IS PSDP EFFECTIVE IN CREATING EMPLOYMENT IN PAKISTAN?

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CERTIFICATE

This is to certify that this thesis entitled: **"Is PSDP effective in creating employment in Pakistan?"** submitted by **Taimoor Ali Butt** is accepted in its present form by the PIDE School of Social Sciences, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Development Studies.

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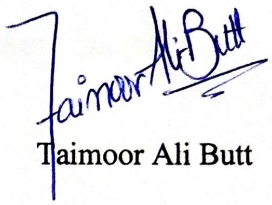

Taimoor Ali Butt

Dedication

I would like to dedicate this research to Papa and Mama for their Support & Love and to my Motherland.

ACKNOWLEDGEMENTS

All Praises for Almighty Allah, the Magnificent, The All-Knowing, The All-Aware, The Guide and Praise and Respect for the Nobel ﷺ. My sincere Gratitude to the Almighty who enabled me to be able to complete this work.

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I wouldn't just close here, because I would like to take this final space to thank my institute as well, PIDE, has been a platform for me from where I had earned high esteem, learnt patience, gained experience and exposure. It's been five years since I came to this institute for my MSc back in 2016, not a day goes by, when I would not thank for Almighty to have been here. Looking forward to work here Insha'Allah.

Blessing and Love for All, Prayers for whoever reads this..!

ABSTRACT

The effectiveness of Public Sector Development Program spending is a debate that has yet been limited to discussions especially when it concerns whether the objective of employment generation is being achieved or not. The present study will explore the relationship between PSDP spending and employment level in Pakistan. We examine the PSDP impact on sectoral employment generation. PSDP spending in Pakistan can generate employment opportunities directly (through public sector investment) and indirectly (through spillover effect) through the private sector investment. We use PSDP data from 1990-2020, and employ a Vector Autoregression (VAR) methodology for the analysis purpose. The results suggest that the effectiveness varies across sectors and PSDP spending is effective only in short run while private investment is more effective in contrast to it. In the long run the effectiveness in Water & Power Sector, Construction and Health Sector. Similarly crowding in effect was also detected in Water & Power and Construction Sector. Overall minimal or no impact was detected by PSDP spending on private investment.

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

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LIST OF ABBREVIATIONS

μ	Mu
β	Beta
∅	Small Phi
δ	Delta
Γ	Gamma Uppercase
Φ	Capital Alpha Phi
ε	Epsilon
e	Epsilon Small
ADP	Asian Development Bank
AIC	Akaike Information Criteria
CDWP	Central Development Working Party Meeting
DDWP	Developmental Development Working Part
FDI	Foreign Direct Investment
FY	Fiscal Year
GDP	Gross Domestic Product
GUE	Graduate Unemployment
HEC	Higher Education Commission
HQ	Hannan Quinn Information Criteria
NEC	National Economic Council
OECD	Organization for Economic Co-operation and Development
PBS	Pakistan Bureau of Statistics
PSDP	Public Sector Development Programme
SME	Small and Medium Enterprises
SAARC	South Asian Association for Regional Cooperation
SC	Schwarz Information Criteria
USA	United States of America

CHAPTER 1

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 in the long run to bring about a spillover effect over other economic indicators. As explained by the Keynesians School, an increased government spending would raise the aggregate demand which is an indication of higher consumption, which raises production and hence pulling economy out of recession. The economic cycle through government spending directly and indirectly impacts the labor market. This relationship between development spending and employment is why government hopes and promises employment generations which is targeted with increased spending especially utilizing their development budget. Government development spending is designed to provide infrastructure to the general public in every sector; Agriculture, Industry, Energy, Transport & Communication, Education, Health, Tourism, and many others. This intervention by the government creates a short as well as long term employment which triggers economic activity and hence in long run a stagnant economic growth.

As Pakistan have been experiencing an unstable economic situation since its inception, this uncertainty in market leads to unstable macroeconomics. With rising labor force of a society of majority youth, the demand and supply gap is creating a persistent unemployment which the government desires to bridge trough development spending on projects. Unemployment has become a major bell ringer globally especially during the last two years of Covid-19 and is now an international concern. In the modern era of massive development, even the developed world has quite higher unemployment rate[1]; France 8.6%, USA 8.3%, Greece 16.9%, Brazil 13.7%, and many more. Pakistan stands at 5.8% which is quite low when it is

[1] Source: World Bank website (https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS)

compared with the neighboring states but higher than China and Bangladesh. Similarly, turning back the pages of history and looking at the statistical trends, one may find that there has been a consistent trend in the unemployment rate in Pakistan. The unemployment rate has been persistent in between 5-6%. Even with massive urbanization, fluctuating yet positive economic growth, billion dollars FDI, trillions of rupee worth Development expenditure and public investment, the matter seems to be unresolved. What is yet to be seen is when will the development policies that were promised to lead to a growth in employment will be achieved.

It is noteworthy that the government have been injecting billions of rupees in name of development expenditure through Public sector development programme (PSDP) not only at federal but also provincial level. As per the Budget document for year 2021-22 drafted by Planning Commission, government has allocated a total Rs 2,135 billion for PSDP (consolidated provincial and federal) which is planned to be allocated for the upcoming year but the question here would be that whether or not the whole amount will be spent as development expenditure or not. As per Ministry of Finance Website, Fiscal operations, PSDP actual spending for 2020-21 was at Rs 1,211 billion while the allocations were planned at Rs 1,344 billion. The similar pattern can be drawn from historic trends. So it is clear that PSDP allocations and PSDP spending are a totally different concepts hence the results both are expected to generate or achieve objective would also be different.

The true purpose for any development project is to create a short, long term and spillover effect in the economy. There are projects such as upgrading transportation network by adding new highways, railways, building dams to expand the energy sector etc. that are categorized as development expenditures. Then there are public investments in form of investing in educational and health sector through building new and improved schools, colleges and universities, or hospitals clinics, trainings and introducing newer equipment. There are a number of ways that the government spend or invest in the form of development or in in the

form of public investment. In case of Pakistan, the concept of development expenditure is reflected through the PSDP. In Pakistan, the Ministry of Planning and Development reforms deals with the development planning that includes the allocation of budget for development expenditure, completing the cycle of project management from planning to implementation, monitoring and evaluation.

1.1 Statement of Problem:

Data about population of Pakistan shows that with increasing population, the number of employed labor is not increasing at the same rate. Every government has planned their economic goals and policies to create more employment opportunities. The five year plans or Mid Term Development Framework are designed to include projects that focuses on creating more employment. The previous government was able to fulfil the promise of the 11th five year plan when the unemployment rate showed some reduction. With CPEC and persistent FDI and in addition to development projects, the short term impact of employment generation was evident. But the unemployment rates even with these measures shows a weaker response. The Annual Plan 2020-21 predicted a rise in unemployment rate i.e. by end of FY21 that would be at 9.56% which is associated to the impact of covid-19. The government although has shifted its PSDP allocation to the social sectors in wake of Covid-19 to mitigate against any further challenges. Yet majority of development expenditures is accumulated for sectors that focuses the attention of PSDP to infrastructure. A Pakistan Bureau of Statistics study (PBS, 2021) have identified an addition of 3.8 million people in unemployment state in 2021 due to pandemic.

Every year, government allocates billions worth of funds at national and provincial level under PSDP (Public Sector Development Program) but the nature of these public expenditures in Pakistan still is derived from the “HAQ-HAG model” of “Brick and Mortar” (Haque et al. 2020), which as mentioned, has concentrated government spending to expansion of sector’s

infrastructure. The trend analysis of PSDP shows that sectoral share in PSDP is highest for Transport and Communication sector, Water and Power sector, and Special Areas Development., yet the unemployment rate shows persistency. Even with high government development spending, there is no significant improvement in employment. And with time there are newer concerns such as the issue of graduate unemployment in Pakistan where a study (Chaudhry & Khan, 2020) showed that the graduate unemployment (GUE) rate of Pakistan is 16.5% and it is expected to rise further with higher rate of graduating students and lesser employment opportunities. Connecting the dots, these factors shows that the government development policy have been unproductive. Studies have identified the hypothesis that the development projects in Pakistan fail to be completed on time and therefore the objective of the projects can't be achieved.

It is now clear that Pakistan's population annual growth rate has been increasing at 2%[2] rate and the same way, government has been persistent with their promises of development focused budgets where trillions again and again are being planned to be injected as development spending. The effectiveness of these plans and high end development spending is a question when one doesn't see much improvement in overall economic performances especially in employment. When economic challenges persist in a society, they are not a healthy sign for economic stability as their ripple effect can not only disturb economic variables but also social and political environment in the country. Unemployment is one of the major macroeconomic challenge that could cause a spillover effect on other economic variables such as disturbing standards of living, raising poverty, reducing economic growth and erupt many social issues (McClelland & Macdonald, 1998.). It is true that no country can achieve a full employment level but the bigger concern here is how to break this persistent trend of unemployment and improving the numbers of employment levels with the rising population.

[2] As per Pakistan Economic Survey 2019-20

This study is planned to address the problem of effectiveness of PSDP spending in generating employment in Pakistan.

1.2 Research Questions

The following research questions will be addressed and answered in the study:

I. What is the impact of national PSDP spending on the total employment in Pakistan and what is the spillover effect of increasing PSDP allocations on other economic variables?

II. How has employment risen across the five sectors through PSDP (or development spending) of the government?

III. How much has Private sector investment impacted employment and has PSDP effected private investment in Pakistan in these sectors?

1.3 Objectives of the Research

The study's objectives are to:

I. Investigate the effectiveness of PSDP on total and sectoral employment focusing on sectors where PSDP spending is most concentrated.

II. Analyze how PSDP has also impacted the Private Sector investment and the state of private investment in these sectors in Pakistan.

III. Compare the role of private investment and PSDP in employment generation in Pakistan in general and sectors in particular.

1.4 Significance of Research

After reviewing various studies it was found that a limited literature is available which studies the impact of PSDP on various macroeconomic indicators. Only few studies such as Haque *et al* (2020) discusses the loop holes in PSDP as it focuses on the "HAQ-HAG model" and addressing as how PSDP is concentrated to few sectors and what is the state of public investment in Pakistan; or Ahmed & Ali (2014) in which they found the impact analysis of public investment on sectors and their employment rate and 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, economic and social development, standards of living across country and also focuses on multiple sectors which is a research gap here. The issue of efficiency and productivity of development expenditures especially PSDP, even being an extremely important concern, is being ignored. Unemployment is becoming a major concern especially when majority population belongs to adult age group (graduate unemployment) who can't find any employment opportunity. One cannot ignore the challenges of brain drain, capital flight and lack of skilled labor that have resulted due to unemployment. With this failure, questions are raised on the performance of Planning Commission, the government's development policies and agendas of the government, and the development projects as whether they are an asset or a liability for the government. This study will provide an insight with a strong empirical justification for how productive the development expenditures or PSDP has been in Pakistan for generating employment at national level and in various sectors. Study can provide an insight into future decision making helping bringing more out of the development policy in long and short run.

1.5 Organization of Research

The study is organized as following; Chapter 2 discusses the insights into PSDP and Labor Sector of Pakistan, its past trends and analysis. Chapter 3 will provide the existing literature; theoretical and empirical. Chapter 4 will explain the data and methodology, and the results will be discussed in Chapter 5. Finally the Chapter 6 will present the conclusion and policy recommendations.

