscal decentralisation.

$$\Delta hepc_t = \nu + \delta t + \sum_{e=1}^{m} \beta_e \Delta hepc_{t-e} + \sum_{f=1}^{n} \beta_f \Delta y_{t-f} + \sum_{h=0}^{q} \beta_i \Delta pgr_{t-i} + \sum_{j=0}^{r} \beta_j \Delta aid_{t-j} + \sum_{k=0}^{s} \beta_k \Delta fd_{it-k} + \gamma_1 hepc_{t-1} + \gamma_2 y_{t-1} + \gamma_3 pgr_{t-1} + \gamma_4 aid_{t-1} + \gamma_5 fd_{it-1} + \varepsilon_t \quad (3)$$

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

Table 3 contains a result for the 'specific' ECM models for *hepc*, where results for each of the three fiscal decentralisation measures are presented in separate columns.[10] Furthermore, it is important to mention that although the *Gets* approach was used, it was only allowed to select the general determinants from the model, making sure not to delete the coefficients for the variable of interest (which were handled manually following the Gets approach).[11] This procedure provides the opportunity to comment upon the signs and significance of the coefficients for fiscal decentralisation measures.

As seen in Table 3, 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 range from "0.66" to "0.69" which indicates speedy recovery. This also validates the existence of a 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 a speedy rate.

4.1.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 a discussion about the signs and significance of different determinants of health expenditure in Pakistan. To start with, Model 1 in Table 3 shows the effects of the first fiscal decentralisation proxy i.e. provincial tax revenues (*fdtax*), on per capita public health expenditures. It is important to note that this variable only appears to have a negative short-run effect, whereas the lagged level effect is insignificant, despite being positive. Hence higher tax collections at the local level lead to a 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 (*fdloc*), results are presented in Model 2. Despite producing comparing results for the other explanatory variables, the variable of interest i.e. *fdloc* could not achieve significance for either short-run or long-run effects. These results are not unexpected as the local revenues at the 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 a local level. Lastly, the third measure of fiscal decentralisation was federal transfers to provinces (*fdtrans*) and Model 3 reports its effects on per capita health expenditures. Once again, the fiscal decentralisation proxy has produced a negative effect on the dependent variable. Results suggest that as central governments in Pakistan started to transfer more resources to sub-national levels, it has negatively affected health spending. The short-run effects of *fdtrans* are insignificant while the implicit long-run effects, represented by the lagged level effects, have produced a highly significant negative coefficient of "-0.38".

Overall, fiscal decentralisation measures have a negative relationship with the dependent variable i.e. per capita public health expenditures. Results suggest that a greater level of fiscal decentralisation will have negative effects on the total consolidated health expenditures and shrinks in its overall volume. In the first instance, this is quite an unexpected result and reflects that an increased level of fiscal decentralisation will further reduce the already meager health resources. The situation reflects that SNGs in Pakistan are not spending as much as the federal government and there is a need to assess its ultimate effects on the provision of health facilities. Results potentially reflect two scenarios; one is that SNGs have a different focus and hence allocate resources to other social sector needs like water schemes, street paving, and lighting, which can become visible in a shorter period. 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 they could have reduced any misuse of funds. Besides, SNGs might have achieved better targeting and 'cure

[10] Obtained with the *Gets* approach

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

before the breakout' strategy (for significant epidemic diseases) which might have resulted in the efficient allocation of the scarce resources under a decentralised setup.[12] 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.

Table 3: Results for ECM Representation of Public Health Expenditure Model (Dependent Variable: Health Expenditures in 1st diff., Δ*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	Δ*hepc*_1	0.37**	0.39**	0.19
GDP per capita	Δ*y*	1.32**	---	---
Population growth	Δ*pgr*	6.15***	4.77***	3.34***
	Δ*pgr*_1	-5.49***	-3.94***	-2.48**
Foreign Aid (UNICEF)	Δ*aid*_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[13]		**-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]

Note: ***, **, and * represent significance at 1%, 5%, and 10%, respectively; # Model 3 includes an outlier dummy for the year 1995; All variables were expressed in log form.

