

PUBLIC SECTOR DEVELOPMENT PROGRAMS EFFECTIVENESS IN EMPLOYMENT GENERATION: EVIDENCE FROM PAKISTAN

TAIMOOR ALI BUTT AND NASEEM FARAZ*

Abstract. Public Sector Development Program (PSDP) spending in Pakistan has been debated in terms of its effectiveness in generating employment. This study aims to explore the relationship between PSDP spending and employment levels by examining its impact on sectoral employment generation. Using a Vector Autoregression (VAR) model, the study finds that the effectiveness of PSDP spending varies across sectors and time periods. The impact of PSDP spending on employment generation is only significant in the short run, with the strongest effects observed in the Water & Power Sector, Construction, and Health Sector. While PSDP spending has a direct impact on short-term employment creation, the role of private investment is also critical in maintaining its impact in the long run. The study suggests that PSDP spending has crowded-in private investment in a few sectors, but overall, there is minimal or no effect of PSDP spending on private investment. PSDP is not productive enough to generate significant employment in Pakistan.

Keywords: Public Sector Development Program effectiveness, Employment Generation, Vector Autoregression, Private Investment

JEL Classification: E22, E62, H04, H50, H54

*The authors are respectively Risk Management Officer at EXIM Bank of Pakistan and Senior Research Economist at Pakistan Institute of Development Economics, Islamabad – Pakistan.
Corresponding author's e-mail: taimoor300719@gmail.com

I. INTRODUCTION

The government sets up targets for development expenditure in order to meet certain objectives with the primary focus of ensuring a rising economic growth, that could promise employment opportunities and generate spillover effect on other economic indicators. The economic cycle through government spending directly and indirectly impacts the labor market. Government development spending extended to provide infrastructure in various sectors including Agriculture, Industry, Energy, Transport & Communication, Education, Health, Tourism, and many others. This intervention by the government that creates a short as well as long term employment triggers overall economic activity.

Government is injecting billions of rupees as development expenditure in Pakistan through Public Sector Development Program (PSDP) with aim to increase growth and development. However, despite this massive spending, unemployment is increasing overtime. The increase in public spending may reflect in the public sector employment generation overtime that must reflect the effectiveness of PSDP spending of the government in generating employment in Pakistan. This study aims to investigate the impacts of PSDP on total and sectoral employment focusing on sectors where PSDP spending is most concentrated. Using Vector Autoregression (VAR) methodology, it will be investigated that whether PSDP spending can generate employment directly (through public sector investment) or indirectly (through spillover effect on the private sector employment).

After reviewing various studies, it was found that a limited literature is available which studies the impact of PSDP on various macroeconomic indicators in case of Pakistan. Only a few studies such as Haque et al (2020) which discuss the loop holes in PSDP as it is still concentrated to the “HAQ-HAG model” and what is the state of public investment in Pakistan. Likewise, Ahmed & Ali (2014) found the impact analysis of public investment on sectors and their employment rate. Another study by Ahmed and Javed (2017) provided an analysis of PSDP’s long term effect on economy. But there were no studies available that analyzed the impact of PSDP on unemployment, poverty, socio-economic development, standards of living and also focuses on multiple sectors which is identified as research gap. The issue of efficiency and

productivity of development expenditures, especially PSDP has been ignored by the stakeholders. Simultaneously, unemployment is becoming a major concern especially when the majority of the population belongs to the adult age group (59% of population) including the challenge of graduate unemployment, where the talented and educated are unable to find opportunities based on their levels of education. These factors have subsequently caused massive brain drains, capital flight and lack of skilled labor that have resulted due to unemployment. These challenges raise concern on the performance of Development Expenditure, government's development policies, and the projects under the Program whether they are an asset or a liability for the government.

The literature on public sector investment in Pakistan lacks a comprehensive analysis of the impact of PSDP on employment creation across various sectors. This study aims to fill this gap by providing empirical evidence on the effectiveness of PSDP spending in generating employment at the national level and across different sectors. This study intends not only to investigate the impact of PSDP spending on employment but also explores the role of private investment in creating employment opportunities in relation to PSDP spending. The results of this study provide insight to policymakers to make informed decisions about the allocation of resources and design more effective development policies to promote employment generation in both the short and long run.

Overview of PSDP and Employment in Pakistan

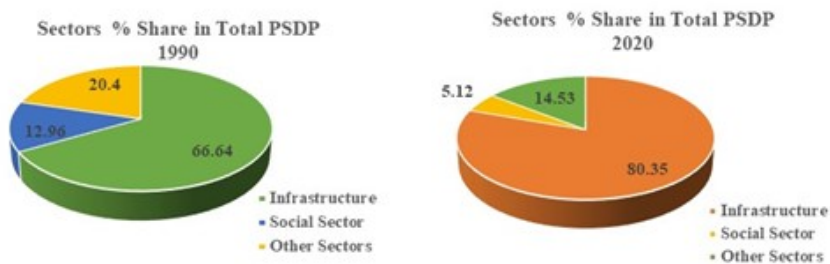
The concept of development spending in Pakistan is defined by the Public Sector Development Program (PSDP) which is designed annually by Ministry of Planning, Development and Special Initiatives with the objective to provide a big push through infrastructure development and expansion that would ultimately lead to economic growth and a positive ripple effect on other macroeconomic variables.

As per the PSDP 2020-21 document provided by Ministry of Planning, Development and Special Initiatives, the Federal government in FY2019-20 estimated allocations were around Rs. 622.7 billion for PSDP and provinces were at Rs. 540 billion. The total national PSDP for FY2019-20 stood at Rs 1.16 trillion. Data from economic surveys and

annual plans showed that in last 10 years, government had been allocating an average of around Rs 1.6 trillion to for PSDP and there has been an increasing trend in it annually (the present government experienced fluctuation). Through data analysis a basic comparison can be drawn of the difference in PSDP allocations in last 30 years in major sectors. The figure 1 below is a pie chart that shows that in last 30 years, the share of three major sectors; Infrastructure Sector (Power Sector and Transport & Communication), Social Sector (Education and Health Sectors) and Others (Agriculture, Industry, Mass Media, Manpower and Employment, Tourism, Culture and Sports and Research and Development).

FIGURE 1

Comparison of % Share of Sectors in Total PSDP in 1990 and 2020



From the figures it is also evident that after 30 years the focus of attention remains towards infrastructure expansion which can be damaging in nature as the social sectors are neglected that includes health and education, not showing any improvements. The cost of improving few major sectors such as share of infrastructure sectors and social sectors has although gone up, but it is at an expense of sectors such as Agriculture, Industry, Tourism, Sports, Culture, Youth Development, Manpower and Employment, Research & Development, Science and Technology, Social Welfare, Mass Media etc.

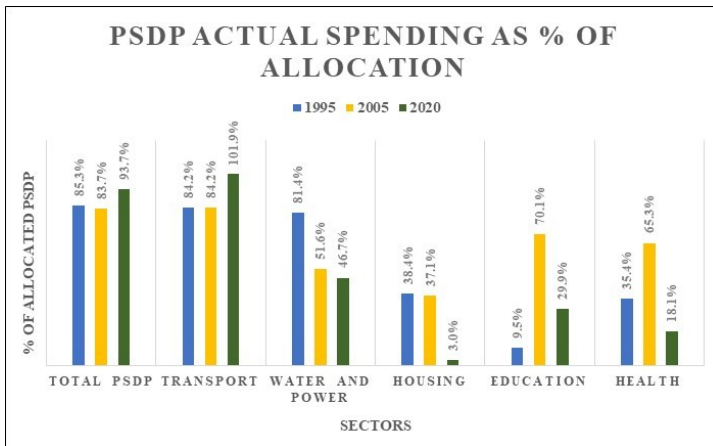
Similarly, data shows that the total PSDP allocations have improved over 1100% in last 25 years from Rs 96.50 billion in 1995 to Rs 1,163.82 billion in 2020. There has been an increasing trend in government's allocations and spending in the Power Sector. Looking at the data it is found that over the years the focus has been on; Power/Energy Sector and Transport & Communication. Last year the government spent over Rs

200 billion on Transport and Communication while approximately Rs 150 billion (Ministry of Finance). The difference in the numbers is probably due to another debate on the difference in PSDP allocations and actual spending.

A major concern found through research was that there remained a difference in actual spending and in allocations of PSDP. Similar arguments had been raised by Haque et al (2020) and Ahmed & Mohamad (2014) studies in which they argued that this factor leads to delays in project that could also be resulting in rising project costs. The chart in figure 2 shows that in three different periods (1995, 2005, and 2020) there is a continuous trend where PSDP spending is lesser than the allocations made in total and in sectors. The bigger concern would be that in case of social sectors, the spending is quite lower to what is allocated. In 2020 only 18.1% of PSDP allocations were actually spent in Health sector which is worse as compared to 1995 and 2005 figures and same is case in education sector.

FIGURE 2

PSDP Actual spent as % of Total Allocations in various sectors



Pakistan is ranked as the country that has the 9th largest labor force in the world and it increasing every year. As per the 2018 Labor Force Survey, Pakistan has 65.50 million labor force which is a 23% increase in last 10 years. The employed labor force as per the Economic Survey of Pakistan 2020-21; is 61.71 million that is 94% of the total labor force.

The majority of the participation is by male and major share in employment (sector wise) is by agriculture sector (38.5% as per Annual Plan, 2020-21). The table 1 below shows the number of employees in different sectors in Pakistan in three different time periods. The unemployment rate in Pakistan as per the last Labor Force Survey of 2018, is at 5.79% which had been decreasing since 2005, meeting the targets of the 11th five year plan.

TABLE 1
State of Employment in Pakistan

(No. in million)	1995	2005	2018
Total Employed labor force	34.20	43.22	61.71
Agriculture	16.00	20.54	23.76
Manufacturing & Mining	3.59	6.60	10.05
Construction	2.47	2.91	4.70
Electricity & Gas distribution	0.28	0.31	0.45
Transport & Communication	1.73	2.72	3.50
Unemployment rate (%)	5.37%	7.69%	5.80%

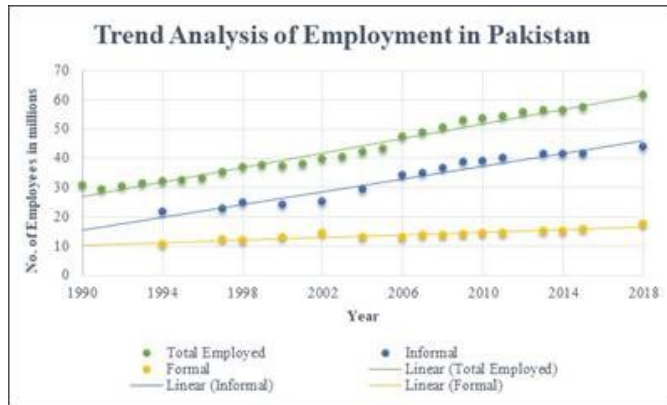
An alarming situation, as per the Labor Force Survey 2017-18 is that the large part of the unemployed labor belongs to people who have graduation degrees (25% of unemployed population). The reason is that there has been an increase in number of graduates in the country as with establishment of HEC since 2002, over 200 universities as of today had been established in Pakistan. Presently there are 1.9 million students enrolled in Universities and 0.59 million in degree colleges which was only a quarter of these figures 10 years or 20 years back. Not only that, the increasing trend in MPhil and PhD admissions in Pakistan is due to the fact that students are unemployed. As per Chaudhry and Khan (2020), the graduate unemployment (GUE) rate stands at 16.5% while as per OECD website, data shows that in developed world it varies between 5% and 10%.¹

¹ <https://data.oecd.org/unemp/unemployment-rates-by-education-level.htm>

Further the labor market in Pakistan is classified as either Formal or Informal Sector employment. Data shows that the majority of the growth in employment over the years has been in the informal sector. The graph above in figure 3 shows a trend analysis in total employment and a linear steep trend in informal sector employment in Pakistan. The informal workers are usually self-employed workers and daily wage workers, those who undergo diversified jobs from petty traders to small producers and from local transport drivers to cobblers etc. Their economic activities are usually excluded from Gross Domestic Product of the economy. Formal sector includes all those activities that are included in GDP and are monitored and taxed by the government. So by looking at this graph one may also identify a cause to why there is lower income tax collection in Pakistan as most of the employment is in informal sector of the economy. The formal sector trend show a nearly flat linear line. As per the last labor force survey, Pakistan’s 74% employment is from informal sector.