CHAPTER 2

PSDP AND EMPLOYMENT SECTOR OVERVIEW

2.1. An Insight into PSDP

The Ministry of Planning, Development & Special Initiatives as per the Rules of Business 1973, inter-alia, was assigned to formulate the annual Public Sector Development Program (PSDP) in consultation with all the stakeholders from all provinces. PSDP is prepared keeping in view the fiscal space vis-a-vis sectoral and regional priorities as well as development objectives set in the Annual Plans, Mid-Term Development Frameworks and the Five-Year Plans. The development programs and projects after thorough need assessment are conceived, prepared and approved by the competent fora for financing through PSDP mainly to achieve development targets set by the Government. Projects that are approved under the PSDP has been defined in section 13 of the Public Finance Management Act 2019 as:

> *"The Public Finance Management Act 2019 defines PSDP projects:*
> ***(a)*** *Core projects in national infrastructure requiring complex planning, design and implementation procedures. The Planning Commission shall designate projects as such in accordance with the criteria notified in official Gazette; and*
> ***(b)*** *Sectoral projects, projects undertaken by specific sectors, Ministries and Divisions which are required to enhance the development of that sector or Ministry or Division and do not fall under the above category of core projects."*

The public investment or PSDP supplements the efforts of the private sector by providing conducive regulatory and business environment to undertake commercial, industrial and development activities aligned to achieve overall long-term sectoral objectives. While safeguarding the overall objectives laid down in the 18th amendment for maintaining provincial autonomies, projects are cleared through a joint meeting between provinces at National Economic Council (NEC) meeting. Each province is provided funds as per the demands for

development projects. It is to be noted that all projects approved for implementation are included in the Annual Development Plan / Public Sector Development Programme (PSDP) subject to resource availability. The projects prepared in each sector and presented by ministry, division or a provincial government for financing are adjudged individually and collectively. As per the rules of practice, the selection and acceptance of the project depends, among other factors, on the general constraints over the country's capacity and position of the exchequer, which may permit only such projects that give quick returns, alleviate poverty, eradicate social evils, promote exports, curtail imports and provide a springboard for the faster development of science and technology.

Only the core projects with tangible deliverables that may be undertaken on priority with adequate funding for early completion during the next year. As per Public Finance Management Act, 2019, no new project which has not been technically approved would be made part of the development budget. As per Manual for Development Projects (2019), projects that fall under the PSDP are finally approved by the highest national level authority i.e. National Economic Council (NEC) which, under the light of 18th Amendment of Constitution of Pakistan, constitutes of all the national stakeholders that include the Chief Minsters of Provinces and Members from Provinces' Planning Boards. Each provinces have their own levels of projects approval but here at federal level the following are the different levels of authorities based on the three tears at federal level which varies across provinces:

Table 2.1: Project Approving forums at Federal Level

Authority	Project Limit
Executive Committee of NEC (ECNEC)	Above Rs 10 billion
Central Development Working Party (CDWP)	Up to Rs. 10 billion
Departmental Development Working Party (DDWP)	Up to Rs. 2 billion provided foreign aid is less than 25% of the total cost of the project

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). The allocations are made to all ministries and divisions based on the demands for grants. Furthermore, every province separately allocates their own Annual Development Programme (ADP) which is similar to PSDP at national level which is formulated by province's Planning and Development Boards. Moving on, it is necessary to understand in which sector PSDP is being allocated to. Through data analysis a basic comparison can be drawn of the difference in PSDP allocations in last 30 years. The figure 2.1 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).

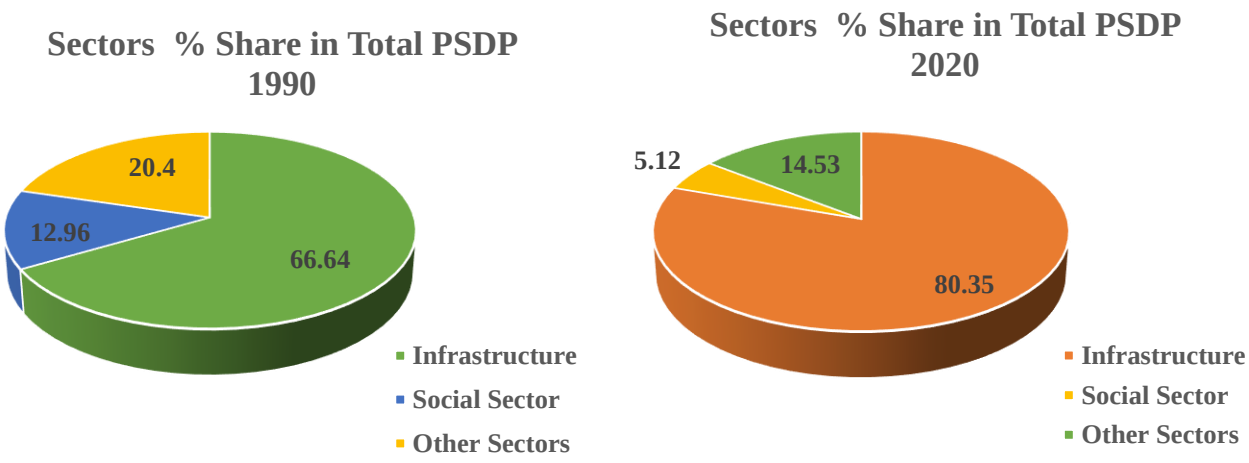

***Figure 2.1*:** Comparison of % share of Sectors in Total PSDP in 1990 and 2020

The figures depict another side towards the development spending in Pakistan. It is clear that after 30 years the focus of attention has remained towards infrastructure expansion while neglecting the other important sectors of the economy especially the social sectors in which even after thirty years, the spending behavior hasn't improved. This much attention and focus of government development spending towards infrastructure sectors, is a cost that has an expense of ignoring sectors such as Agriculture, Industry, Tourism, Sports, Culture, Youth Development, Manpower and Employment, Research & Development, Science and Technology, Social Welfare, Mass Media etc.

Similarly the data gathered from Annual Plans of FY21, FY2005 and FY1995 selected as base years here the table below shows that the following were the major sector where PSDP has been mostly concentrated:

Table 2.2: National PSDP allocation in key sectors

Sector *(Rs in billion)*	**FY1995**	**FY2005**	**FY2020**
Total PSDP	96.50	272.00	1,163.82
Transport & Communication sector	16.87	41.39	195.84
Water and Power sector	34.03	84.20	319.35
Construction/Housing sector	9.76	11.04	149.95
Education sector	6.42	17.87	110.36
Health sector	4.13	9.93	110.35

From the table above, 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 trends 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.

Upon research it has been found that there has remained a difference in actual spending and in allocations. The similar arguments had been raised by Haque *et al* (2020) and Ahmed & Mohamad (2014) that could have led to delays in project that could be resulting in rising throw-forward in PSDP. The graphs in figure 2.2 shows that in three different periods the trend continues where the total allocations made to sectors aren't actually spent. The bigger concern would be that in the social sectors as it is common over the years that spending is quite low. In 2020 only 18.1% of PSDP allocations were actually used in Health sector which is worse as compared to 1995 and 2005 figures and same is case in education sector.

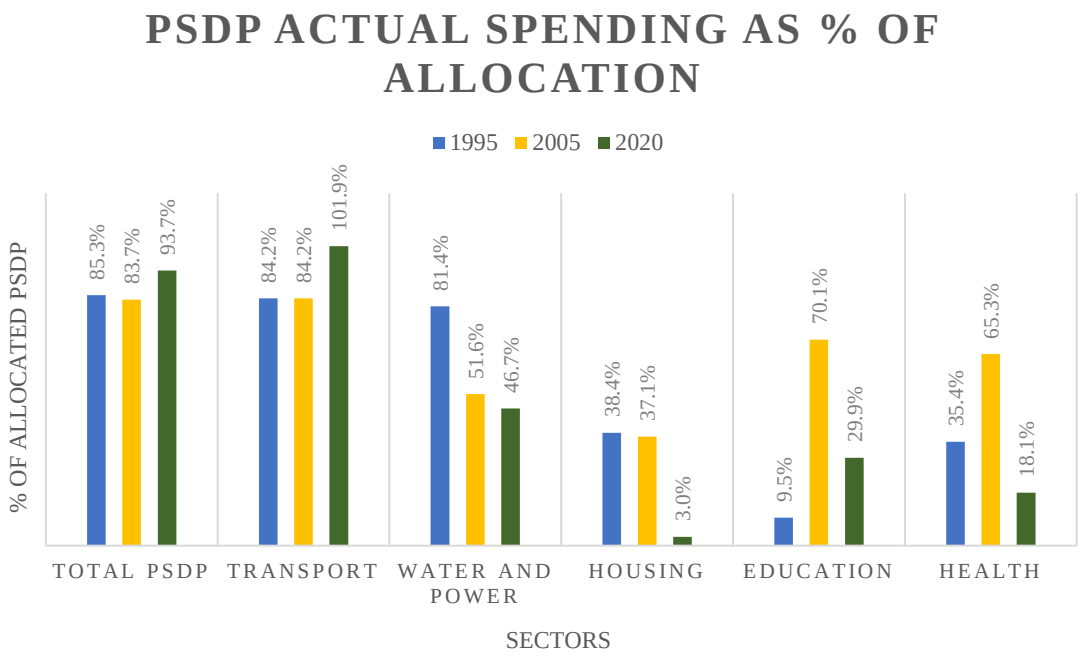

Figure 2.2: PSDP Actual spent as % of Total Allocations in various sectors

2.2. An Insight into the Labor Market of Pakistan

Pakistan is ranked as the country that has the 9th largest labor force in the world and its 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 2.3 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 2.3: State of Employment in Pakistan

(No. in million)	**FY1995**	**FY2005**	**FY2018**
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%

The figure 2.3 presents the trend in employment in various sectors focusing on those where PSDP has been most concentrated. Employment is on rise in Construction and Transport sector showing a steeper curve.

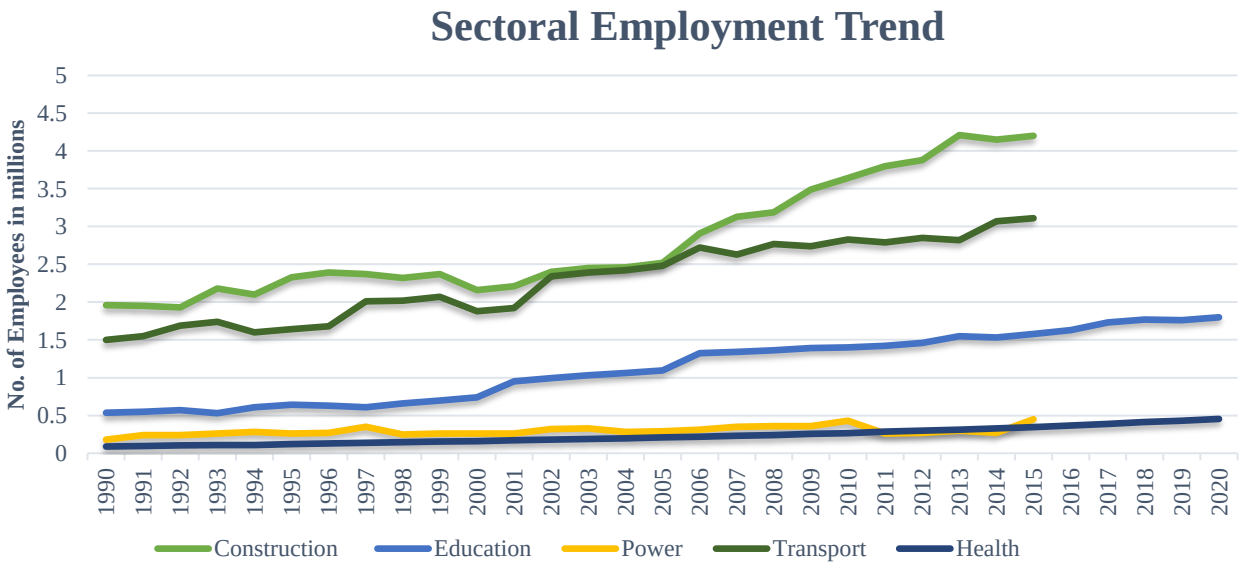

Figure 2.3: Employment Trends in Various Sectors

An alarming situation, as per the Labor Force Survey 2017-18 is that the majority of the unemployed labor belongs to people who have graduations degrees. The reason is that there has been an increase in number of graduates in the country 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. As per Chaudhry and Khan (2020), the graduate unemployment (GUE) rate stands at 16.5% while as per OECD website data available shows that in developed world it varies between 5% and 10%. [3]

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 below in figure 2.4 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 tax 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 has 74% employment in informal sector.