Having discussed the fiscal decentralisation measures, other control variables are by the existing literature. Results for the lagged level effects indicate that the improvement in economic progress (y) will have a positive impact on total health spending. This is according to expectation in developing countries like Pakistan, which need more resources to achieve a better quality of life. Similarly, to maintain/improve the existing health facilities, the government has to take into consideration the population growth. Results suggest that population growth is positively related to public health expenditures. This indicates effective planning on the part of the government because the increased level of the population has shown a positive effect on health expenditures. However, foreign aid will have a negative effect on 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 a negative effect on public health expenditure, which is not a healthy trend.

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

[13] The critical values and p-values used for the significance for the *PcGive* unit root test were obtained using the response surfaces in Ericsson and MacKinnon (1999) and Ericsson and MacKinnon (2002, p-316).

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.

4.2 Results for Health Outcome Model

For the health outcome model, estimation results are once again divided into two parts. Firstly, the existence of a 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.

4.2.a Evidence for the existence of LR relationship

The 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 (following Equation 2), to find out the long-run cointegrating relationship between the variables. Once an economical and improved ADL model was obtained, the proxies for fiscal decentralisation were analysed turn by turn, and the model was re-estimated in ECM representation (Equation 4). Final results for the infant mortality model including the fiscal decentralisation measures are presented next.

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

Table 4 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 a long-run relationship in the ECM representation as well. The error correction terms represented by lagged level dependent variable (*imr_1*) are highly significant in all the three ECM models and appear 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, the model shows a slow speed of adjustment, indicating that health interventions take a long time to take effect. Besides, all the diagnostic tests are satisfied, and we can rely on the results.

4.2.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 4 shows that out of the three proxies of fiscal decentralisation, only fdtax has produced significant short-run effects in final specific Models 1. This indicates that if SNGs have 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 (*fdtax_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 (*fdloc*) and SNGs capacity (*fdtrans*) remained insignificant both for the short-run and long-run effects. Thus, it can be concluded that fiscal decentralisation has failed to bring the expected optimum outcome in the health sector, and hence, results are not very encouraging for Pakistan.

Analyzing 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 signs, although it could not achieve significance in the ECM model, despite being significant in the ADL model. Another very important variable i.e. *hepc* retained statistically significant negative signs 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 a chance that this positive sign might be indicating towards 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 4: 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***
Hospital Beds to population ratio	Δ*bedtp*_1	---	---	0.098**
Foreign Aid (UNICEF)	Δ*aid*	0.006**	0.007**	0.007**
	Δ*aid*_1	-0.006*	---	-0.007*
Female primary school enrolment	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]

Note: ***, **, and * represent significance at 1%, 5%, and 10%, respectively; *PcGive* Unit root test represents the Kiviet and Phillips (1992) test for cointegration; All variables were expressed in log form

5. 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 a 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 a 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 the health sector.

Overall, in Pakistan, the health sector could not get the optimal attention from the policymakers. Despite the theoretical basis for improved service provision under a decentralized setup, we could not get the desired empirical support in the case of Pakistan. Data limitations, difficulty in separating foreign-funded projects, and other complexity, especially concerning the analysis in the case of Pakistan, leaves us with many unexplained questions. Yet, this study attempts to provide certain important indications in the case of Pakistan. The surprising fact relates to the negative effect of fiscal decentralisation in the case of health sector indicators in Pakistan. Pakistan is a country having less than 1% (of GDP) allocation to the health sector, therefore, such results are not unexpected. Still, fiscal decentralisation appearing with negative effects reflects the need for remedial measures.

Results made it clear that the health sector yet again is not in the basic focus even by SNGs. In both cases, with higher tax revenues and federal transfers to provinces, funds available to the health sector seem to have suffered. We can think of efficiency gains and capping any loopholes in the systems when funds are allocated through better informed local policymakers. 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, however, these are neither too strong, due to potential econometric issues. To sum up, this study provides a basis for analysis relating fiscal decentralisation with the health sector. There is certainly support for fiscal decentralisation as provincial fiscal autonomy had a negative and significant short-run impact on health outcomes, however, the policymakers need to seriously reconsider the situation and consider the inclusion of efficiency-enhancing indicators in the resource distribution mechanism in Pakistan.

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