FIGURE 3

Trend Analysis of Employment in Pakistan; Formal and Informal Sector



II. REVIEW OF LITERATURE

The idea of public investment effectiveness on macroeconomic variables has long been debated to develop its theoretical understandings and to conduct empirical analyses. Anderson et al.’s (2006) found that public investment affects the level of national income by affecting the aggregate demand as wages are inflexible and economies sometimes operate at full

employment level so an increase in public investment will also increase national income in the long run which will be caused by an acceleration in economic growth. Kamps (2005) investigation into the dynamic effect of public capital in OECD countries which showed that shock in public capital varies across states i.e. either positive or negative. Further he found that the response of employment to public capital was negative in most cases which indicates ineffectiveness of public investment. But there are many studies that have proved the positive impact that public investment has on economic growth such as Romer (1986), Lucas (1988), Barro and Sala-i-Martin (1999), Rebelo (1992), and many more.

Studying the very relationship in case of Pakistan, studies such as Ghani and Din (2006), Bint-e-Ajaz and Ellah (2012), and Ellahi and Kiani (2011) discussed as how public investment would impact the economic growth in short and long run. The studies have all concluded that the response of GDP growth has been negative which as per their arguments, is the result of public investment in unproductive and inefficient sectors. But studies have found that private investment positively affects the growth of GDP which has also been investigated by Khan and Sasaki (2001). Sial, Hashmi and Anwar (2010) investigated the impact of public and private investment on economic growth of Pakistan and concluded that the private investment in Pakistan has a larger and longer impact on economic growth as compared to the public investment.

There are very limited studies that discuss the role of public investment and development spending on employment and multiple sectors; Ahmed & Javed (2017) investigated the long-term effect of public sector development expenditure and investments on economy in four sectors; Education, Transport, Health, and Housing Sector. It was found that development spending in education and housing have a positive relationship with economic growth which on the other hand is negative in the case of health and transport. The reason is that the transport sector contributes less in GDP i.e. lesser returns with higher expenditures. Similarly Ahmed & Ali (2014) analyses on sectoral public investment efficiency and its impact on the economic growth of country, employment and private investment found that employment response to public investment in agriculture sector is negative but positive for private investment. But on the other hand, in manufacturing and construction sectors, a positive response was recorded from employment, sector

growth, and private investment. And one important finding was that in case of majority of sectors, crowding in effect was found as private investment response to increased public development spending in the sectors.

The results from these studies lead to questions regarding the efficiency and effectiveness of public investment/development spending and in this case PSDP on stimulating other macroeconomic variables through a spillover effect. In this regard, Haque et al (2020) have criticized the conditions of the projects approved and completed under PSDP. The study had found that from 2000 to 2018, 98 projects exited PSDP out of which only 55 were completed and the rest were abandoned. The total cost of these abandoned projects was Rs. 176 billion while expenditure incurred at around Rs. 27 billion. The argument upholds the results from previous mentioned studies that PSDP projects are unproductive in nature as they are approved without due diligence (lack any project analysis and are subject to political considerations) and focuses on just the brick and mortar which shows that the government is still using the old Haq/Hag model that has resulted in lesser returns and higher costs.

III. DATA AND METHODOLOGY

DATA SOURCES AND VARIABLES

For the study, secondary data has been used for Pakistan through time period of 1990-2020. The data has been collected from various sources; Ministry of Finance documents such as Economic Survey of Pakistan and also Budget Documents, Planning Commission documents such as Annual Plans, Labor Surveys of Pakistan Published by Pakistan Statistical Bureau. For the study, two main variables have been used i.e. Total and Sectoral Employment in Pakistan and Total and Sectoral Spending of PSDP (Consolidated). Other controlled variables included in the model are; Annual Inflation rate (Consumer Price Index); Annual GDP growth; Total and Sectoral Private Investment; and finally Pakistan's Total Government Expenditure excluding PSDP. The study will be covering sectors after considerations from studies (Haque *et al*,

2020 and Ahmed & Javed, 2017) i.e. those sectors have been chosen where PSDP spending had remained most concentrated;

- Transport & Communication sector
- Water and Power sector
- Housing/Construction sector
- Education sector
- Health sector

MODEL SPECIFICATION

The present study will provide a descriptive analysis by using quantitative data. The study will be employing an econometric technique in the form of Sims (1980) Vector-Auto regression (VAR). VAR models are dynamic multivariate models that are used in forecasting, shock analysis of variables and used as a policy making tool. These models are used to capture the dynamic relationships that exist between variables as they interact with each other in a time series data. The model is subject to the assumption that variables are all endogenous and their past values impact their present. These have been the main reasons to use this strategy for analysis that would provide a strong econometric justification that would help prove the mentioned hypothesis. In general, the model is represented as:

$$Y_t = A_1 q_{t-1} + \dots + A_p q_{t-p} + \mu_{Z_t} + \varepsilon_t \quad (1)$$

Here Y_t is a k -vector of endogenous variables, Z_t is the d vector for exogenous variables, $A_1 q_{t-1} + \dots + A_p q_{t-p}$ and μ are the matrices of coefficients to be estimated and ε_t is the error term vector.

The equation (2) below is the basic econometric equation that underlines the hypothesis:

$$EMP_t = \beta + \beta PSDP_{t-1} + \delta X_{t-1} + U \quad (2)$$

$$X = \begin{pmatrix} GovExp \\ GDPG \\ I_p \\ Infl \end{pmatrix} \quad (2a)$$

The hypothesis of this study is to check as how much the PSDP spending by the government in different sectors of economy has been effective in generating employment i.e. how affective is PSDP for generating employment in Pakistan. The said relationship will be estimated using VAR and considering the controlled variables as Private investment, GDP growth, Inflation rate and Total Government expenditure (excluding PSDP).

$$X_{s_t} = \beta_{s_t} + \sum_{i=1}^p \phi_{s_t} X_{s_t-k} + \varepsilon_{s_t} \quad (3)$$

The equation (3) above is the general VAR model for the study. I have used six variables using VAR analysis to analyze how the PSDP have been effective in countering unemployment across various sectors. The following represents the 6×1 endogenous variables vector.

$$X_{s_t} = \begin{pmatrix} EMP_{s_t} \\ PSDP_{s_t} \\ GovExp_t \\ GDPG_t \\ I_{p_{s_t}} \\ Infl_t \end{pmatrix} \quad (3a)$$

The subscripts s= Education, health, transport and communication...N represent sectors and t= 1....T represents time lags. The variables EMP_{s_t} is the National Employment Level and Employment across the selected five sectors, $PSDP_{s_t}$ is National PSDP spending on annual basis (consolidated federal and provincial) across the five sectors, $GovExp_t$ is the Total Government excluding PSDP, $GDPG_t$ is the GDP growth rate of Pakistan, $I_{p_{s_t}}$ indicates Private Investment in Pakistan and in five sectors and $Infl_t$ is the average annual inflation in Pakistan. The

model is a multivariate model which will withhold the assumption that; (i) All variables in model are stationary, and (ii) Error terms used in the models are all identically and independently distributed with mean zero and variance.

The reduced form of VAR for the equations (2) is as below:

$$\Phi x_t = \Gamma_0 + \Gamma_1 x_{t-1} + \varepsilon_t \quad (4)$$

Multiplying whole equation (4) by Φ^{-1}

$$x_t = A_0 + A_1 x_{t-1} + e_t \quad (5)$$

Where, $A_0 = \Phi^{-1}\Gamma_0$, $A_1 = \Phi^{-1}\Gamma_1$, and $e_t = \Phi^{-1}\varepsilon_t$

The empirical models for the study can be specified as:

$$EMP_{s_t} = \phi_0 + \sum_{k=1}^p \phi_{1k} EMP_{s_{t-k}} + \sum_{k=1}^p \phi_{2k} GovExp_{t-k} + \sum_{k=1}^p \phi_{3k} PSDP_{s_{t-k}} + \sum_{k=1}^p \phi_{4k} I_{P_{s_{t-k}}} + \sum_{k=1}^p \phi_{5k} Infl_{t-k} + \sum_{k=1}^p \phi_{6k} GDPG_{t-k} + \varepsilon_{s_t} \quad (6)$$

Here EMP_{s_t} is employment rate which is a function of its own lags ($EMP_{s_{t-k}}$), the lag of total government expenditure ($GovExp_{t-k}$), PSDP lags for sectors ($PSDP_{s_{t-k}}$), Private investment in sectors ($I_{P_{s_{t-k}}}$), average annual inflation rate and lags denoted by ($Infl_{t-k}$), GDP growth rate ($GDPG_{t-k}$), and ε_{s_t} is the error term. In the same pattern we will model the other equations including control variables will be formulated.

DATA AND MODEL TESTING

Stationarity: Unit Root Test

The first step before estimating the VAR model would be test data stationarity. It is necessary to check whether the time series data is stationary (No trend) or non-stationary (trend in data). It is necessary for data to be stationary otherwise the estimation will be spurious or results would be meaningless. Hence a unit root test will be used for it.

Lag Identification

The VAR model is estimated on an optimal number of lags determined through various techniques. For this study, we will use Akaike information criteria (AIC) and Schwarz information criterion

(SC) to determine the appropriate length of the lag. As the data set is annual data hence either 1 or 2 lag order will be ideal.

Impulse Response Function

The impulse response function will be derived that explains the reaction of the dependent variable in the VAR system to shocks in the error term ε_{it} (Gujarati, 2011). The impulse response function will be derived from estimated VAR parameters and their standard errors, so it is necessary to estimate the confidence interval to get the impulse response function.

Forecasted Error Variance Decomposition

The forecast error variance decomposition helps analyze any changes in the variables that results due to shocks in the other variables and its own shock. It determines the severity of the total effect and provides the upcoming trends of variables when there is a shock in the economy. Through it one can predict that in future; in short and long run which variables will determine which variables and to what extent in the model.