[3] https://data.oecd.org/unemp/unemployment-rates-by-education-level.htm

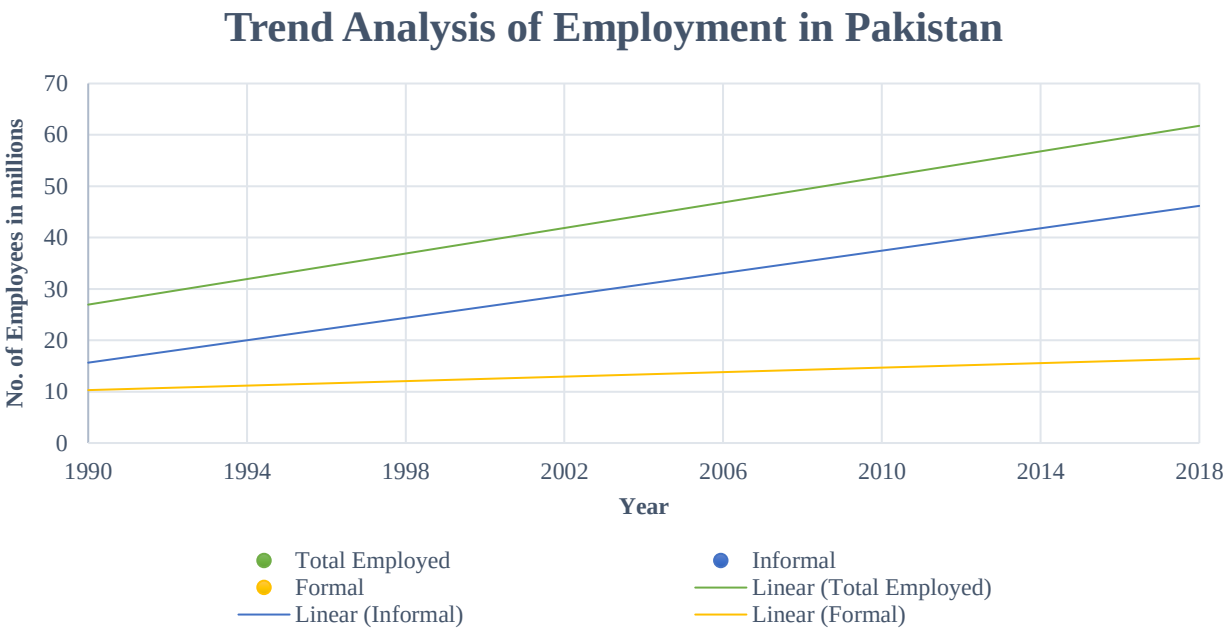

Figure 2.4: Trend Analysis of Employment in Pakistan; Formal and Informal Sector

2.3. Covid-19 Impact on Labor Market of Pakistan:

The Annual Review of 2020-21 had predicted an increase in unemployment level to 9.56% as a consequence to Covid-19 lockdowns. As per Special Survey for Evaluating Socio-Economic Impact of Covid-19 on Wellbeing of People (PBS, 2021), around 3.18 million people have been additionally unemployed due to covid-19 lockdowns in the country. It was found that daily wagers (majority construction workers), casual workers and own-account workers such as shop keepers, street vendors, and taxi drivers were the most affected segments of the society. As mentioned, the majority impact was on people employed in informal sector. The Economic Survey of Pakistan 2020-21 states that the working population numbers dropped from 55.75 million to 35.04 million which indicates that people either lost their jobs or were not able to work. Through fiscal stimulus and monetary measures, although 52.56 million resumed working yet around 3.18 million remained unemployed which raises the figures of unemployed labor force from 3.79 million to 6.88 million which is around 81% increase. This would mean a much larger fiscal or development stimulus would be needed in future from

Government as a big push to improve this deteriorating condition of labor market. This would also result in bring private sector employment to rise which has been effected the most.

CHAPTER 3

LITERATURE REVIEW

The impact of public sector investment on growth, employment, and many other imperative economic factors has been investigated over a long time and there is vast literature available on the relationship between public sector investment and other factors. The literature review section is arranged in three subsections providing literature review about the variables separately at global and Pakistan level. The section 3.1 discusses the available theoretical literature and section 3.2 discusses the available literature regarding methodologies used on present study hypothesis.

3.1. Theoretical Literature

3.1.1. Public investment/ Public sector development and Economic growth

Before jumping into the available literature about the relationship of development expenditure in Pakistan, it is necessary to understand the theoretical understanding about the role of public investment in impacting key macro-economic variables. For the basic understanding about this relationship, Anderson *et al.'s* (2006) paper provided a theoretical understanding of the relationship of public investment with growth, poverty, and employment. The study argues that theoretically it is found that, in countries where employment operates at less than full employment level, rise in public investment will also raise employment by stimulating aggregate demand but only in the short run. The Keynesian aspect to this theoretical relationship argues 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. Several studies such as

Gomanee *et al.* (2003), Mosley *et al.* (2004) found that higher government expenditures on education, agriculture, housing, and amenities have a statistically significant effect on poverty which results in a pro-poor distribution. A similar study by Fan *et al.* (2002) for Chinese states found that spending on rural education has the largest impact on poverty. Similar results were also evident for Fan *et al.* (1999) for Indian states. Anderson's study states that from the existing studies and theoretical understanding, it is more evident that public capital complements private capital and other factors of production. The government needs to allocate funds optimally across sectors according to the economic structures and available physical public capital stock.

One of the most important studies that helped understand this relationship was provided by Kamps (2005) who investigated the dynamic effect of public capital for 22 OECD countries with 25 years of data. The study found that among the 22 countries, most countries showed the output effect of a shock to public capital as positive while few were negative (Japan, Ireland). The study found that an increase in public capital in OECD countries on average can be expected to lead to an increase in output in long run and it is not an appropriate policy if the objective is to increase employment as there are only little pieces of evidence to prove the theory.

It is evident now that a change in investment affect aggregate demand/economic growth and enhances the productive capacity of the economy. It is discussed in theory that investment boosts economic growth by increasing the physical capital directly and indirectly by the spillover effect of technology. Many studies have proved this relationship that investment plays a positive role in economic growth such as Romer (1986), Lucas (1988), Barro and Sala. i.Martin (2004), Rebelo (1991), and many more.

Moving the attention towards case studies from Pakistan, the basic relationship of public investment and economic growth was presented in best way by Ghani & Din (2006), in their

study, they examined the impact of public investment on the economic growth of Pakistan. The study discussed two different approaches that highlight this relationship; The production function approach by Ebert (1986), Deno(1988) and many others which proved that public investment has significant input in the production process and both public and private investment are complementary to one another. On the other hand, Milbourne, e*t al.*(2003) using a steady-state model approach with an extension of the Mankiw, Romer, and Weils Augmented Solow-swan growth model, states that there is no significant effect in output per worker (by public investment). The results from study found that public consumption and private investment positively impact output; public investment negatively impact economic growth that proves Devarajan, *et al.* (1996) which as per the study is mainly due to inefficient and unproductive investments which authors term as misallocations of resources towards unproductive capital expenditures. The study also showed that growth is mainly driven by private investment and concludes that increase in public investment raises national investment rate which crowds out private investment.

A key study that analyzed PSDP in multiple sectors was done by Ahmed & Javed (2017) where they investigated the long-term effect of public sector development expenditure and investment on economy. The study examined PSDP allocation towards four sectors; Education, Transport, Health, and Housing Sector. Study found that the trend analysis shows that in first three sectors, the trend of government spending in these sectors was increasing but quite uncertain in the housing sector. This gave space for private investment to invest which is the main reason why the real estate in Pakistan is mostly owned by private investors. The empirical results showed that education and housing expenditures 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 lesser in GDP i.e. lesser returns with higher expenditures. The study concludes that the PSDP trend is quite uncertain and the key social

sectors that have to be addressed through PSDP are under the autonomy of the provinces after the 18th amendment which is one of the major reasons why the health sector showed a negative impact on GDP.

A fresh study on the state of PSDP projects conditions was discussed by Haque *et al* (2020), where the study showed that from 2000 to 2018, 98 projects exited PSDP out of which only 55 were completed and the rest were abandoned. The total cost on these abandoned projects was Rs. 176 billion while expenditure incurred at around Rs. 27 billion. Analyzing the 2017-18 PSDP, the study showed that the total size of the projects was set at Rs 7 trillion. The study criticized that PSDP projects are approved without due diligence (lack any project analysis and are subject to political considerations) and focuses more on brick and mortar which shows that the government is still using the old Haq/Hag model. A very similar criticism on government investments was also presented by Ellahi and Kiani (2011) arguing that due to non-productive investments by the governments the impact of government investment on GDP is negative which is positive for private investment as the investments are efficient and well planned. The same argument by Bint-e-Ajaz and Ellahi (2012) study provided that in the long run public investment exerts a negative effect on GDP growth rate as the government is investing more in unproductive and inefficient sectors which proves the studies mentioned above, and private investment positively affects the growth of GDP that proves Khan and Sasaki (2001) study.

3.1.2. Determinants of Unemployment

Unemployment is a major macroeconomic challenge for the economies. The governments' focus is to generate more employment opportunities through various activities such as FDI, Public Investment, development expenditures, inflation effect (Philips curve), human development policies, and many others. If unemployment is not curbed then

unemployed laborers will relocate themselves to other countries in search of better employment opportunities which results in brain drain. In a country like Pakistan where the majority of the population is youth, employment is a major concern. An alarming rise in population, lower economic growth, and economic instability add to generating unemployment when they are skilled and educated. Multiple studies have been carried out to analyze the determinants of unemployment globally and in Pakistan's case as well. Studies have proved the existence of Philips curve and Okuns Law in case studies of Pakistan and other countries.

A lot of studies have found existence of Philips curve around the world such as Eita and Ashipala (2010) study in Namibia found that a negative relationship exists between inflation and unemployment which proved the existence of the Philips curve there and further found that the investment and unemployment relationship was negative. Katria *et al* (2012) proved its existence in SAARC states, and many other have proved it such as Hassler & Neugart (2002) and Aguiar & Martins (2005) proved its existence in Europe.

But another perspective to unemployment was provided by Mortensen (1970) study where he provided a Job search model that states that the major cause of unemployment is the job offer and acceptance requirements or standards such as skills of labor, level of education, previous work experiences, and condition of market demand for labor and all these factors affect employment directly.

Kamps (2005) study also investigated the impact of public capital on employment. Study found that almost one-third of countries' employment to public capital response was negative which shows public capital and employment as substitutes and few showed positive (as complements). The study explained that the response can be theoretically explained in two way; the traditional Keynesian approach predicts that employment will rise in response to government spending while the neoclassical approach states that the effect may be two way; if public capital is financed by non-distortionary taxes then the public capital will raise

employment but if financed by distortionary taxes then it will decrease, assuming that the financing is mildly productive.

One key aspect of factors impacting unemployment was found by Blomström *et al.* (1997) study that unemployment can be reduced by more Foreign Direct Investments that are driven towards financing more projects. Elmeskov *et al.* (1998) focused on OECD countries gave a newer aspect that taxation has a positive impact on unemployment in both the short and long run. And it's a major factor that impacts unemployment. To study the existence of Okun's law, Haririan *et al.* (2010) investigated the long-run relationship between unemployment and GDP growth for Egypt, Turkey, Jordan, and Israel and found a negative impact of GDP growth on unemployment. Moazzami and Dadgostar (2009) conducted a similar study for OECD countries and found a similar negative relationship in the short and long run.

In case of Pakistan, multiple studies had determined the unemployment determinants in Pakistan and how unemployment can be reduced. For existence of Philips curve, it had been proved by many studies such as Zaman *et al* (2011), Hye & Siddiqui (2010), Gul *et al*. (2012), Malik & Tashfeen (2007) and many others. For unemployment determinants, Maqbool *et al.* (2013) found that in Pakistan; Population (Kalim, 2003. study had proved this relationship), GDP, Inflation, and FDI impact unemployment significantly and have a long-run effect on it. The study also found that external funding (debt) can't be used to minimize unemployment. The study also pointed out that unemployment is primary caused because the government doesn't allocate enough funds to development projects. On the other hand, Akhtar & Shahnaz (2005) added that the major factors that impact youth employment are the growth rate of the services sector, private sector investment, and public sector investment.

Of all these the (Foreign Direct Investment) FDI and Unemployment relationship has always been a center of discussion. Arslan & Zaman (2014) found that FDI has a negative relationship with unemployment. This shows that if in case there is an increase in FDI then

employment opportunities will be created. This hypothesis was also proved by Awan *et al.* (2010). But, Rizvi and Nishat (2009) suggest that FDI shouldn't be expected to generate employment opportunities directly which was concluded from case studies of China, India, and Pakistan. They argued that FDI impact on employment varies across different industries. The impact of FDI in several industries might be negative which is why no impact was calculated.

To analyze the current scenario of employment in Pakistan, Ahmad & Samad's (2019) PIDE research brief provided a statistical analysis of the current structure and share of employment in all economic sectors. As per the brief, the total employment has been rising in Pakistan even when there has been a sudden drop in GDP growth between 2006 and 2008 and uncertain economic growth between 2008 and 2010, the total employment level was rising. But data of the sectoral share shows a different picture. The analysis found that even though the majority share in employment is held by the agriculture sector, but its trend is also dropping and rising in the services and manufacturing sector. The brief calculated sectoral employment elasticities from 1960 to 2018 and it was found that employment elasticity concerning GDP is highest in the mining sector (0.83) and it was lowest in agriculture (0.05). While the total elasticity has been decreasing.

As the hypothesis of the present study assumes that unemployment is affected by the public sector expenditure for development in Pakistan and by the nature of where and how the government invests in multiple sectors. For this, a study by the Ministry of Finance, authored by Ahmad (2006) argued that public expenditures, directly and indirectly, creates productive employment, and hence it helps reduce poverty. If the government invests in social sectors such as improving education, health, sanitation, skills development; it will increase the capability of people which will make labor more efficient, hence suitable for employment. Infrastructure development is a way, by which government can generate employment. Projects such as Tameer e Pakistan and Khushal Pakistan Program that are designed to develop infrastructure

especially the rural infrastructure will create prosperity in the rural region which will create space for SMEs to operate hence creating employment opportunities. For this reason the PSDP allocation for 2010 was estimated to be able to create over 100,000 jobs using infrastructure development programs. A quite similar analysis by Asghar & Awan (2012) argued that a high expenditure on infrastructure, rural development, and social safety net by the government creates employment prospects, especially for skilled workers. This reduces inequality among rural and urban areas which will provide more job opportunities to rural people.

Finally, it's necessary to have a basic understanding about the state of unemployment sector distribution in Pakistan. It is found that Pakistan's employment sector is mostly captured by the private sector and mostly the informal sector. This hypothesis was proved by Nasir's (2000) study that analyzed the public and private sector employment in Pakistan. The study found that the informal sector is the biggest employer in Pakistan but here the working conditions and remunerations are quite low and unsatisfactory. The formal private sector, he argued, is better than the public sector. The study found that there is a wage differential in public-private sectors where the public sector has higher wages as compared to the private sector. A similar study, Aslam & Kingdon (2009), had proved the same results and also added that the public-private wage differential is 1.5 times more for men and 3 times for females.

3.1.3. Sectoral analysis of Public Sector Development in Pakistan:

One key criticism on public sector development in Pakistan is the uneven distribution of funds across various sectors. Studies like Haque *et al.* (2020) argue that government has been spending on projects that are mostly infrastructure based. A very similar Haider (2010)[4] study analyzed the sector-wise employment elasticities w.r.t. to GDP in Pakistan and it was found that there is a negative elasticity of agriculture employment to GDP which might be due to

[4] Haider (2010) found that since 1970 there has been jobless growth in Pakistan. Here majority of the employed labor force in Pakistan is working in unorganized sector.

surplus labor. While all other sectors (non-agriculture sectors) showed positive employment elasticities to GDP growth. It was highest (0.49) in the case of the construction sector and lowest in Mining and Manufacturing (excluding agriculture sector) i.e. 0.03. This proves that agriculture cannot be stated as a major contributing sector to employment growth in Pakistan although the majority of labor has been absorbed by this sector, the trend shows that there is a tilt towards the services sector. With economic expansions, employment rises in all non-agriculture sectors as sectoral migration is also caused during this process.

In another study, Haider (2010) investigated how sectoral reallocation (a structural change in the economy) is the major causes of joblessness or unemployment and explained a newer phenomenon of Jobless growth (a situation in which there is growth in the overall economy but the employment growth is either stagnant, slow or negative or with economic growth, unemployment also rises). The study found that employee's share in the agriculture sector is highest in the case of developing world and lowest in developed countries. The study found the effects of sectoral change during economic peak (1968-69 and 1990-92) and trough (1979-80 and 2002-03) in Pakistan. It was found that, of seven economic sectors only the transport and communication sector had a positive structural shift effect during stages of recession in Pakistan while mixed results were shown in case of other sectors. This doesn't conclude any result. The study also found that employment growth rate has been growing in peak and trough years in Electricity, Gas and water sector also in case of trade and finance. While a negative growth was in the agriculture sector.

One fundamental paper that had been instrumental in the public sector investment and employment impact was by Ahmed & Ali (2014) which analyzed the sectoral public investment efficiency and its impact on the economic growth of country, employment and private investment in each sector. The study at first found that there is a negative impulse response of sectoral public investment in the agriculture sector on employment and growth but positive on

agriculture private investment. On the other hand, the manufacturing and construction sectors showed a positive response in three cases (employment, sector growth, and private investment). The empirical results showed that in the majority of cases the aggregate, as well as sectoral public investment, has a positive (crowding in) effect on sectoral private investment. The elasticity of sectoral public investment in employment was negative in the case of the agriculture and services sector. The study further found that the major benefit of aggregate and sectoral public investment on sectoral employment was taken by the manufacturing sector. The results can conclude that in the case of Pakistan the public investment stimulates economic growth at aggregate and sectoral levels with few exceptions. For studying the impact the sectoral investments have in long and short run on employment, Bashir *et al.* (2018) found that agriculture investment, industrial investment, and services sector investment enhances employment in the long run but few other factors such as taxes and inflation rate reduced employment. Employment in these sectors through investments can be archived if the government controls the monetary and fiscal policy (not to use expansionary policies).

3.2. Literature on Hypothesis using VAR Methodology

Few studies as mentioned earlier provided theoretical and empirical understanding about the relationship between unemployment and public investment/ PSDP/ Development expenditure. The model to be used for the research as mentioned is Vector Autoregressive (VAR) Model. The Sims (1980) model have now become a major tool of macroeconomic econometric analysis. Stock and Watson (2001) believe that the model has been able to provide a more credible approach to description of data, structural inference, forecasting and analysis of policy. Particularly in studies, VAR has been used for studying fiscal and monetary policy shocks in modern day researches but there are many studies that study what the impact of public investment/ public capital has on multiple macro-economic variables. The table 3.1 is an

extraction from a Kamps (2004) showing the impact of public capital on output. The studies have explored the output effect of public capital in multiple periods across European states and in USA through VAR empirical analysis.

There are a few empirical studies that have used the Vector auto-regressive approach to establish a relationship between development expenditure/ public investment/ PSDP in Pakistan with employment or economic growth. Ghani & Din (2006) used the VAR model to explore relationship of economic growth and public investment and between public and private investments in Pakistan. Empirical results from the study showed that public consumption and private investment positively impact output; public investment negatively impact economic growth that proves Devarajan, *et al*.(1996) which is mainly due to inefficient and unproductive investments which he terms as misallocations of resources towards unproductive capital expenditures, further study showed that growth is mainly driven by private investment and increase in public investment raises national investment rate which crowds out private investment.

Table 3.1: Studies using VAR (Global) as Estimation

Study	Country	Sample	Variable	Output Effect Of Public Capital [a]
Cullison(1993)	USA	1955-1992	I^G,G^D,B^G,Y,M	Insignificant
Mc Millin & Smyth (1994)	USA	1952-1990	E,π,K^G/K^P,N/K^P,Y/K^P	Insignificant
Pereira & Andraz (2001)	USA	1956-1997	I^G, I^P, N,Y	Positive [b]
Pereira & Roca Sagales (2003)	Spain	1970-1995	K^G,K^P,N,Y	Positive [b]
Otto & Voss (1996)	Australia	1959-1992	K^G, K^P, N, Y	Insignificant [c]
Everaert (2003)	Belgium	1953-1996	K^G, K^P, Y	n.a.
Ligthart (2002)	Portugal	1965-1995	K^G, K^P, N, Y	Insignificant
Mittnik & Neumann (2001)	6 OECD Countries	1955-1994	I^G,C^G,I^P,Y	Insignificant [c]
Pereira (2001b)	12 OECD countries	1960-1990	I^G,I^P,N,Y	Positive [b]

Notes: VAR: Vector Auto regression. *FD* = model in (log) first differences. *L*= model in (log) levels. *Y*= output. *N*= employment. K^G= public capital. K^P= private capital. I^G= public investment. I^P= private investment. G^D= government defense spending B^G=government debt. *M*= money supply. *E*= energy price. π= inflation. C^G= public consumption

[a] Long run output effect of public capital (public investment), measured by the impulse responses of output to a shock to public capital (public investment)

[b] Study does not report Any measure of the statistical significance of the estimated effect

[c] Positive and statistically significant short-run effect

The other study of Ahmed & Ali (2014) that has also been used as a base paper for this study, used the VAR analysis to establish a relationship of sector wise public investment's impact on the economic growth of country, employment and private investment in all the sectors of economy distributed as Agriculture; Mining & Quarrying; Manufacturing; Construction; Electricity & Gas Distribution; Transport, Storage and Communication; Finance and Insurance; and Services sector. Data set used was time series data from 1964 to 2011. Through the impulse response function the study found that the sectoral public investment has a negative impulse response to agriculture and services employment. Meanwhile it also has

negative effect in few sectors output i.e. agriculture, mining and electricity & Gas Distribution Sectors. The results from elasticity comparisons concluded the similar results.

In another study, Sial, *et al.*(2010) investigated the impact of public and private investment on economic growth of Pakistan using VAR approach using time series data from 1973 to 2008. The unique thing about study was that OLS (ordinary least square) technique was used to derive the impact. The empirical results showed that the private investment in Pakistan has a larger and longer impact on economic growth as compared to the public investment.

Through the extensive study on available literature, it was found that there is a lack of knowledge about the PSDP effectiveness on meeting its desired objectives. Other than the few mentioned studies that discuss inefficiencies of public investments in case of Pakistan or the impact of PSDP on economic growth, there were no studies that could identify or analyze the behavior of development spending; the direct and spillover effect of development spending on the macroeconomics of Pakistan. For this reason, the present study seeks to identify and contribute to this research gap as whether PSDP or development spending in case of Pakistan is effective in creating employment, or is it the private investment that creates employment, and along with it the role development spending plays in crowding in or out private investment.