IV. RESULT AND DISCUSSION

DESCRIPTIVE STATISTICS

The Table 2 shows the descriptive statistics of all the variables. The average value in last 30 years for employment is 43.20 million, the average for Total National PSDP Spending is Rs 445.47 billion while for private investment it is Rs 1,339.57 million and average total government expenditure is Rs 2,633.78 billion. The average inflation rate (CPI) in last 30 years has been 8.32% while GDP growth rate has been 4.22%. The maximum employment so far has been 61.71 million employed where minimum is 29.92 million. Similarly government had spent the maximum PSDP of Rs 1,577.75 billion (2017) and the lowest so far had been Rs 56.05 billion (1990). The highest inflation so far has been 17.03% (2009) and lowest 2.86% (2016) while highest GDP ever recorded in last 30 years was 7.70% (2004) and lowest was -0.47% (2020).

TABLE 2
Descriptive Statistics

	EMP	PSDP	IP	INFL	GDPG	GOVEXP
Mean	43.20	445.47	1,339.67	8.32	4.23	2,633.78
Median	40.47	227.72	880.1	7.92	4.18	1,116.98
Maximum	61.71	1,577.75	4,393.57	17.03	7.7	9,648.48
Minimum	29.52	56.05	76.56	2.86	-0.47	201.18
Std. Dev.	10.17	450.18	1,289.99	3.64	1.93	2,734.58
Skewness	0.26	1.09	0.91	0.26	-0.32	1.09
Kurtosis	1.64	3.04	2.65	2.29	3.12	2.99
Jarque-Bera	2.38	6.11	4.40	1.01	0.55	6.10
Probability	0.30	0.05	0.11	0.60	0.76	0.05
Sum	1,166.49	13,809.6	41,529.9	257.91	131.07	81,647.14
Sum Sq. Dev.	2,687.49	6,079,761	49,922,679	397.8915	111.41	2.24E+08
Observations	27	31	31	31	31	31

Looking at the normality of the data from the Table 2, the variables Private Investment, Employment, and Inflation Rate show normal skewness; positive skewness for PSDP and Total Government Expenditure; and Negative skewness for GDP growth. Meanwhile looking at the kurtosis, PSDP, GDP Growth, and Government Expenditure showed normal distribution (Kurtosis near 3) while Employment, Private Investment and Inflation show flat distribution (Platykurtic as kurtosis below 3) which is relative to normal.

EMPIRICAL RESULTS: PSDP SPENDING AND EMPLOYMENT LEVEL

The first estimation was conducted using the main variables of PSDP spending and Employment Level Data including the four controlled variables of Private Investment, GDP growth rate, Inflation Rate and Government Expenditure where all sectors have been consolidated into a total figure. The following is the analysis over the results:

PSDP Impact on Employment

The regression results of VAR show that PSDP spending has a weak negative impact on employment as results show a reverse causality between PSDP spending and employment level in Pakistan. This

indicates that in the short run the total PSDP spending is not effective in creating employment. However, it has been found that the private investment shows a positive but moderate impact on employment generation in Pakistan which indicates that in case of Pakistan, private investment is critical in generating employment. This behavior of employment generation towards private investment rather than PSDP generation has two major reasons; first, PSDP spending in Pakistan is more on infrastructure projects such as Roads, Highways, Energy projects which employ mostly short term laborers during the project completion cycle. With time the employment on these projects squeezes to limited staff of professionals. Second, most of the employment in Pakistan belongs to the private sector (94%)² and specifically informal sector (70%). Private investment is a major source that provides new employment in Pakistan.

Results also show that employment level in the country has a strong positive impact on the PSDP spending. This implies that the decision to spend PSDP is based on the condition of labor market or labor force. Another interpretation to this relationship can be that as PSDP or development spending is set up to provide employment opportunities which mostly is laborer or unskilled worker, the PSDP spending is spent in areas which can possibly generate more employment. The results also show that an increase in the current year's employment level is associated to around 60% to its past values. This relationship between employment's past value has an impact on determining its present value is due to the fact that with increasing labor force every year, there is limited employment opportunity in market hence the present value is determinant to its past values as well.

Furthermore, the past values of PSDP show a strong impact on the current values of PSDP spending in addition to GDP growth rate which shows a strong impact on PSDP spending. This would imply that with positive GDP growth rates, government's development spending would also increase. So would GDP as it shows a positive dependency on PSDP spending indicating that GDP growth rate grows due to development spending. Results provide that in case of Pakistan, PSDP spending is also

² Source: Labor Force Surveys and Pakistan Public Administration Research Centre.

driven by the Private Investment where a unit increase in private investment would raise the PSDP spending by 20%. A negative response of private investment coefficient to PSDP spending was found which through investigation (Annexure B-1) using different lags, concluded that the response of private investment to PSDP is either weak or minimal indicating no impact. Similarly trend analysis (Annexure A) shows that private investment grows even with increasing PSDP spending over the years.

Results conclude that employment generation in Pakistan is more driven by private investment than PSDP (a unit increase in private investment would raise the PSDP spending by 20%) which implies that the behavior of government for their decision on public spending is driven by the state of private investment in the economy or specifically any sector. In such cases, the most relevant economic phenomenon would be of *Big Push* as per which, government interventions are needed at point to push the market to a new point of equilibrium henceforth, government in order to push private investment, would spend on sectors development through PSDP. Furthermore, government interventions in form of development spending are necessary to support private investments e.g. government in order to expand business activities in industrial zones would construct highways and declare areas as special economic zones. These results show the relationship between the variables exists in short run. It was also found that among the selected variables, employment has most significant impact on GDP growth rate, then private investment and then PSDP spending. This indicates that with growing employment, GDP growth rate would increase and so in case of rising private investment and rising PSDP spending.

TABLE 3
VAR Estimations

	LPSDP	LEMP	LGOVEXP	LIP	INFL	GDPG
LPSDP(-1)	0.617 ***	-0.006	-0.009	-0.246 *	4.163	0.229
	(0.228)	(0.021)	(0.072)	(0.172)	(3.775)	(2.519)
	[2.708]	[-0.288]	[-0.138]	[-1.425]	[1.102]	[0.091]
LEMP(-1)	1.638	0.598 ***	1.735 ***	1.868 **	24.099	7.407
	(1.407)	(0.129)	(0.445)	(1.067)	(23.314)	(15.556)
	[1.164]	[4.621]	[3.892]	[1.750]	[1.033]	[0.476]
LGOVEXP(-1)	-0.238	-0.006	0.645 ***	0.198	-7.172 *	-2.935
	(0.265)	(0.024)	(0.084)	(0.201)	(4.399)	(2.935)
	[-0.896]	[-0.268]	[7.675]	[0.986]	[-1.630]	[-0.999]
LIP(-1)	0.202	0.093 ***	-0.035	0.632 ***	-2.102	0.579
	(0.204)	(0.018)	(0.064)	(0.155)	(3.393)	(2.264)
	[0.988]	[4.945]	[-0.554]	[4.073]	[-0.619]	[0.255]
INFL(-1)	0.022 *	0.003 ***	0.011 **	-0.005	0.549 ***	-0.100
	(0.012)	(0.001)	(0.003)	(0.009)	(0.206)	(0.137)
	[1.804]	[3.383]	[2.729]	[-0.521]	[2.656]	[-0.730]
GDPG(-1)	0.031	0.003	0.012	0.038 **	0.325	0.143
	(0.025)	(0.002)	(0.007)	(0.019)	(0.416)	(0.278)
	[1.243]	[1.581]	[1.524]	[2.010]	[0.780]	[0.516]
C	-3.935	0.960	-3.743	-4.727	-45.945	-7.390
	(3.426)	(0.315)	(1.086)	(2.600)	(56.803)	(37.902)
	[-1.148]	[3.043]	[-3.446]	[-1.818]	[-0.808]	[-0.194]

Note: Standard error in (), t-stats in []; *, **, *** indicate significant at significance level 10%, 5%, 1% respectively

The impulse response function is a graphical representation of how a variable in a model would behave over time due to any random shock in another variable of the model. The figures below show the impulse response of main variables to shocks in controlled variables over 5 periods. It is assumed that periods 1 and 2 indicate short run and 3 to 5 periods indicate long run. Detailed results of other controlled variables shock response are provided in Annex B-2.

The Figure 4 shows how variables shock effect employment in Pakistan where a shock in PSDP, indicated by the blue line, would raise employment in short run but in the long run the response diminishes indicating that PSDP is creating only short run employment. But on the other hand private investment is most effective in creating employment in

long and short run which is indicated by the steep green line. Similarly the results show that a shock in inflation would although result in rise in employment in short run but will fall in the long run. Similarly, a shock in Government Expenditure results in a slight rise in employment but in the long run it falls. The Figure 5 shows the response of PSDP to shocks that occur in other five variables. The red line is the reaction of PSDP to one unit shock in employment that would result in PSDP to remain positive to that shock and spending would increase. Similarly PSDP response to shock in government expenditure is negative which was evident in the VAR estimates. It is seen that in the short run the response is weak but in long run it further falls. One important aspect is the behavior of private investment to any shock in PSDP and vice versa. From impulse response, it was found that a shock in PSDP spending would in short run raise private investment but in long run its effect would fade away and turn negative. This implies, as discussed in the previous section, that PSDP impact on private investment is weak hence there are other variables such as inflation, interest rate etc. Private investment would increase PSDP in the short and long run. This implies that private investment rise would also induce PSDP spending.

FIGURE 4

Response of EMP to Other Variables

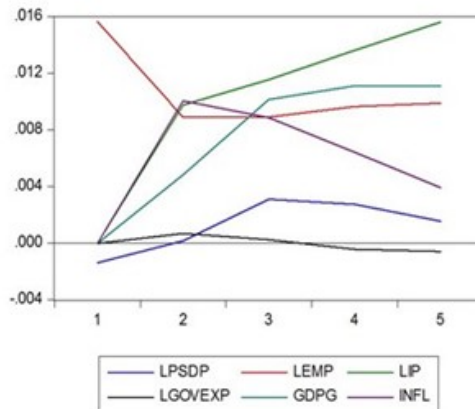
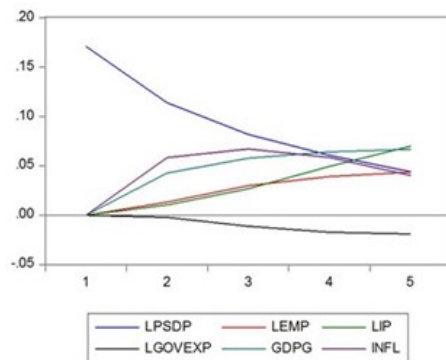


FIGURE 5

Response of PSDP to Other Variables



The results have proved the arguments presented by Ghani and Din (2006) Binte Aijaz, Maryam and Elahi (2012), and Ellahi and Kiani (2011) about the insignificant effect of public investment on economic growth and employment. The results showed that a shock in the long run the impact of shock in PSDP spending on GDP growth rate is negative and instead of growing it would fall.

PSDP Sectoral Analysis

The results from the sectoral analysis are discussed hereafter and the Table 4 at the end of the discussion is a short summary to these results:

Transport & Communication Sector

Results (Annex C) from estimations of VAR in Transport and Communication sector showed that PSDP isn't effective in creating employment in Transport and Communication sector but on the other hand, Private Investment was effective in impacting employment. Moreover the PSDP and Private Investment coefficients were significant when estimating their relationship individually which implies that private investment is not effected by PSDP spending.