CHAPTER 4

DATA AND METHODOLOGY

This chapter will discuss the data sources, descriptions of variables and the methodological framework for this thesis. The section 4.1 will provide a description about data and variables. Section 4.2 will discuss the empirical model that will be used to evaluate the relationship between PSDP and employment.

4.1. Data Sources and Variables

For the study, a secondary data has been used for Pakistan through time period 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 National PSDP. Other controlled variables included in the model include; Annual Inflation rate (Consumer Price Index); Annual GDP growth; Total and Sectoral Private Investment; and finally Pakistan's Total Government Expenditure excluding PSDP allocations. The study will be covering the following sectors after considerations from studies (Haque *et al*, 2020 and Ahmed & Javed, 2017), where sectors have been chosen where PSDP spending had remained concentrated and also through the analysis of previous years PSDP allocation and spending trends, sectors used for this study are;

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

- *Health sector*

Each variables parameters are discussed below for time period 1990-2020 and the table 4.1 in the end is the Meta Data covering Variable, Notation, Units and Data Source:

4.1.1. PSDP

The study will use the Total Public Sector Development Programme (PSDP) spending at National Level (Federal and Provincial) and spending of PSDP in five sectors separately from 1990 to 2020 e.g. PSDP spending in Transport and Communication, Power Sector, Housing sector etc.

4.1.2. Employment

For the study, Employment variable will be used as Total Number of Employees in Pakistan and in five sectors; Total number of employees in Education, Health, and Transport etc. Education employees include only teachers at all levels of education (based on data available) and Health sector employees include Doctors, Dentists, Nurses, Midwives, Lady health visitors registered with PM&DC and Pakistan Nursing council.

4.1.3. Private Investment

The first controlled variable is private investment where variable used will be Total Private Investment and Sectoral Private Investment in Pakistan.

4.1.4. Inflation Rate

The inflation rate will be the second controlled variable where Consumer Price Index (CPI) will be used as a proxy for inflation rate. It will be annual CPI from 1990 to 2020.

4.1.5. GDP Growth

GDP growth rate is another controlled variable with annual GDP growth rate from 1990-2020.

4.1.6. Total Government Expenditure

Final controlled variable is the Total Government (Consolidated Federal and Provincial) Expenditure excluding development expenditures or PSDP.

***Table 4.1*:** Data and Variable Description

Variable	Notations	Unit	Source
Total No. of Employed Labor Force	EMP	Number in million	Pakistan Economic Surveys 1990 onwards
No. of Employees in Housing Sector	EMPCON		
No. of Employees in Education sector	EMPEDU		
No. of Employees in Power sector	EMPPWR		
No. of Employees in Transport & Communication Sector	EMPTC		
No. of Employees in Health Sector	EMPHH		
Total National PSDP Spending	PSDP	Rs in billion (Current Prices)	Ministry of Finance (Fiscal Operations and Budget Wing)
National PSDP Spending in Construction/ Housing Sector	PSDPCON		
National PSDP Spending in Education Sector	PSDPEDU		
National PSDP Spending in Power Sector	PSDPPWR		
National PSDP Spending in Transport & Comm. Sector	PSDPTC		
National PSDP Spending in Health Sector	PSDPHH		
Total Private Investment	IP	Rs in billion (Current Prices)	Pakistan Economic Surveys 1990 onwards & Ministry of Finance
Private Investment in Construction/ Housing Sector	IPCON		
Private Investment in Education Sector	IPEDU		
Private Investment in Power Sector	IPPWR		
Private Investment in Transport & Comm.	IPTC		
Private Investment in Health Sector	IPHH		
Inflation rate (CPI average annual)	INFL	% growth	Pakistan Economic Survey 2020-21
GDP Growth annual	GDPG	% growth	Pakistan Bureau of Statistics (National Accounts)
Total Government Expenditure	GovExp	Rs in Billion (CP)	Pakistan Economic Surveys 1990 onwards

4.2. Model Specifications

The present study will provide a descriptive analysis by using quantitative data. The study will be employing an econometric technique in form of Vector-Auto regression (VAR). VAR models are dynamic multivariate models that are used in forecasting, shock analysis of variables and also used as a policy making tool. These models are used to capture the dynamic relationships that exist in 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. Furthermore, VAR is used when variables behavior is known in relation to each other such as how they interact in the economy but their responsiveness to any shock on one variable and their impact on the other one is analyzed using it. These have been the main reasons to use this methodology for the present study's analysis that would provide a strong econometric justification that would help prove the mentioned hypothesis.

4.2.1. General VAR Model

The Vector Auto regression (VAR) was first presented by Christopher Sims (1980) as an n-equation, n-variable linear model in which every variable is elucidated by its own lagged value and by the remaining n-1 variable's present and past values. When one is dealing with a uni-variate auto regression then this will be represented as a single variable linear model and the current value will be explained by its own lagged values. Similarly it will be expanded in case of bi or multi variate models. Sims argued that if one is not sure about the variables that are either endogenous or exogenous then all the variables are treated as endogenous. Generally, the model is represented as:

$$Y_t = A_1 q_{t-1} + \cdots + A_p q_{t-p} + \mu_{Z_t} + \varepsilon_t \qquad (4.1)$$

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

For the study,

$$X_{s_t} = \beta_{s_t} + \sum_{i=1}^{p} \emptyset_{s_t} X_{s_{t-k}} + \varepsilon_{s_t} \qquad (4.2)$$

The equation (4.2) above is the general VAR model for the study. I have used six variables using VAR analysis to analyze as how the PSDP have been effective in countering unemployment across various sectors. The following represents the 6×1 endogenous variables vector.

$$X_{s_t} = \begin{pmatrix} EMP_{s_t} \\ PSDP_{s_t} \\ GovExp_t \\ GDPG_t \\ I_{p_{s_t}} \\ Infl_t \end{pmatrix} \ldots\ldots\ldots (4.2a)$$

The subscripts s= Education, health, transport and communication…N represent sectors and t= 1….T represents time lags. The variables $\boldsymbol{EMP_{s_t}}$ is the National Employment Level and Employment across the selected five sectors, $\boldsymbol{PSDP_{s_t}}$ is National PSDP spending on annual basis (consolidated federal and provincial) across the five sectors, $\boldsymbol{GovExp_t}$ is the Total Government excluding PSDP, $\boldsymbol{GDPG_t}$ is the GDP growth rate of Pakistan, $\boldsymbol{I_{p_{s_t}}}$ indicates Private Investment in Pakistan and in five sectors and $\boldsymbol{Infl_t}$ is the average annual inflation in Pakistan. The model is a multivariate model which will withhold the assumptions 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 equation (4.3) below is the basic econometric equation that underlines the hypothesis:

$$EMP_t = \beta + \beta PSDP_{t-1} + \delta X_{t-1} + U \qquad (4.3)$$

$$X = \begin{pmatrix} GovExp \\ GDPG \\ I_p \\ Infl \end{pmatrix} \text{……. (4.3a)}$$

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 creation of 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).

4.2.2. Reduced Form VAR

The reduced form of VAR for the equations (4.2) and matrix notation are below. First separate equations will be formed for each variable which are mentioned in section 4.2.3.

$$\begin{bmatrix} 1 & \emptyset_{11} & \emptyset_{12} & \emptyset_{13} & \emptyset_{14} & \emptyset_{15} \\ \emptyset_{21} & 1 & \emptyset_{22} & \emptyset_{23} & \emptyset_{24} & \emptyset_{25} \\ \emptyset_{32} & \emptyset_{31} & 1 & \emptyset_{33} & \emptyset_{34} & \emptyset_{35} \\ \emptyset_{43} & \emptyset_{41} & \emptyset_{42} & 1 & \emptyset_{44} & \emptyset_{45} \\ \emptyset_{54} & \emptyset_{51} & \emptyset_{52} & \emptyset_{53} & 1 & \emptyset_{55} \\ \emptyset_{65} & \emptyset_{61} & \emptyset_{62} & \emptyset_{63} & \emptyset_{54} & 1 \end{bmatrix} \begin{bmatrix} PSDP_{s_t} \\ EMP_{s_t} \\ GovExp_t \\ IP_{s_t} \\ Infl_t \\ GDPG_t \end{bmatrix} = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \\ \beta_5 \\ \beta_6 \end{bmatrix} +$$

$$\begin{bmatrix} \emptyset_{10} & \emptyset_{11} & \emptyset_{12} & \emptyset_{13} & \emptyset_{14} & \emptyset_{15} \\ \emptyset_{21} & \emptyset_{20} & \emptyset_{22} & \emptyset_{23} & \emptyset_{24} & \emptyset_{25} \\ \emptyset_{32} & \emptyset_{31} & \emptyset_{30} & \emptyset_{33} & \emptyset_{34} & \emptyset_{35} \\ \emptyset_{43} & \emptyset_{41} & \emptyset_{42} & \emptyset_{40} & \emptyset_{44} & \emptyset_{45} \\ \emptyset_{54} & \emptyset_{51} & \emptyset_{52} & \emptyset_{53} & \emptyset_{50} & \emptyset_{55} \\ \emptyset_{65} & \emptyset_{61} & \emptyset_{62} & \emptyset_{63} & \emptyset_{64} & \emptyset_{65} \end{bmatrix} \begin{bmatrix} PSDP_{s_{t-1}} \\ EMP_{s_{t-1}} \\ GovExp_{t-1} \\ IP_{s_{t-1}} \\ Infl_{t-1} \\ GDPG_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{PSDP_{s_t}} \\ \varepsilon_{EMP_{S_t}} \\ \varepsilon_{GovExp_t} \\ \varepsilon_{IP_{s_t}} \\ \varepsilon_{Infl_t} \\ \varepsilon_{GDPG_t} \end{bmatrix} \qquad (4.4)$$

Or,

$$\Phi x_t = \Gamma_o + \Gamma_1 x_{t-1} + \varepsilon_t \qquad (4.5)$$

Where,

$$\Phi = \begin{bmatrix} 1 & \emptyset_{11} & \emptyset_{12} & \emptyset_{13} & \emptyset_{14} & \emptyset_{15} \\ \emptyset_{21} & 1 & \emptyset_{22} & \emptyset_{23} & \emptyset_{24} & \emptyset_{25} \\ \emptyset_{32} & \emptyset_{31} & 1 & \emptyset_{33} & \emptyset_{34} & \emptyset_{35} \\ \emptyset_{43} & \emptyset_{41} & \emptyset_{42} & 1 & \emptyset_{44} & \emptyset_{45} \\ \emptyset_{54} & \emptyset_{51} & \emptyset_{52} & \emptyset_{53} & 1 & \emptyset_{55} \\ \emptyset_{65} & \emptyset_{61} & \emptyset_{62} & \emptyset_{63} & \emptyset_{54} & 1 \end{bmatrix}, x_t = \begin{bmatrix} PSDP_{s_t} \\ EMP_{s_t} \\ GovExp_t \\ IP_{s_t} \\ Infl_t \\ GDPG_t \end{bmatrix}, \Gamma_o = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \\ \beta_5 \\ \beta_6 \end{bmatrix},$$

$$\Gamma_1 = \begin{bmatrix} \emptyset_{10} & \emptyset_{11} & \emptyset_{12} & \emptyset_{13} & \emptyset_{14} & \emptyset_{15} \\ \emptyset_{21} & \emptyset_{20} & \emptyset_{22} & \emptyset_{23} & \emptyset_{24} & \emptyset_{25} \\ \emptyset_{32} & \emptyset_{31} & \emptyset_{30} & \emptyset_{33} & \emptyset_{34} & \emptyset_{35} \\ \emptyset_{43} & \emptyset_{41} & \emptyset_{42} & \emptyset_{40} & \emptyset_{44} & \emptyset_{45} \\ \emptyset_{54} & \emptyset_{51} & \emptyset_{52} & \emptyset_{53} & \emptyset_{50} & \emptyset_{55} \\ \emptyset_{65} & \emptyset_{61} & \emptyset_{62} & \emptyset_{63} & \emptyset_{64} & \emptyset_{65} \end{bmatrix}, x_{t-1} = \begin{bmatrix} PSDP_{s_{t-1}} \\ EMP_{s_{t-1}} \\ GovExp_{t-1} \\ IP_{s_{t-1}} \\ Infl_{t-1} \\ GDPG_{t-1} \end{bmatrix}, \varepsilon_t = \begin{bmatrix} \varepsilon_{PSDP_{s_t}} \\ \varepsilon_{EMP_{s_t}} \\ \varepsilon_{GovExp_t} \\ \varepsilon_{IP_{s_t}} \\ \varepsilon_{Infl_t} \\ \varepsilon_{GDPG_t} \end{bmatrix}$$