It was found that a shock in PSDP doesn't positively impact employment although in long run it increases. On the other hand, private investment shock raises the employment in the sector in short run but

reduces in long run which still would remain positive. Similarly a shock in government expenditures would in short run keep employment stable but will raise it slowly. The results from forecasted vector error decomposition predicted that in long run the influence on PSDP in transport and communication sector is strongly explained by employment in the sector and private investment on the other hand, employment remains explained in majority by itself in long run. The reason to this behavior would be due to the fact that this sector is mostly private based i.e. in case of Transport sector the two major modes of transport buses and air travel are mostly under private ownership and the communication sector is in majority of private sector. The government's role in this sector is only limited to providing the infrastructure such as new road networks, improving highways, railway facilities and providing employment to labor during this expansion phase and also the role of few public sector enterprises but the impact of PSDP spending in this area is negligible in creating employment.

Water and Power (Energy) Sector

Results (Annex C-1) from estimations in case of Water & Power sector; VAR shows that employment in energy sector is highly dependent on PSDP spending in the sector while all other variables in equation show negative coefficient in relation to employment. Further results also indicate that the PSDP spending in Energy Sector is dependent on the Government Expenditures and GDP growth rate. Results add that PSDP spending also results in positive growth in private investment. This indicates that there is crowding in effect of PSDP in energy sector. This would imply that because the Energy sector is a huge sector, investing in it requires confidence of investors. With higher government development spending the investor's confidence grows hence there is a positive impact. Similarly it is noteworthy that the energy sector is one of the major sectors where governments development spending is concentrated and the reason behind this is that, this sector needs huge capital investment which at this level can only be done by government side. Further, government using the PSDP spending also employees the technical and administrative staff which is why PSDP spending showed an increase in employment.

Results (Annex C-2) from impulse response function show that over the short term period the point can be proved that PSDP is effective in creating employment but over the long period of time the shock effect on employment fades away. This implies that labor generated in this sector through PSDP spending is only for short run which would be during construction of project. Similar behavior was also found in the case of Private Investment in Energy Sector response to shock in PSDP spending in Energy Sector; private investment rises while in the long run it falls, this may be due to some factors other than the model. But the major role in energy sector is of PSDP spending.

Results (Annex C-3) from Forecasted decomposition shows that employment in energy sector in short and long run explained itself. The results confirmed that in short run and by the mid period, PSDP spending do explain a chunk of changes in employment but its effect will reverse in long run. Similarly private investment explained majority of changes in itself but in long run, PSDP spending and Employment also explain 10% and 13.3% of variations in it respectively.

Construction Sector

The next case is to estimate the responsiveness of variables in the model in construction sector. The results (Annex C-1) from VAR show that PSDP in construction sector is strongly dependent on employment in the sector and mildly dependent on GDP growth of economy. Further, the employment in the sector is weakly dependent on PSDP spending in the sector and on private investment. The major dependency of employment in the sector is upon itself. The reason to it is that the labor in this sector is something that exists, there is supply of labor even with no demand, and isn't generated by any government development spending. With increased PSDP spending in this sectors, the labor is employed which raises labor productivity and hence in long run it raises employment in sector. Similarly, results also show a weak crowding in effect in the sector that indicates that PSDP spending would also attract private investment but the dependency is strong on GDP growth rate, on private investment itself and employment in sector.

Meanwhile the impulse response function shows that employment response to shocks in PSDP and private investment were completely

opposite. The shock in PSDP spending in the construction sector raises the employment in short run but it gets stable in the long run. But opposite was the shock response of employment in construction sector to private investment in the sector. Results (Annex C-2) also showed that the shock in PSDP has a stable effect on private investment in short and long run. Due to PSDP although there was a slight positive growth in private investment but it remains stagnant indicating no rise in long run.

The results (Annex C-3) from variance decomposition showed that in long run the majority of the variation in PSDP spending in Construction Sector was explained by other endogenous variables such as employment (27.5%), GDP growth (7.21%). Similarly, in case of employment in construction sector, the majority of variation in long run was explained by PSDP (21.79%) and by private investment while employment only explained 38.98% of itself.

Education Sector

For the case of education sector of Pakistan, the main variables of PSDP and Employment showed a positive relationship with positive coefficients. (Annex C-1) It shows that PSDP spending is effective in creating employment in education sector. But the effectiveness of private investment in education couldn't be estimated due to data unavailability. The result indicates that as the PSDP spending in education rises, which indicates more schools, colleges and universities which would ultimately increase employment. As with rising labor participation, rising number of population, the focus of government in every budget is to add more educational institutions in PSDP spending, which brings in more employment during the project cycle (construction period) as well as the project operational period (educational institution operational). The time this impact would take can be shown in the impulse response function (Annex C-2). It has been found that due to shock in PSDP in short there is an increase in employment but in long run the response dies off.

Results from variance decomposition (Annex C-3) show that, in the third period, 55.65 % of the changes in PSDP spending in education sector is determined by the employment in the sector while its 1.33% for inflation, and 40% for PSDP itself. Similarly in long run, majority of the changes in PSDP spending is determined by shocks in employment in education sector. On the other hand, changes in employment in education

are explained in majority by employment itself. PSDP spending explained not more than 1% of variation in education employment in Pakistan. While inflation played its part as in short run it had 5.54% and in long run 9.76% share in explaining any variations in employment in education sector.

Health Sector

The final case of estimating the variables relationship is for health sector of Pakistan. The VAR results were quite similar to the results in education sector. The estimations show that employment and PSDP spending have a positive coefficient in relationship to each other. Similarly it shows that a unit increase in PSDP spending in the Health sector would increase its employment by 2%. Results identify that PSDP spending in Health sector greatly impacted employment in health. PSDP spending in health sector of Pakistan is usually infrastructure based which involves construction of new hospitals and universities and improvement of equipment at hospitals. This in similar method increases the demand for labor, from construction workers in short run to doctors, nurses, other paramedic staff, administration staff etc. in long run and hence PSDP spending creates employment in health sector. Meanwhile, an impulse response shock in PSDP spending in health sector would reduce employment in two periods but in long run it would rise. Similarly a shock in GDP growth rate would also raise the employment in short and long run.

The results from Variance decomposition shows that the majority of the variations in PSDP spending in health sector are explained by PSDP itself in short (97%) and in long (90.7%) run. Employment only explained maximum of 3.27% variations in PSDP spending in long run only. While in case of employment in health sector, in short run 25% of variations are explained by shocks in PSDP spending and 4.69% by GDP growth. While in long run, PSDP spending 33.7% changes in employment were explained by PSDP and 10.08% by Government expenditures.

TABLE 4

Consolidated Results for Empirical Analysis

PSDP Spending in Sectors	Response of Employment to PSDP Spending	Response of Employment to Private Investment	Response of Private Investment to PSDP Spending
Total	-ve	+ve	+ve but minimal
Transport & Communication	-ve	+ve	Nil
Water & Power	+ve	-ve	+ve
Construction	+ve	-ve	+ve
Education	Neutral	-	-
Health	+ve	-	-

Note: +ve indicate that the response would result in growth, -ve indicate the response would result in fall of the variable, neutral indicate that variable remained stable with slight positive response.

V. CONCLUSION

The motivation for the study was to understand a relationship between PSDP spending and Employment generation in Pakistan and to investigate if and how PSDP is effective in generating employment and the role of private investment in employment generation. With analysis the results has brought the discussion to the conclusion that PSDP spending in Pakistan has not been effective in generating employment in the long run, rather, the positive impact is evident in the short run. Furthermore, the role of private investment in generating employment has been more profound in both time periods while simultaneously the response of GDP growth is weak to PSDP spending as compared to private investment. These results has proved the study of Haque et al. (2020), Ghani & Din (2006), Ellahi and Kiani (2011) which ultimately questions the abilities of PSDP driven projects. One reason to it is the fact that PSDP spending has been more of infrastructure development focused hence it is evident that there is a short run creation of employment. The employment rise during the projects ongoing stage but as soon as the project is complete; the employment falls which may be due to project not being able to attract employment, or employment would be contractual or the projects are left ideal (Metro bus Project in

Islamabad Line II which extends from Peshawar Mor to Islamabad International Airport can be evident example).

In transport and communication sector, employment is mostly driven by private investment; in short run it's more responsive, than by PSDP spending. This may be due to two reasons; first the Transport and communication is mostly private and informal sector so private investment is more effective in creating employment and second; government development spending here is more focused on improving the road network which calls in private parties as contractors where employment opportunities here are mostly contract based employment. On the other hand a very different situation was found in case of Energy sector and construction sector. In both sectors, PSDP spending has been effective in generating employment which is a greater magnitude as compared to private investment.

Finally, the education and health sector employment also is driven by PSDP spending. Looking into the PSDP 2021-22 document of Planning Commission, that provides the upcoming years PSDP spending based on demand for grants, the analysis in both the sectors brought a conclusion that through the development spending, infrastructure in both the sectors is being improved. Such as new schools, colleges, institutions, hospitals, research labs etc. With newer infrastructure, more staff would be attracted, more professionals to work. As these sectors have long been ignored and with rising population, it is necessary to expand the infrastructure of education and health sector. But this would need time and it could be years till the actual impact could be felt.

Through this research, it has been found that in the short run, due to PSDP spending of government, private investment is attracted but in the long run its fades away hence there is no impact or minimal impact of PSDP on private investment. Same was case in transport and communication sector but in case of water and power sector and construction sector, results show private investment improvements. The reason maybe that there are sectors that require Big Push from government in order to generate employment such as Transport and Energy Sector where for private investment it may take time. But private investment is more focused in Pakistan on areas where government spending has been weak and hasn't shown any interest. This includes

Construction, social sectors, media, services sector, industry and agriculture. Government development spending is quite lower in these sectors creating a vacuum which private investment fills; which is why these sectors hold mostly under private ownerships.

To conclude the discussion here, government through development spending designs the project in a way that it would have a direct and an indirect impact on employment. The results indicate that for short run employment creation PSDP spending could be used but to maintain the impact in long run, it is necessary for private sector to step in. PSDP spending has a triggering effect on economy as it leads to GDP growth. But it is necessary that private sector to have confidence in the government policies for which few changes have to be made from administrative as well as policy perspective. This study has shown that PSDP effectiveness in employment generation varies across sectors so there has to be a reason why private investment has more effectiveness in employment generation. Studies has shown that there has been problems in PSDP projects such as delay in funds, politicization of projects, abandoning of projects, unnecessary projects extension days causing delays and increasing costs. But the following are suggestions to ensure that the employment generation is effective through government development spending: Government has to establish a role in ensuring Public-Private Partnerships following the Build-Operate-Transfer models and facilitating the private sector; similarly it is essential to ensure financing smoothing for the project for which project fund must be approved at the time the project initial cycle and must be transferred to the project single account jointly managed by government and the project company; It is necessary that the post completion evaluation report to be prepared should be focused on whether the project has been able to attract private investment, impact on employment and overall contribution to GDP growth; and finally Government needs to focus the attention of its development spending to other crucial sectors such as agriculture, mining, manufacturing, media, research and development, and rural development.

REFERENCES

- Ahmed, Q. M., & Ali, S. A. (2014). Public investment efficiency and sectoral economic growth in Pakistan (Vol. 22). Intl Food Policy Res Inst.
- Ahmed, S. S., & Javed, A. (2017). The Effect of Public Sector Development Expenditures and Investment on Economic Growth: Evidence from Pakistan. *Journal of Economics and Political Economy*, 4(2), 203-214.
- Anderson, E., De Renzio, P., & Levy, S. (2006). The role of public investment in poverty reduction: theories, evidence and methods (Vol. 111). London: Overseas Development Institute.
- Barro, R. J., Barro, R. J., Sala-i-Martin, X., & Xavier, I. (2004). Economic growth. MIT press.
- Bint-e-Ajaz, M., & Ellahi, N. (2012). Public-private investment and economic growth in Pakistan: an empirical analysis. *The Pakistan Development Review*, 61-77.
- Covid-19 Responsive Annual Plan 2020-21, Government of Pakistan, Planning Commission.
- Ellahi, N., & Kiani, A. (2011). Investigating public investment-growth nexus for Pakistan. In *International Conference on E-business, Management and Economics*, IPEDR (Vol. 25, pp. 239-244).
- Ghani, E., & Din, M. U. (2006). The impact of public investment on economic growth in Pakistan. *The Pakistan Development Review*, 87-98.
- Gujarati, D. (2012). *Econometrics by Example*. Macmillan
- Haque, N., Mukhtar, H., Grary, J., & Ishtiaq, N. (2020). *Doing Development Better*. PIDE, Islamabad, Pakistan
- Kamps, C. (2005). The dynamic effects of public capital: VAR evidence for 22 OECD countries. *International Tax and Public Finance*, 12(4), 533-558.
- Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of monetary economics*, 22(1), 3-42.
- Manual for Development Projects (Revised 2019), Ministry of Planning, Development and Reforms.
- Rebelo, S. (1991). Long-run policy analysis and long-run growth. *Journal of political Economy*, 99(3), 500-521.

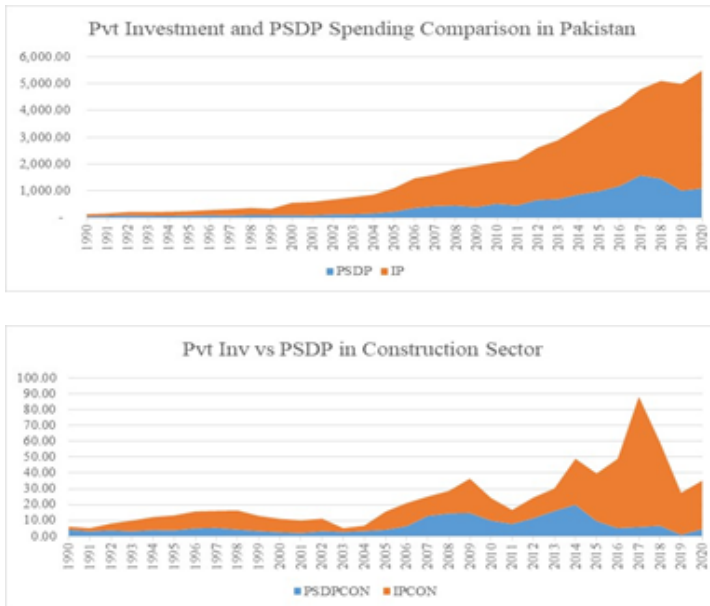
- Romer, Paul M. (1986) Increasing Returns and Long-Run Growth. *Journal of Political Economy* 94:5 (October), 1002–1037.
- Sial, M. H., Hashmi, M. H., & Anwar, S. (2010). Role of investment in the course of economic growth in Pakistan. *World Academy of Science, Engineering and Technology*, 66, 160-164.
- Stock, J. H., & Watson, M. W. (2001). Vector auto regressions. *Journal of Economic perspectives*, 15(4), 101-115.
- Yousuf Khan, M. T., & Sasaki, K. (2001). Roles of public capital in Pakistan's economy: productivity, investment and growth analysis. *Review of Urban & Regional Development Studies*, 13(2), 143-162.

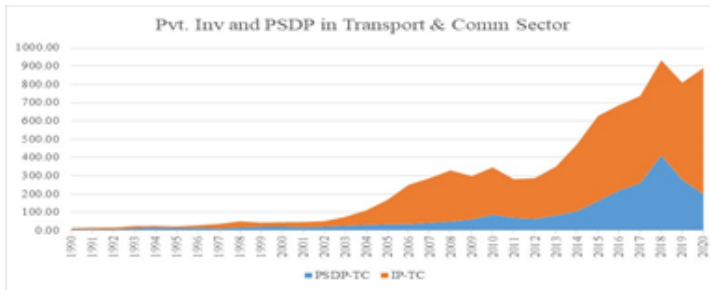
APPENDIX A

Comparison between PSDP and Private Investment in Pakistan

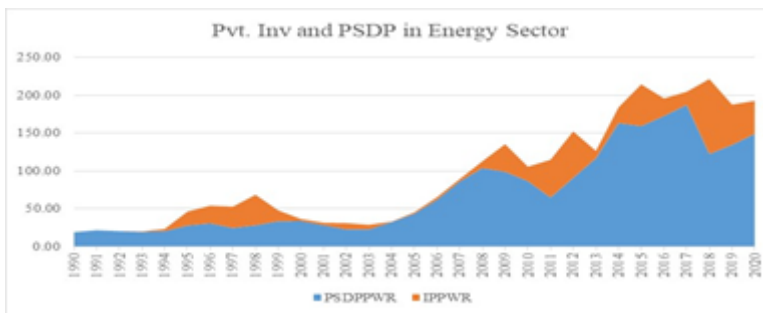
The below figures draws a trend in PSDP spending and Private Investment in Pakistan. The share of private investment is higher than PSDP spending and in total, private investment is increasing so is the case of PSDP. The figures below are self-explanatory. It is evident that in case of private investment there is an increasing trend and a much higher volume as compared to PSDP. This implies its importance especially in Pakistan for generating employment and bringing economic growth. The figure below shows the trend of both PSDP and Private investment in construction sector over last 30 years. It's evident that there is uncertain trend in both variables. Below is the trend analysis of private investment and PSDP in transport and communication sector. The figure shows that private investment is twice the size of PSDP being spent in this sector and hence it has a major role in employment generation while PSDP had minimal role.

FIGURE



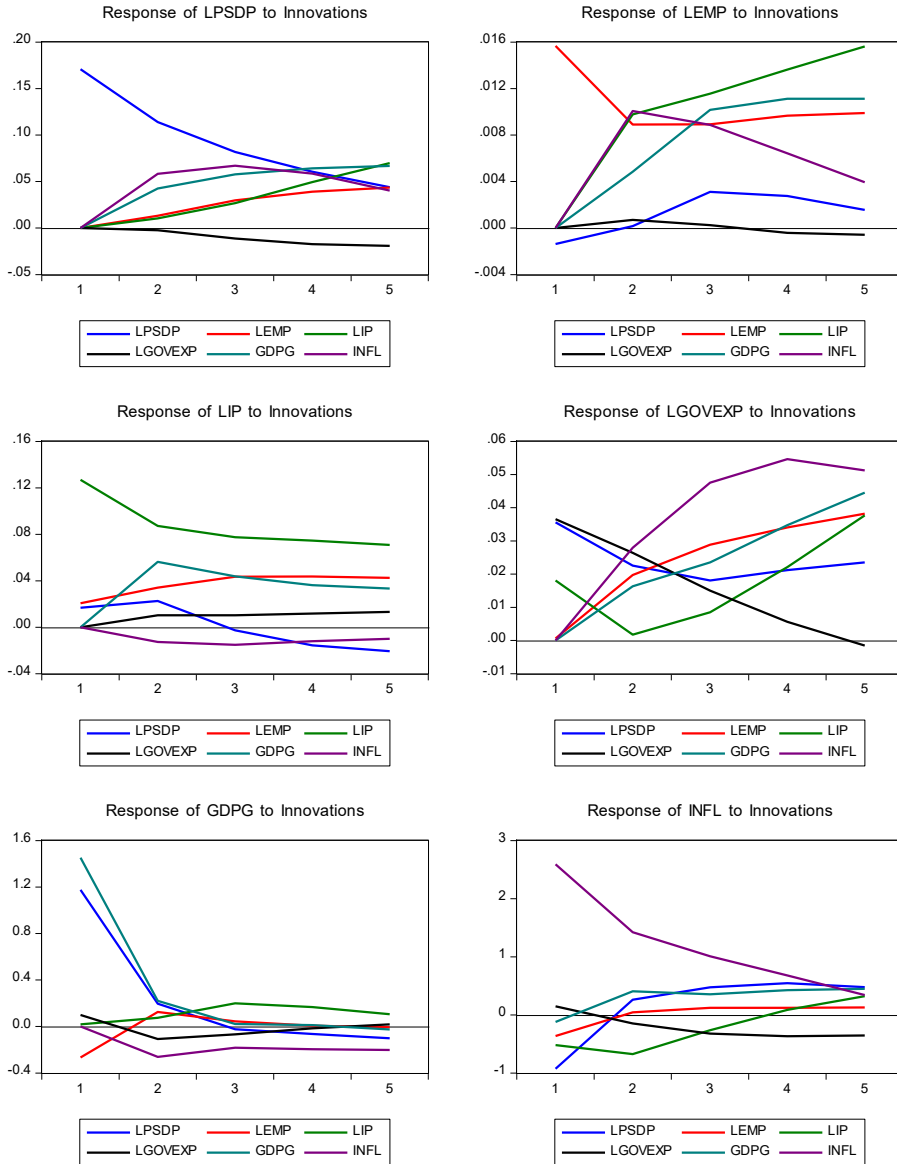


As the estimation results had shown that there is a major share of PSDP in employment and economic growth in energy sector because of its size, the figure below shows the difference between the sizes of both investments over the years.