Multiplying whole equation (4.5) by Φ^{-1},

$$x_t = A_o + A_1 x_{t-1} + e_t \qquad (4.6)$$

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

4.2.3. Empirical Description of relationship between PSDP and Employment:

The empirical models for the study can be specified as:

$$EMP_{s_t} = \emptyset_o + \sum_{K=1}^{P} \emptyset_{1k} EMP_{s_{t-k}} + \sum_{K=1}^{P} \emptyset_{2k} GovExp_{t-k} + \sum_{K=1}^{P} \emptyset_{3k} PSDP_{s_{t-k}} +$$

$$\sum_{K=1}^{P} \emptyset_{4k} I_{P_{s_{t-k}}} + \sum_{K=1}^{P} \emptyset_{5k} Infl_{t-k} + \sum_{K=1}^{P} \emptyset_{6k} GDPG_{t-k} + \varepsilon_{s_t} \qquad \text{------ (4.7)}$$

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 such as below and separate equations for separate sectors;

$$GovExp_{s_t} = \emptyset_o + \sum_{K=1}^{P}\emptyset_{1k}GovExp_{t-k} + \sum_{K=1}^{P}\emptyset_{2k}EMP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{3k}PSDP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{4k}I_{P_{s_{t-k}}} + \sum_{K=1}^{P}\emptyset_{5k}Infl_{t-k} + \sum_{K=1}^{P}\emptyset_{6k}GDPG_{t-k} + \varepsilon_{it} \text{ ------(4.8)}$$

$$PSDP_{s_t} = \emptyset_o + \sum_{K=1}^{P}\emptyset_{1k}PSDP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{2k}EMP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{3k}GovExp_{t-k} + \sum_{K=1}^{P}\emptyset_{4k}I_{P_{s_{t-k}}} + \sum_{K=1}^{P}\emptyset_{5k}Infl_{t-k} + \sum_{K=1}^{P}\emptyset_{6k}GDPG_{t-k} + \varepsilon_{it} \quad \text{------ (4.9)}$$

$$I_{P_{s_t}} = \emptyset_o + \sum_{K=1}^{P}\emptyset_{1k}I_{P_{s_{t-k}}} + \sum_{K=1}^{P}\emptyset_{2k}EMP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{3k}PSDP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{4k}GovExp_{t-k} + \sum_{K=1}^{P}\emptyset_{5k}Infl_{t-k} + \sum_{K=1}^{P}\emptyset_{6k}GDPG_{t-k} + \varepsilon_{it} \text{ ------- (4.10)}$$

$$Infl_t = \emptyset_o + \sum_{K=1}^{P}\emptyset_{1k}Infl_{t-k} + \sum_{K=1}^{P}\emptyset_{2k}EMP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{3k}PSDP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{4k}I_{P_{s_{t-k}}} + \sum_{K=1}^{P}\emptyset_{5k}GovExp_{t-k} + \sum_{K=1}^{P}\emptyset_{6k}GDPG_{t-k} + \varepsilon_{it} \quad \text{------- (4.11)}$$

$$GDPG_t = \emptyset_o + \sum_{K=1}^{P}\emptyset_{1k}GDPG_{t-k} + \sum_{K=1}^{P}\emptyset_{2k}EMP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{3k}PSDP_{s_{t-k}} + \sum_{K=1}^{P}\emptyset_{4k}I_{P_{s_{t-k}}} + \sum_{K=1}^{P}\emptyset_{5k}GovExp_{t-k} + \sum_{K=1}^{P}\emptyset_{6k}Infl_{t-k} + \varepsilon_{it} \text{ ------- (4.12)}$$

4.2.4. 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.

4.2.5. 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.

4.2.6. Granger Causality Test

Granger causality test is used to investigate the causality between variables and the future values of variables by using present and past values of other variables. In other words it explains how changes in one variable effect other variables by identifying the direction of causality from one variable to another.

4.2.7. 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}. 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.

4.2.8. 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.

CHAPTER 5

RESULT AND DISCUSSION

This chapter contains the estimation results and interpretation of the econometric models as discussed in the last chapter. The section 5.1 will discuss descriptive statistics, section 5.2 will provide all the necessary tests as mentioned in the previous chapter, section 5.3 will discuss the results from estimations and their interpretations for the models.

5.1. Descriptive Statistics

Table 5.1: Results of 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

The table 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 level of inflation so far has been 17.03% (2009) and lowest 2.86% (2016) while highest GDP growth rate ever recorded in last 30 years was 7.70% (2004) and lowest was -0.47% (2020).

Looking at the normality of the data from the table, 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.

5.2. 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:

5.2.1. Stationarity Testing

Time series data usually have fluctuations and trends 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 5.2: ADF Unit Root Test Results

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 H_0 and accept H_1 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. 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. Hence the study will be using the data in its original form without differencing.

5.2.2. Optimal Lag Selection:

The table 5.3 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 5.3: 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*

5.2.3. Granger Causality Test

The study also applied a granger causality test in order to test whether there exists any causality between variables and their past values. The results (Annex A-1) show results for causality of different variables in the model. With 5% significance level it was found that the Total National PSDP spending and Employment Level does not granger cause each other. Only private investment showed granger causality with PSDP. But there was a unidirectional relationship between multiple variables.

From the controlled variables, unidirectional causality was found between few variables such as GDP granger cause Employment, employment granger cause government expenditure, PSDP granger cause GDP growth, Private Investment granger cause government expenditure.

In order to elaborate a causality relation, the similar tests were performed in case of five sectors. The results varied across sectors; in construction sector; PSDP spending has no causal effect on employment level in Transport & Communication, Construction, Education and Health Sectors, but in Power sector the PSDP spending has a causal effect on employment level in the short run. Results varied across sectors and this was already predicted in various studies as mentioned earlier in the literature.

The data and model were tested with other diagnostic tests as well which proved model is stable. Hence, below results are analyzed for VAR, Impulse response function and Variance Decomposition for relationship of total PSDP spending to employment for investigating its effectiveness which are discussed in section 5.3 and section 5.4 discusses the variable estimations and relationship in five different sectors.

5.3. 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:

5.3.1. VAR Analysis:

The regression results of VAR show that employment has a weak negative impact to National PSDP spending as it shows a reverse causality between PSDP spending and employment level in Pakistan. This indicates that in short run the total PSDP spending is not effective in creating employment in Pakistan. On the other hand, employment generation in Pakistan is mostly determined by private investment than PSDP. This behavior of employment generation towards private investment rather than PSDP generation has three major reasons;

first, PSDP spending in Pakistan is more on infrastructure projects such as Roads, Highways, Energy projects which employee 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%)[5] and specifically informal sector (70%). Private investment is a major source that provides new employment in Pakistan and finally the Annexure A discusses the difference in magnitude of investments in different sectors where private investment is twice the size of PSDP spending hence the behavior of employment is evident.

Moreover, results show that employment level in the country has a strong positive impact on the PSDP spending. This could indicate 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 include laborers or unskilled workers, the PSDP spending is spent in areas which can possibly generate more employment. Government by taking note of the status of labor market could also direct their spending in specific areas e.g. with increasing labor force in the country, government directs their spending in sectors that could employee this rising force. This maybe another reason to why government is PSDP spending in new energy projects as it employees engineers, skilled and unskilled labor force in greater number (the primary reason to governments attention towards this sector is to control energy crisis). The results also indicate that an increase in current year's employment level is associated to around 60% to its past values. This relationship of employments 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.

[5] Source: Labor Force Surveys and Pakistan Public Administration Research Centre.

Furthermore the past values of PSDP show a strong impact on the current values of PSDP spending - as discussed in chapter 2, there is a considerable portion of PSDP allocation that is not spent hence in the present year, government's decision on spending is based on the previous year's position on PSDP spending. In addition to that, GDP growth rate shows a strong impact on PSDP spending. This would imply that with positive GDP growth rates, government's development spending would also increase. Similarly, GDP growth shows a positive dependency on PSDP spending that implies that GDP growth rate grows due to development spending which could be explained as when there is an increased government development spending, there is a short run employment, rise in incomes, capital production and hence economic activity cycle begins which results in output generation.

Results provide that in case of Pakistan, PSDP spending is also driven by the Private Investment where a unit increase in private investment would raise the PSDP spending by 20%. This is implicated to 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.

Furthermore, the results show that the coefficient of PSDP spending is negative while private investment is on the dependent side. This could indicate that there is no impact as it is insignificant with 5% significance level. In order to investigate this relationship better and based on the logic that the PSDP spending would take more than one lag to show its response, VAR was run using both the variables by taking 1, 2 and 3 lag orders separately to investigate

this relationship. The results (Annexure-B2) show that either there is very weak or no response of private investment to PSDP spending. Statistically the trend (Annexure-A) shows that private investment has been increasing. Its fall would be due to other factors such as interest rate, devaluation of currency, inflation or tax structure.

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 and private investment. This indicates that with growing employment GDP growth rate would increase which is plausible as with increased employment, consumption increase that increases production and hence a cycle of economic activity continues, similarly employment level also raises private investment as private investor would inject their investments in sectors where they would find abundant labor that would reduce wage rate.

Table 5.4: 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*

5.3.2. Variables Behavior to Shocks in Other Variables:

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 figure 5.1 below shows the impulse response of main variables to shocks in controlled variables over 5 periods. It is assumed that the period 1 and 2 are short run and 3 to 5 periods indicate long run. Results for response of other controlled variables to shocks is provided in Annex A-2.

The figure 5.1(a) 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 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 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 short and long run. This implies that private investment rise would also induce PSDP spending.

From the figure 5.1(b), the major hypothesis of effectiveness of PSDP in creation of employment was depicted here as 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 the 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 slight rise in employment but in long run it falls.

The results has proved the arguments presented by Ghani & Din (2006) Bint e Aijaz 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.

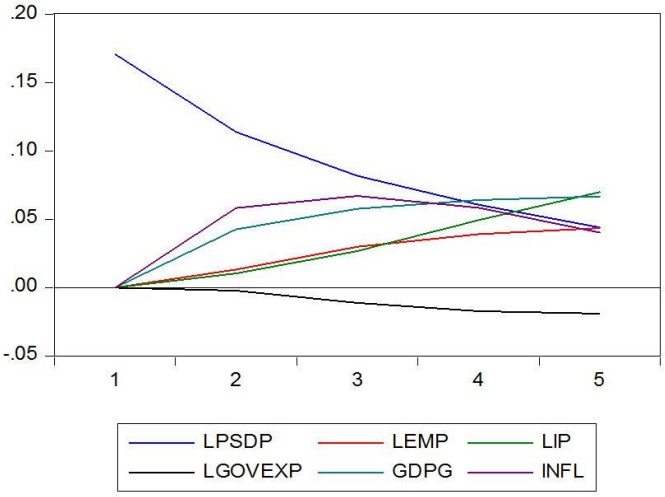

Figure 5.1(a): Response of PSDP to Other Variables

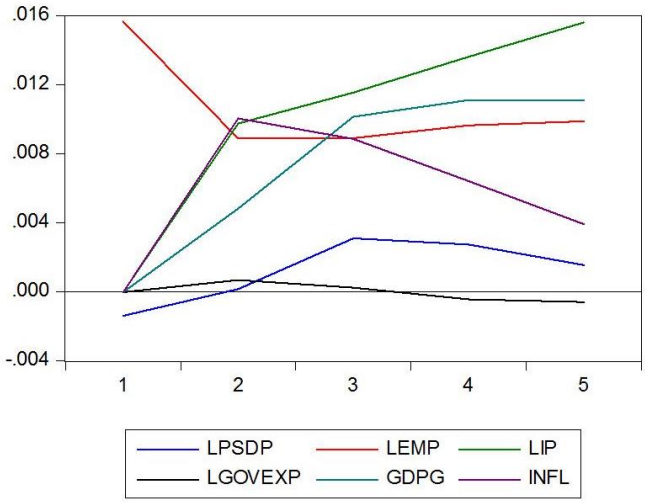

Figure 5.1(b): Response of EMP to Other Variables

5.3.3. Short and Long Run Decomposition:

The table 5.5(a) and 5.5(b) provides the results of variance decomposition for two main variables and the results for controlled variables are mentioned in Annexure (Annex B-3). 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 5.6(a) it is found that for PSDP major influence comes from private investment by the end of 10^{th} 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 10^{th} 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

GPD 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 5.5(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 5.5(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 5.5(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.

5.4. PSDP Sectoral Analysis

5.4.1 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 in comparison to that Private Investment was effective. 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. Results from Impulse response of employment to other variables in the figure 5.4 below:

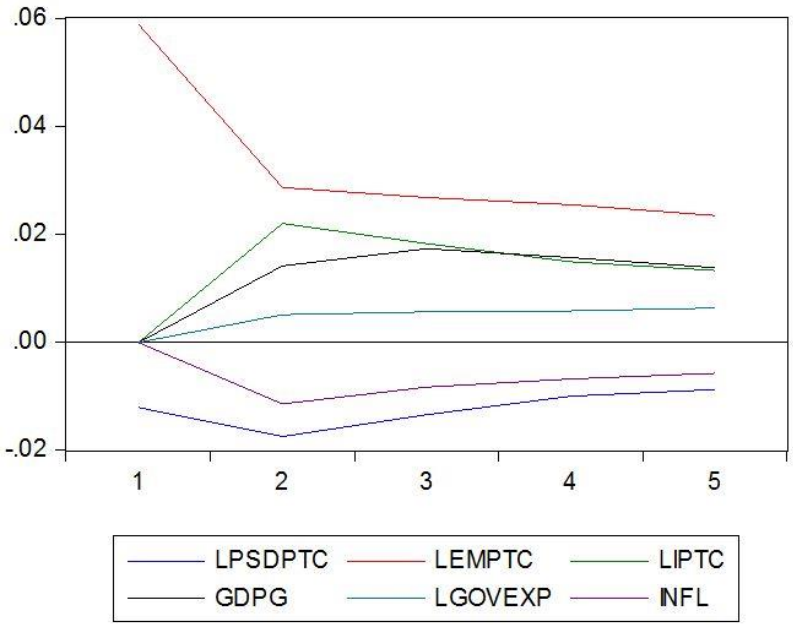

Figure 5.2: Impulse Response of Employment in Transport Sector to Other Variables

The figure shows 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 results from the estimations indicate that in case of transport and communication sector, the private investment is more effective in creating employment while PSDP is limited. 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.

5.4.2. Water & Power (/Energy) Sector

The next is estimating the relationship between variables and understanding effectiveness of PSDP spending in generating employment in Energy Sector of Pakistan. Results (Annex C) from VAR show 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 variable. Further results also indicate that the PSDP spending in Energy Sector is dependent on the Government Expenditures and GDP growth rate. 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. In addition to that, the 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 as discussed, the nature of sector requires government interventions, for private sector, investing in it requires confidence of investors. With higher government development spending the investor's confidence grows hence there is a positive impact.

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.

5.4.3. 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 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. This implies that the labor in this sector is something that exists, there is supply of labor event 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. The similar reaction is also shown by the private investment. Similarly, results show that PSDP spending would 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. It is shown in the figure 5.3 below that the employment remains stable in short run but drastically would be negative in the long run showing an opposite relation. 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.

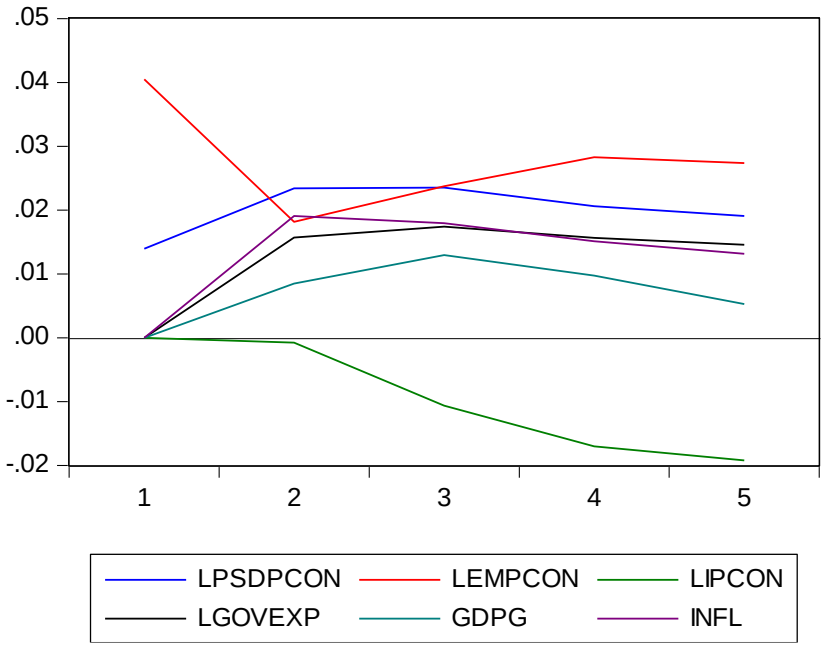

Figure 5.3: Impulse Response of Employment in Construction sector to other variables.

5.4.4. 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). The figure 5.4 below is the shock response of employment in education sector to PSDP spending in education sector. The figure shows that due to shock in PSDP in short there is an increase in employment but in long run the response fades and then shows an

increasing sign. This can better be explained with an example; the short term of first two to three years are the periods when the PSDP spending is made on a university which would be the project construction phase that employees labor for construction which is a short term employment. When university construction is completed, in few years the government hires its staff and administration so during mid period there is low employment but in long run it rises.

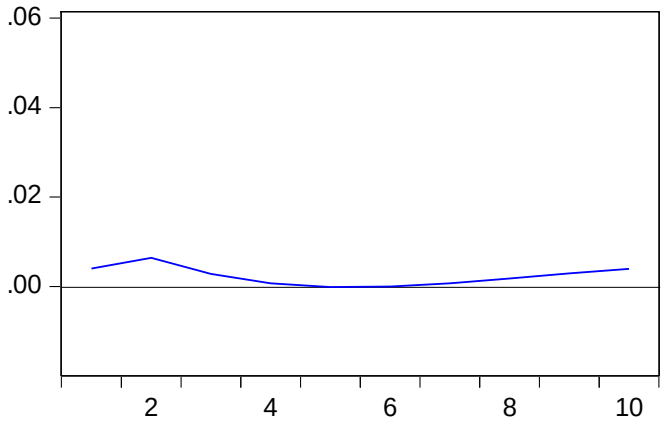

Figure 5.4: Impulse Response of Employment to PSDP Spending in Education Sector

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.

5.4.5. 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 are greatly impacted employment in health. The reason to this behavior is similar to what has been argued above in education sector. 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. The figure 5.5 below shows the response of employment to a shock in other variables in health sector case. The figure shows that a 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.

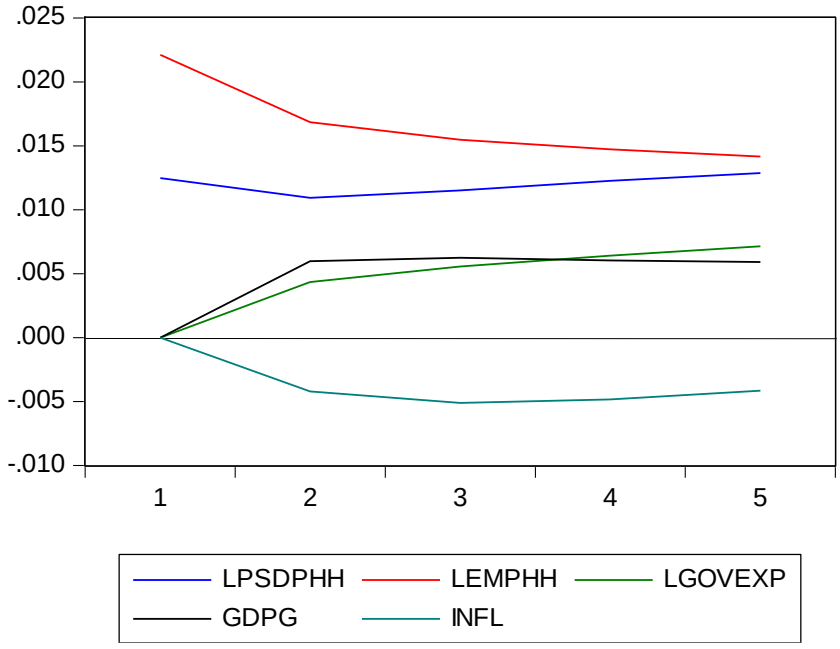

Figure 5.5: Impulse Response of Employment to Shock in Other Variables in Health Sector

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.

CHAPTER 6

CONCLUSION AND POLICY RECOMMENDATIONS

6.1. Conclusion

The study was motivated to understand what the responsiveness of employment is in Pakistan due to PSDP spending. The objective was set to investigate whether PSDP spending is effective in generating employment in Pakistan. The analysis has shown that PSDP spending is concentrated to a few of the sectors which are mostly infrastructure based, meanwhile employment has shown a slower growth, hence the effectiveness of PSDP spending in generating employment was under investigation. Using a three decades available time series data the present study has found that the case of employment effectiveness may vary across periods and across sectors.

The results has brought the discussion to the conclusion that PSDP spending in Pakistan is not 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 short and long run. These two results has proved the study of Haque *et al.* (2020), Ghani & Din (2006), and Ellahi and Kiani (2011) that the PSDP driven projects are not productive enough as compared to private investment or private sector projects that are able to achieve desired objectives because of their effective design and policy. Another 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).

It has further 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. One reason to that is that this behavior may vary from projects to sectors. There may be sectors that require Big Push from government in order to generate employment such as Transport and Energy Sector where for private investment to enter may take time. Moreover, there are sectors that need higher spending which can only be backed by government as private investment would more focus on smaller projects in these areas e.g. building dams, energy plants, motorways etc. are more of government area of spending. But private investment is more focused in Pakistan on areas where government spending has been weak and hasn't shown any interest. This includes social sectors especially education, media, telecom sector, industry and agriculture. Government development spending is quite lower in these sectors which brings in private investment hence these sectors hold mostly under private ownerships.

The study analyzed the sectors where it was found that PSDP is most concentrated to so to investigate whether the similar pattern is followed in all sectors or it varies. Results showed that it varies across all sectors and the employment in sectors which involve large scale projects there PSDP spending is more effective in creating employment while in few private investment also has its share in generation of employment. Such as in transport and communication sector, employment is mostly driven by private investment but on the other hand in case of Energy sector and construction sector, PSDP spending has been effective in generating employment which of a greater magnitude as compared to private investment. Similarly both (Energy and Construction) sectors showed crowding in phenomena that would indicate that through the PSDP spending, the sectors have attracted private investment but no effect was found in Transport & Communication sector. Private investment is based on the investor's confidence which is built not only through investment friendly policies but also through the pathway

government may create for it. Development spending in these sectors, which are now a growing sectors in Pakistan, have provided private investment a space to enter and perform.