APPENDIX B

Impulse Response Function of PSDP Spending and Employment Level



Forecasted Error Variance Decomposition of Controlled Variables

Period	S.E.	Variance Decomposition of LIP:					GDPG	INFL
		LPSDP	LEMP	LIP	LGOVEXP			
1	0.129	1.668	2.523	95.808	0.000	0.000	0.000	
2	0.171	2.688	5.364	80.305	0.362	10.725	0.552	
3	0.199	2.018	8.749	74.880	0.534	12.830	0.986	
4	0.221	2.137	10.978	72.005	0.711	13.075	1.092	
5	0.240	2.556	12.472	69.934	0.906	13.029	1.099	
6	0.256	3.021	13.584	68.301	1.099	12.925	1.067	
7	0.269	3.432	14.470	66.979	1.278	12.829	1.009	
8	0.281	3.750	15.212	65.889	1.431	12.774	0.941	
9	0.292	3.969	15.851	64.976	1.554	12.771	0.875	
10	0.302	4.101	16.411	64.201	1.646	12.818	0.820	

Period	S.E.	Variance Decomposition of LGOVEXP:					GDPG	INFL
		LPSDP	LEMP	LIP	LGOVEXP			
1	0.054	43.210	0.014	11.163	45.611	0.000	0.000	
2	0.074	31.836	6.979	5.923	36.490	4.768	14.001	
3	0.099	21.355	12.385	4.088	22.950	8.321	30.898	
4	0.127	15.786	14.726	5.503	14.171	12.532	37.278	
5	0.155	12.828	15.865	9.544	9.473	16.554	35.733	
6	0.183	10.734	16.536	15.271	6.950	19.639	30.866	
7	0.208	8.913	16.936	21.683	5.467	21.556	25.441	
8	0.232	7.338	17.131	27.872	4.483	22.366	20.807	
9	0.254	6.146	17.167	33.181	3.773	22.301	17.428	
10	0.273	5.437	17.097	37.284	3.262	21.665	15.253	

Period	S.E.	Variance Decomposition of GDPG:					GDPG	INFL
		LPSDP	LEMP	LIP	LGOVEXP			
1	1.889	38.698	1.982	0.009	0.275	59.033	0.000	
2	1.938	37.786	2.297	0.160	0.572	57.371	1.812	
3	1.959	37.010	2.300	1.186	0.679	56.183	2.639	
4	1.977	36.449	2.260	1.876	0.673	55.175	3.563	
5	1.993	36.124	2.225	2.129	0.671	54.310	4.538	
6	2.007	35.995	2.202	2.150	0.704	53.656	5.289	
7	2.018	35.953	2.198	2.129	0.771	53.234	5.712	
8	2.027	35.902	2.209	2.195	0.849	52.984	5.858	
9	2.034	35.796	2.230	2.385	0.914	52.821	5.852	
10	2.039	35.640	2.252	2.662	0.952	52.671	5.821	

Period	S.E.	Variance Decomposition of INFL:					GDPG	INFL
		LPSDP	LEMP	LIP	LGOVEXP			
1	2.831	10.745	1.660	3.345	0.274	0.186	83.786	
2	3.279	8.643	1.255	6.729	0.410	1.665	81.296	
3	3.508	9.392	1.215	6.443	1.193	2.467	79.288	
4	3.660	10.836	1.226	5.974	2.104	3.612	76.244	
5	3.766	11.842	1.274	6.366	2.870	4.818	72.826	
6	3.842	12.093	1.330	7.539	3.362	5.680	69.993	
7	3.902	11.859	1.363	8.989	3.568	6.078	68.141	
8	3.954	11.549	1.364	10.191	3.569	6.109	67.215	
9	4.003	11.437	1.340	10.865	3.489	5.977	66.890	
10	4.048	11.584	1.311	11.034	3.425	5.867	66.777	

Cholesky Ordering: LPSDP LEMP LIP LGOVEXP GDPG INFL

APPENDIX C-1

Sector Level Estimation Results

VAR Estimations

Note: Here onwards in VAR estimation tables, Standard error is in (), t-stats in []; *, **, *** indicate significant at significance level 10%, 5%, 1% respectively

Transport and Communication Sector

	LPSDPTC	LEMPTC	LIPTC	GDPG	LGOVEXP	INFL
LPSDPTC(-1)	0.225 ** (0.206) [1.091]	-0.043 (0.063) [-0.691]	-0.061 (0.262) [-0.233]	2.720 (1.818) [1.496]	0.026 (0.077) [0.341]	2.831 (2.992) [0.946]
LEMPTC(-1)	1.604 (0.940) [1.706]	0.268 (0.288) [0.932]	1.7325 (1.197) [1.446]	12.625 (8.284) [1.524]	0.113 (0.354) [0.320]	-21.152 (13.632) [-1.551]
LIPTC(-1)	-0.102 (0.161) [-0.634]	0.074 (0.049) [1.50988]	0.612 *** (0.205) [2.984]	-1.532 (1.420) [-1.079]	0.064 (0.060) [1.062]	4.196 * (3.049) [1.795]
GDPG(-1)	-0.009 (0.025) [-0.396]	0.006 (0.007) [0.810]	0.075 ** (0.032) [2.359]	0.271 (0.221) [1.224]	0.005 (0.009) [0.527]	0.297 (0.364) [0.817]
LGOVEXP(-1)	0.434 * (0.210) [2.067]	0.098 (0.064) [1.525]	0.211 (0.267) [0.788]	-3.351 (1.853) [-1.808]	0.853 *** (0.079) [10.751]	-3.702 (3.049) [-1.214]
INFL(-1)	0.004 (0.013) [0.366]	-0.004 (0.004) [-1.071]	-0.001 (0.01666) [-0.05881]	-0.027 (0.115) [-0.236]	0.008 ** (0.004) [1.813]	0.558 *** (0.189) [2.943]
C	-1.193 (0.794) [-1.502]	-0.214 (0.243) [-0.879]	-1.246 (1.012) [-1.230]	13.779 (7.003) [1.967]	0.611 (0.299) [2.037]	18.987 (11.525) [1.647]

Water and Power Sector

	LPSDPPWR	LEMPWR	LIPPWR	GDPG	LGOVEXP	INFL
LPSDPPWR(-1)	0.533 *** (0.202) [2.630]	0.313 * (0.164) [1.908]	1.053 (0.968) [1.087]	-3.249 (1.648) [-1.972]	-0.046 (0.076) [-0.608]	0.527 (2.452) [0.214]
LEMPWR(-1)	-0.181 (0.322) [-0.563]	0.016 (0.261) [0.063]	-0.122 (1.540) [-0.079]	0.886 (2.621) [0.338]	0.133 (0.121) [1.097]	8.849 ** (3.899) [2.269]
LIPPWR(-1)	-0.040 (0.041) [-0.984]	-0.010 (0.033) [-0.319]	0.339 ** (0.198) [1.709]	-0.300 (0.337) [-0.890]	-0.011 (0.015) [-0.721]	-0.916 ** (0.502) [-1.826]
GDPG(-1)	0.052 * (0.027) [1.910]	-0.000 (0.022) [-0.007]	-0.076 (0.130) [-0.585]	0.305 (0.221) [1.377]	0.017 * (0.010) [1.607]	0.613 ** (0.329) [1.860]
LGOVEXP(-1)	0.378 ** (0.153) [2.460]	-0.136 (0.124) [-1.095]	-0.534 (0.735) [-0.727]	2.070 (1.250) [1.654]	1.035 *** (0.058) [17.857]	-0.454 (1.861) [-0.244]
INFL(-1)	0.024 (0.015) [1.599]	-0.002 (0.012) [-0.122]	0.122 * (0.073) [1.672]	-0.001 (0.124) [-0.007]	0.012 ** (0.005) [2.188]	0.851 *** (0.186) [4.585]
C	-1.372 (0.695) [-1.974]	-1.365 (0.563) [-2.424]	0.469 (3.321) [0.141]	2.482 (5.651) [0.439]	0.054 (0.262) [0.208]	12.425 (8.408) [1.478]

Construction Sector

Standard errors in () & t-statistics in []

	LPSDPCON	LEMPCON	LIPCON	LGOVEXP	GDPG	INFL
LPSDPCON(-1)	0.342 *** (0.230) [1.483]	0.024 (0.034) [0.703]	0.017 (0.299) [0.057]	-0.012 (0.065) [-0.193]	-1.875 (1.321) [-1.419]	3.990 (2.208) [1.807]
LEMPCON(-1)	2.146 * (1.522) [1.409]	0.339 (0.231) [1.470]	0.210 (1.975) [0.106]	0.350 (0.435) [0.804]	14.33 (8.731) [1.641]	2.463 (14.591) [0.168]
LIPCON(-1)	-0.007 ** (0.130) [-0.050]	0.006 (0.019) [0.276]	0.599 *** (0.169) [3.527]	-0.028 (0.037) [-0.751]	-1.172 ** (0.751) [-1.560]	-1.646 (1.256) [-1.310]
LGOVEXP(-1)	-0.147 * (0.337) [-0.437]	0.158 *** (0.051) [3.092]	0.147 (0.437) [0.336]	0.927 *** (0.096) [9.614]	-2.382 (1.933) [-1.232]	-2.238 (3.231) [-0.692]
GDPG(-1)	0.085 (0.036) [2.338]	0.009 * (0.005) [1.700]	0.126 ** (0.046) [2.701]	0.009 (0.010) [0.958]	0.162 (0.207) [0.781]	0.385 (0.346) [1.113]
INFL(-1)	0.029 * (0.021) [1.365]	0.008 ** (0.003) [2.445]	0.039 (0.027) [1.429]	0.007 (0.006) [1.137]	-0.088 (0.121) [-0.729]	0.449 ** (0.203) [2.20642]
C	-0.547 (1.084) [-0.504]	-0.581 (0.164) [-3.529]	-1.189 (1.406) [-0.845]	0.263 (0.310) [0.847]	12.595 (6.219) [2.024]	12.955 (10.39) [1.246]

Education Sector

	LPSDPEDU	LEMPEDU	LGOVEXP	GDPG	INFL
LPSDPEDU(-1)	0.327 *** (0.120) [2.725]	0.020 (0.024) [0.839]	0.039 (0.024) [1.603]	0.048 (0.738) [0.065]	2.467 ** (1.081) [2.282]
LEMPEDU(-1)	3.794 *** (0.690) [5.495]	0.870 *** (0.141) [6.131]	0.155 (0.142) [1.092]	4.207 (4.239) [0.992]	-6.367 (6.208) [-1.025]
LGOVEXP(-1)	-0.465 ** (0.187) [-2.474]	0.007 (0.038) [0.170]	0.889 *** (0.038) [22.914]	-2.150 * (1.154) [-1.862]	-1.192 (1.690) [-0.705]
GDPG(-1)	0.041 (0.035) [1.170]	-0.009 (0.007) [-1.264]	0.010 (0.007) [0.129]	0.147 (0.215) [0.681]	0.209 (0.315) [0.662]
INFL(-1)	0.010 (0.017) [0.603]	-0.006 * (0.003) [-1.774]	0.005 (0.003) [1.555]	-0.111 (0.106) [-1.047]	0.546 *** (0.154) [3.534]
C	4.255 (1.424) [2.987]	0.053 (0.293) [0.175]	0.808 (0.294) [2.750]	19.839 (8.747) [2.268]	7.533 (12.80) [0.588]

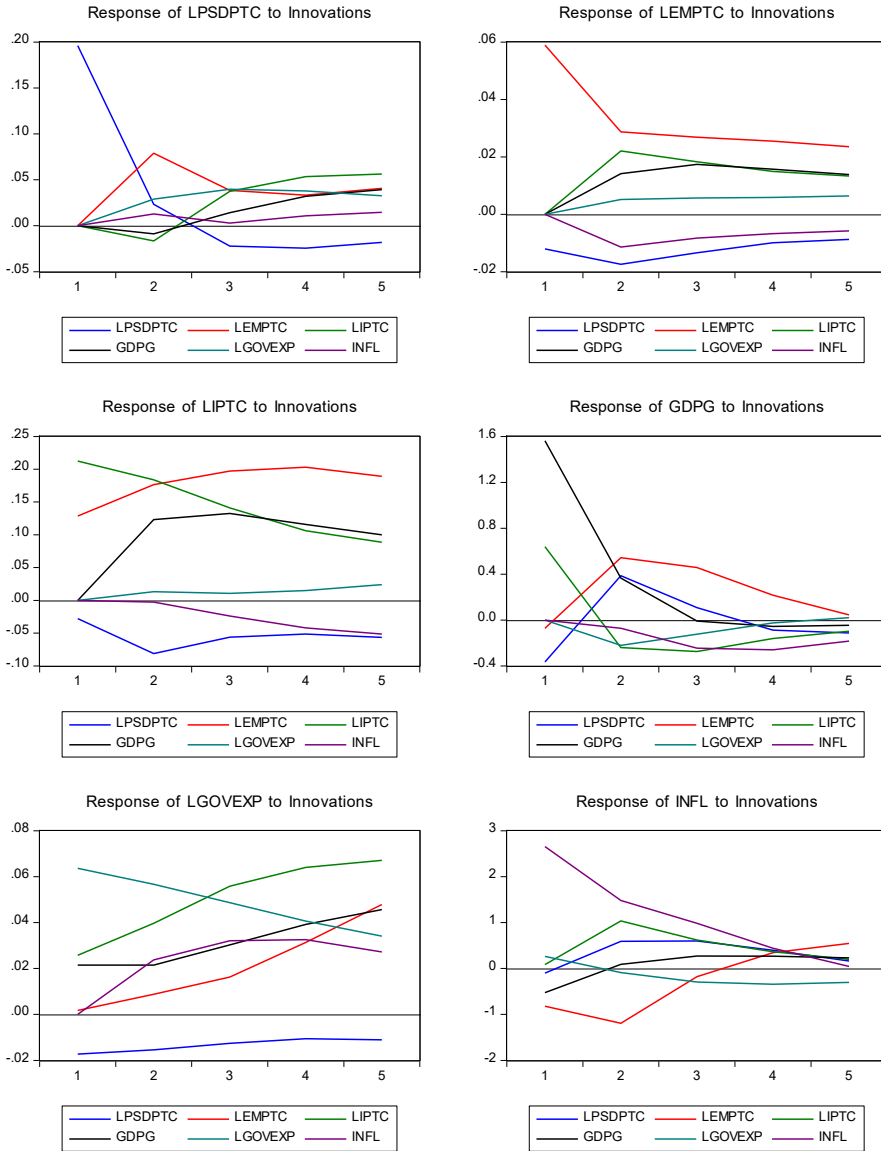
Health Sector

	LPSDPHH	LEMPHH	LGOVEXP	GDPG	INFL
LPSDPHH(-1)	0.501 *** (0.226) [2.212]	0.003 (0.012) [0.219]	0.019 (0.031) [0.613]	0.139 (0.850) [0.164]	-0.546 (1.363) [-0.401]
LEMPHH(-1)	1.609 (2.086) [0.771]	0.838*** (0.109) [7.729]	0.432 (0.291) [1.483]	8.371 (7.842) [1.067]	-5.789 (12.566) [-0.461]
LGOVEXP(-1)	-0.130 (0.728) [-0.178]	0.060 (0.037) [1.588]	0.802*** (0.101) [7.882]	-4.097 (2.738) [-1.496]	2.828 (4.388) [0.645]
GDPG(-1)	0.045 (0.055) [0.817]	0.003 (0.003) [0.945]	0.007 (0.007) [0.924]	0.210 (0.207) [1.013]	0.433 (0.333) [1.301]
INFL(-1)	0.001 (0.033) [0.028]	-0.002 (0.001) [-0.975]	0.009 ** (0.004) [2.097]	-0.053 (0.128) [-0.415]	0.641 *** (0.204) [3.135]
C	4.247 (8.499) [0.499]	-0.640 (0.442) [-1.448]	2.098 (1.188) [1.766]	46.451 (31.951) [1.453]	-27.547 (51.197) [-0.539]

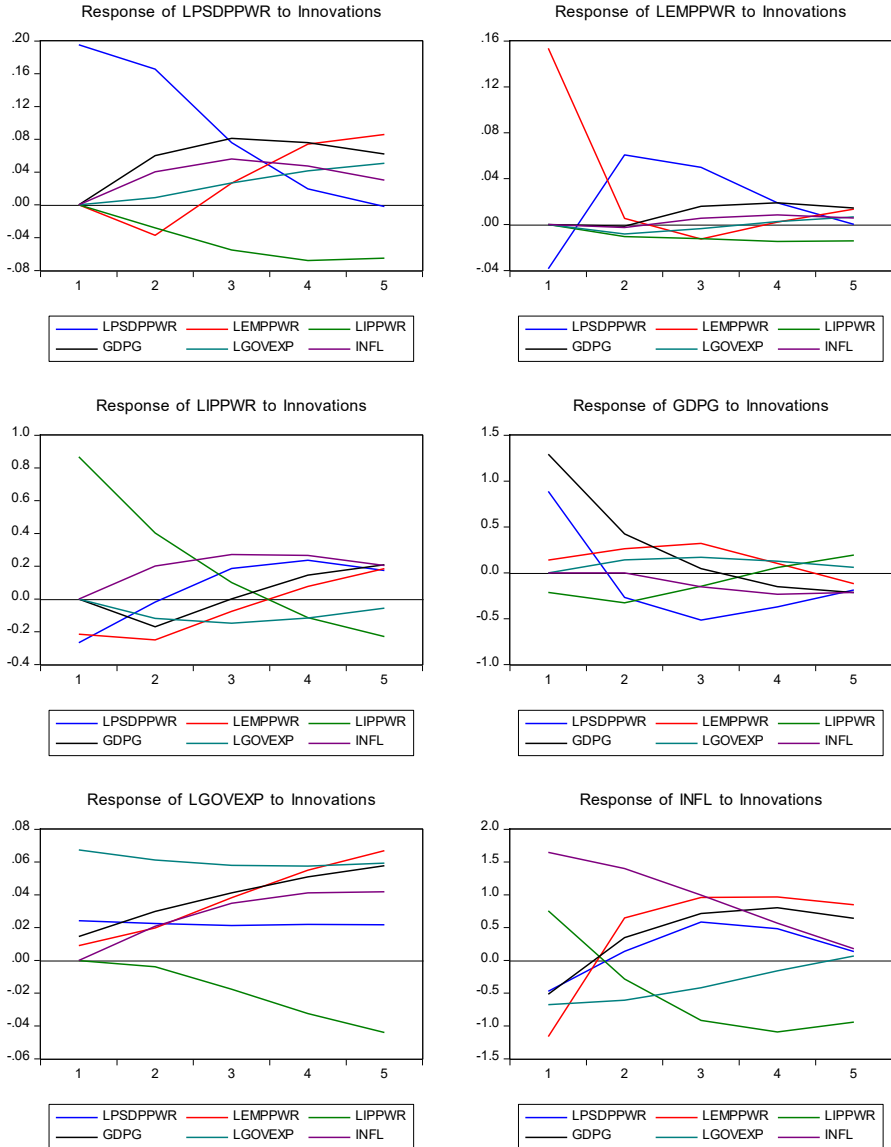
APPENDIX C-2

Impulse Response Function

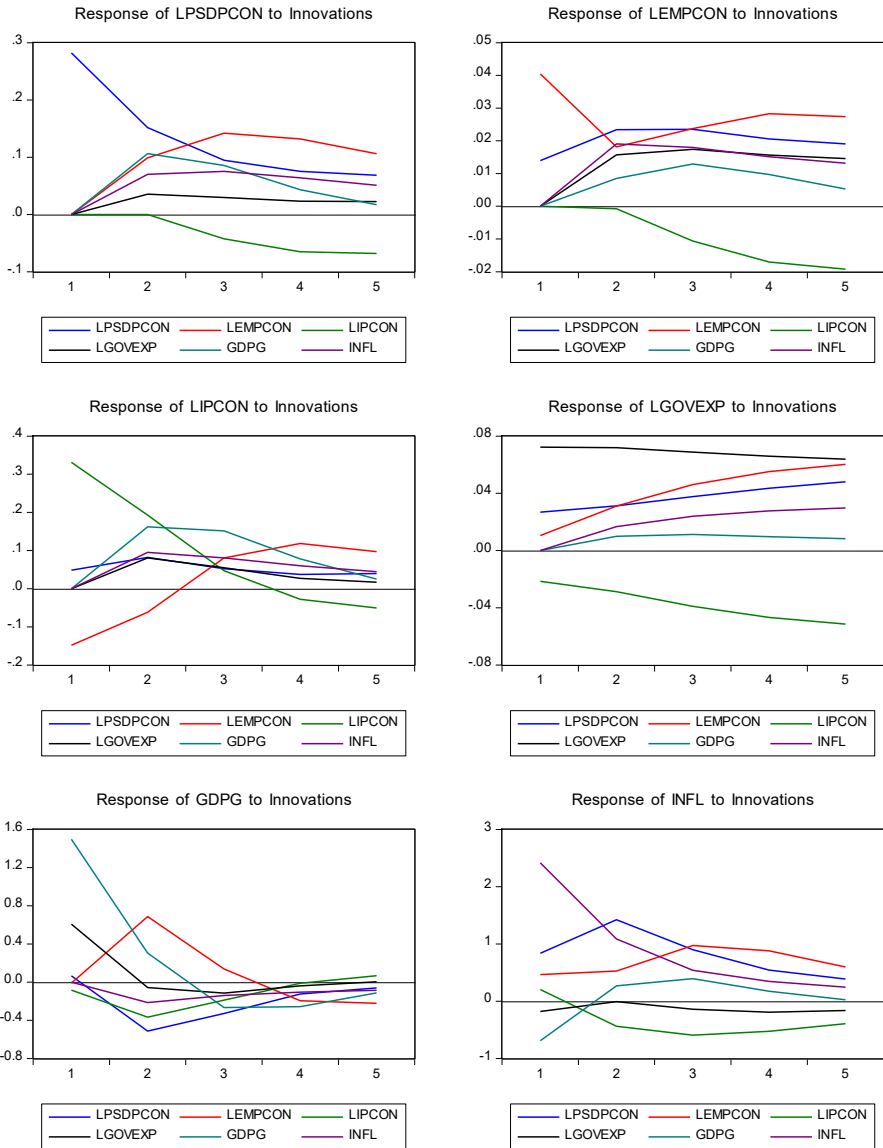
Transport and Communication



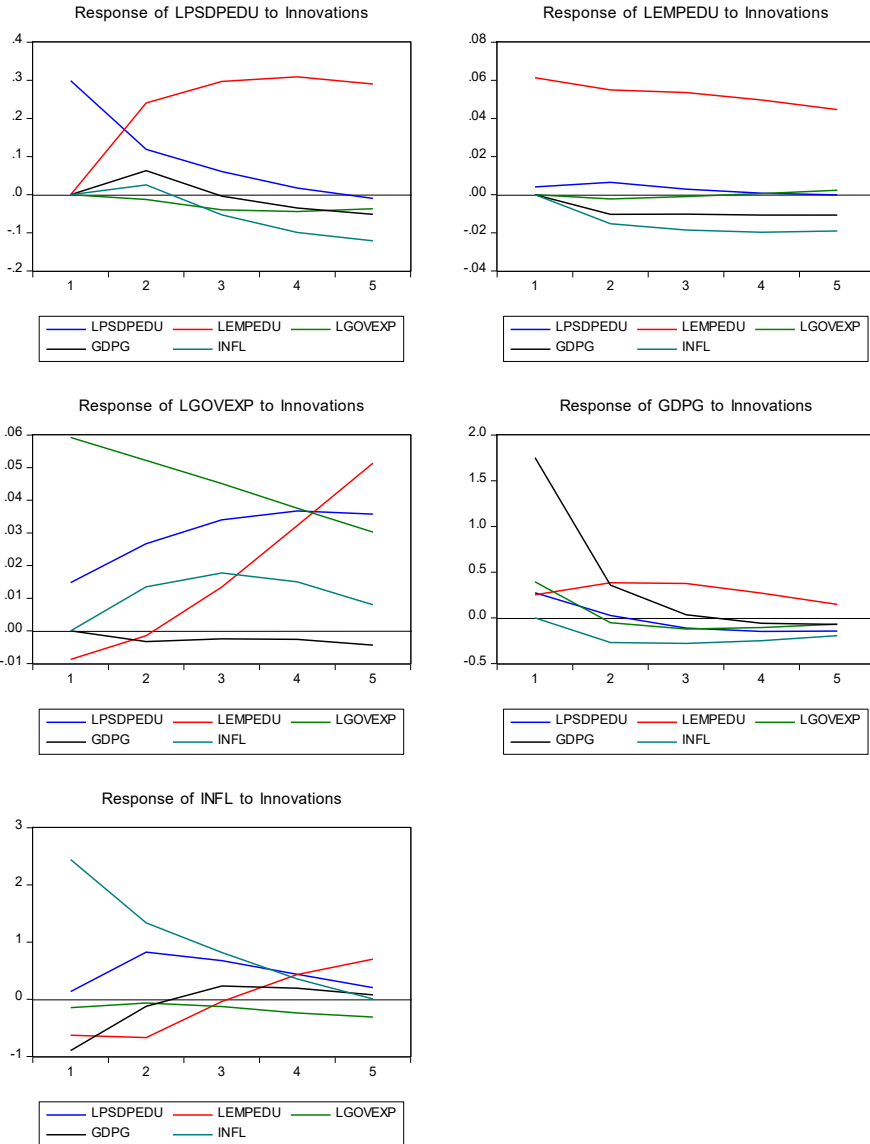
Water and Power Sector



Construction Sector

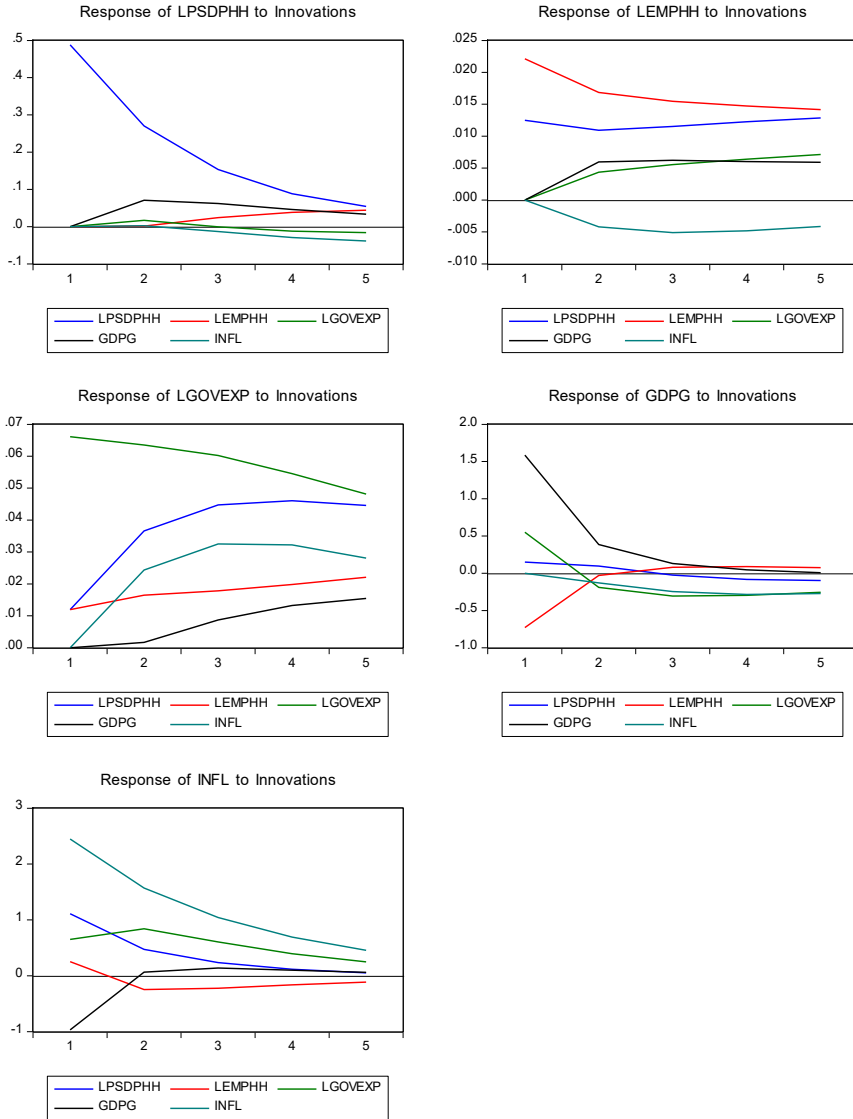


Education Sector



Health Sector

Response to Cholesky One S.D. (d.f. adjusted) Innovations



APPENDIX D

Short and Long Run Decomposition

The Table (A) and (B) provides the results of variance decomposition for two main variables. Using the forecasted error decomposition, the VAR results are explained in detail if whether the variables impact differ in short and long run. From Table (A) it is found that for PSDP major influence comes from private investment by the end of 10th year as it explained 30% of the impact on PSDP while GDP growth is 16.3%. Employment level explain around 8.3% of the variation in PSDP by the end of 10th period. In short run (here up to 3 years) 1.65% and 1.28% variance of employment and private investment explain the variation in PSDP where GDP growth rate was at 8% and inflation at 12%. Meanwhile in the long run, 8.3%, 16.34% and 29.3% variation in PSDP is explained by employment, GDP growth rate and private investment shocks respectively. It is found that most significant shocks on PSDP are GDP growth and Private investment.

TABLE A

Short and Long Run Decomposition of PSDP

Period	S.E.	LPSDP	LEMP	LIP	LGOVEXP	GDPG	INFL
1	0.170	100.000	0.000	0.000	0.000	0.000	0.000
2	0.218	88.463	0.363	0.223	0.011	3.811	7.127
3	0.253	76.441	1.659	1.289	0.203	8.059	12.348
4	0.282	66.173	3.254	4.112	0.540	11.671	14.248
5	0.307	57.606	4.743	8.609	0.839	14.519	13.682
6	0.331	50.502	5.981	13.985	0.993	16.396	12.141
7	0.352	44.757	6.923	19.294	0.998	17.282	10.743
8	0.371	40.357	7.584	23.801	0.922	17.371	9.9626
9	0.387	37.237	8.021	27.149	0.847	16.964	9.7800
10	0.401	35.227	8.304	29.340	0.835	16.347	9.9450

The Table (B) shows the variance decomposition of employment with all endogenous variables. The results indicate that employment has strong influence on itself but over time it will grow weak as was with the PSDP variance decomposition. The table shows that in short run, PSDP explained 1.23% of shocks while private investment was at 24.05% and in long run, the majority of variation in employment is explained by private investment (48.85%) and GDP growth rate (18.14%) while employment only explained 24.27% of itself. It shows that in long run

major contribution to employment is by private investment and GDP growth rate while PSDP in long run was at 1.95% change.

TABLE B
Short and Long Run Decomposition of Employment

Period	S.E.	LPSDP	LEMP	LIP	LGOVEXP	GDPG	INFL
1	0.015	0.764	99.235	0.000	0.000	0.000	0.000
2	0.023	0.350	59.348	17.431	0.089	4.276	18.503
3	0.030	1.215	42.481	24.050	0.057	13.296	18.897
4	0.037	1.365	35.453	29.544	0.051	17.821	15.763
5	0.043	1.144	31.552	34.900	0.056	19.801	12.544
6	0.048	0.905	29.008	39.587	0.048	20.448	10.002
7	0.053	0.832	27.219	43.307	0.042	20.299	8.298
8	0.058	1.003	25.912	46.006	0.065	19.707	7.305
9	0.061	1.400	24.951	47.788	0.138	18.930	6.789
10	0.064	1.951	24.265	48.851	0.266	18.140	6.523

In the similar pattern as above, using VAR, relationship between the variables were also estimated in the five selected sectors. Through results it has been found that PSDP is not effective as compared to private investment in generating employment. It can be possible in short run but the magnitude of impact is washed off by the magnitude of impact by private investment in generation of employment. Further we will analyze how the variables will respond in sectoral analysis.

Testing Data

Before estimating the model, the data has to be tested in order to get correct and desired results. Below are multiple tests and their interpretations:

Stationarity Testing

Time series data usually have fluctuations and trends so for this purpose it is necessary to employ a stationarity test which is also a basic condition for VAR model. For the study, Augmented Dickey Fuller (ADF). The results are shown in the table below:

TABLE

Variables	Test for Unit Root	Included in Test Equation	P- Statistics		Result
			ADF Test Statistics	Critical Value	
EMP	Level	Intercept	0.67	-2.98	H ₁
		Trend and Intercept	-2.60	-3.60	

	1st Difference	Intercept	-4.64	-2.99	
PSDP	Level	Intercept	-0.38	-2.96	H ₁
		Trend and Intercept	-2.37	-3.57	
	1st Difference	Intercept	-4.26	-2.97	H ₀
		Trend and Intercept	-3.43	-3.62	H ₁
IP	Level	Intercept	3.52	-2.98	H ₁
		Trend and Intercept	2.92	-3.6	
	1st Difference	Intercept	1.18	-2.99	
INFL	Level	Intercept	-4.3	-2.99**	H ₀
		Trend and Intercept	-4.37	-4.39*	H ₁
	1st Difference	Intercept	-3.33	-3.75*	
		Trend and Intercept	-3.04	-3.63	
GDPG	Level	Intercept	-3.22	-3.67*	H ₁
		Trend and Intercept	-3.19	-3.57	
	1st Difference	Intercept	-6.35	-3.57	H ₀
		Trend and Intercept	-6.35	-3.57	
GovExp	Level	Intercept	4.63	-2.99	H ₁
		Trend and Intercept	3.87	-3.62	
	1st Difference	Intercept	1.78	-3.004	

Note: * indicate the critical value at 1% significance level & ** indicate critical value at 1%, 5%, 10%.

From the table, the results show that at 5% significance level, in cases of Employment, Private Investment, PSDP and Government Expenditure we reject the H₀ and accept H₁ so the data is stationary at level. But only in the case of Inflation data is stationary only with 1% significance level and at 1st difference. Similarly in case of GDP growth, it was stationary at level but non-stationary at 1st difference hence overall data is stationary other than inflation rate. Before correcting the data, it was found that as per Enders (2015, p. 291); Sims (1980) and Sims, Stock and Watson (1990) were not in favor of differencing variables even when unit root is detected. They argued that it would “throw away” the

information that is concerned to data and could disturb the inter-relationships among variables. Therefore, this study will be using the data in its original form without differencing assuming that all are stationary.

Optimal Lag Selection:

The Table below describe the lag selection statistics. The lag is determined here on the basis of minimum values of Akaike Information Criteria (AIC), Hannan-Quinn Information Criteria (HQ) and Schwarz Information Criteria (SC). As per the results, the study will be using one lag for the model.

TABLE
Lag Selection for Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-77.592	NA	3.23e-05	6.687	6.979	6.768
1	61.052	199.647*	9.62e-09*	-1.524*	0.523*	-0.956*