Finally it was found that 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 next 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 building new and upgrading existing schools, colleges, institutions, hospitals, research labs etc. With newer infrastructure, that would attract more staff, more professionals to work. As these sectors have long been ignored and with rising population, it is now seen that the focus in more on expanding the infrastructure of education and health sector.

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 indicating a short run employment creation is a direct impact 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 which leads to GDP growth. But it is necessary that private sector holds confidence in the government for that below are few policy suggestions:

6.2. Policy Recommendations

The results from the study show that PSDP effectiveness in employment generation varies across sectors and 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, projects extensions and increasing costs. But the following are suggestions to ensure that the employment generation is effective through government development spending:

6.2.1. Boosting Private Investment Morale and Role of Private Sector

One major factor of Private investment is the market sentiments and the confidence in the government policies. It is necessary to ensure that the private sector receives maximum incentives to invest. The government development spending is just a pathway for the private investment to enter the market and generate output. The government needs to ensure that the government policies are designed to benefit private investment which would include special tax relief, stronger banking industry, easy availability of credit from banks, stabilizing inflation and exchange rates. These would boost the morale of private investor and hence will bring out more output and employment growth. Similarly, it is a norm in countries that private sector plays a pivotal role in working with the government in projects hence enabling profound employment opportunities.

For this reason, Public-Private Partnership is essential in development projects where government would act as a big push but the private sector would infuse their investments in ways such as establishing SMEs and industries across the road or railway networks that the government has been building. Government's role in facilitating the private sector would remain crucial here otherwise the problem of crowding out would result. Example to such relationship would be Sialkot-Lahore motorway, Karachi Circular Railway, Chamba House Lahore Project etc.

6.2.2. Using Build-Operate-Transfer Model

The model is a global practice where a private entity is granted concession by the government to finance the project, build it and operate the project for a period of 15-25 years, during which the private entity can earn a profit. After that period, the project is returned to the government or in other words transferred back to the government. The same model must be applied in Pakistan as well as the private sector projects are more efficient and planned. The

private entities confidence would also increase and this will also create opportunities for FDI to enter the country. CPEC is an example of this model but that is on a much larger scale, what is needed is to let local private investor enter the market.

6.2.3. Ensuring financing stability

One of the key ingredients in a project is the financing for it which directly impacts the time for completion of project. One of the major reasons why development spending has been ineffective in creating a long run employment opportunities is that the projects financing is not consistent. This results in project completion delays or in many cases projects are completed without considering the quality of project e.g. project delay in Islamabad International Airport and when it is completed, project show poor quality of work. The process of approvals is the major reason why there are delays in projects as the demand for project financing has to go through various forums.

So to ensure financing stability for the project it is suggested that a project fund must be approved at the time the project is in 1st year of its cycle and must be transferred to the project single account jointly managed by government and the project company. The project funds must be audited on annual basis and be evaluated on close watch. This would not only ensure quality of work but also ensure there are no leakages in the project funds. Further the project would be completed on time. Cost overruns are a part of project as the estimated cost is based on projections, but government has to maintain a stable economic environment so project costs don't off shoot.

6.2.4. Post Completion Project Evaluation

Projects evaluation reports are a requirement as per the rules of business and a post project evaluation report as well such as PC III and PC V which is monthly progress reporting and

post completion evaluation. It is necessary that the post completion evaluation report must be focused on whether the project has been able to attract private investment and generate employment. A first Project evaluation reports must be conducted after at least 3 years of completion and then a second one after 10 years of completion. This would result in calculating a short and a long term impact of the project. These reports must be made publicly available as to ensure accountability and it would help generate research on projects.

6.2.5. Focus of Spending in Major Employment Sectors

Government has concentrated its development spending on few sectors and other important sectors are ignored. Some of them include Agriculture, Mining, Manufacturing, Media, Research & Development, and Rural Development. These are areas where the employment has a major share. Agriculture share in employment is 44%, it needs serious attention as its share in GDP is decreasing. Further there has been a serious concern of urbanization and city expansions due to which fertile land is being converted into housing societies. A new technique is used globally named Liquid NanoClay technique currently being used in China and Saudi Arabia as well through which desert soil can be converted into fertile land. This is a costly project which is not possible unless government provides a big push. Government has to intervene in these matters and spend on farmers such as upgrading machinery, establishing agriculture research labs in all cities, improving existing and constructing new irrigation system and more. Furthermore the industry needs attention, especially the mining side as Pakistan is rich in mineral resources. These steps would induce employment and can create a ripple effect in the economy. Or to sum up, the government in order to create more employment has to focus on sectors that has highest employment.

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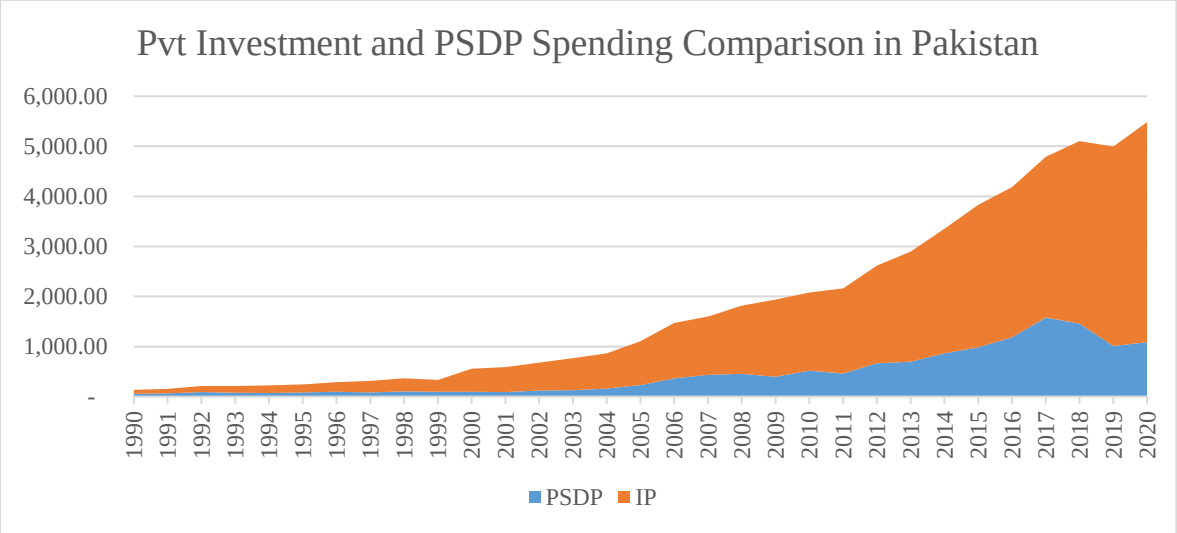
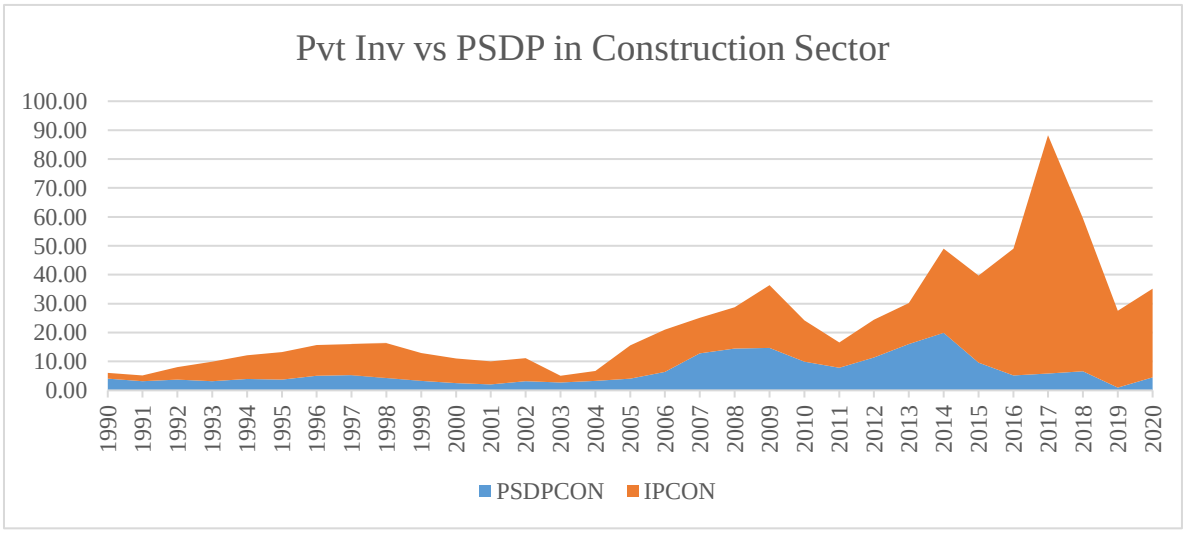
Annexure A

Comparison between PSDP and Private Investment in Pakistan

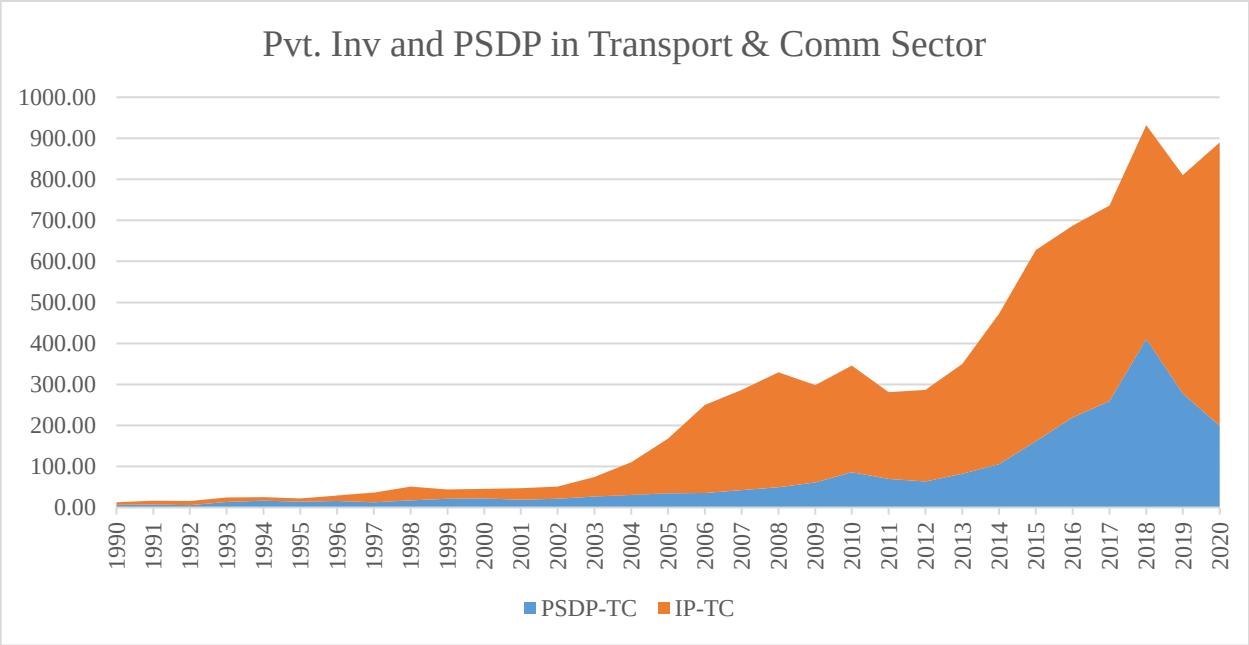
The below figures draws a trend in PSDP spending and Private Investment in Pakistan. The share of private investment is higher than PSDP spending and in total, private investment is increasing so is the case of PSDP. The figures below are self-explanatory. It is evident that in case of private investment 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.



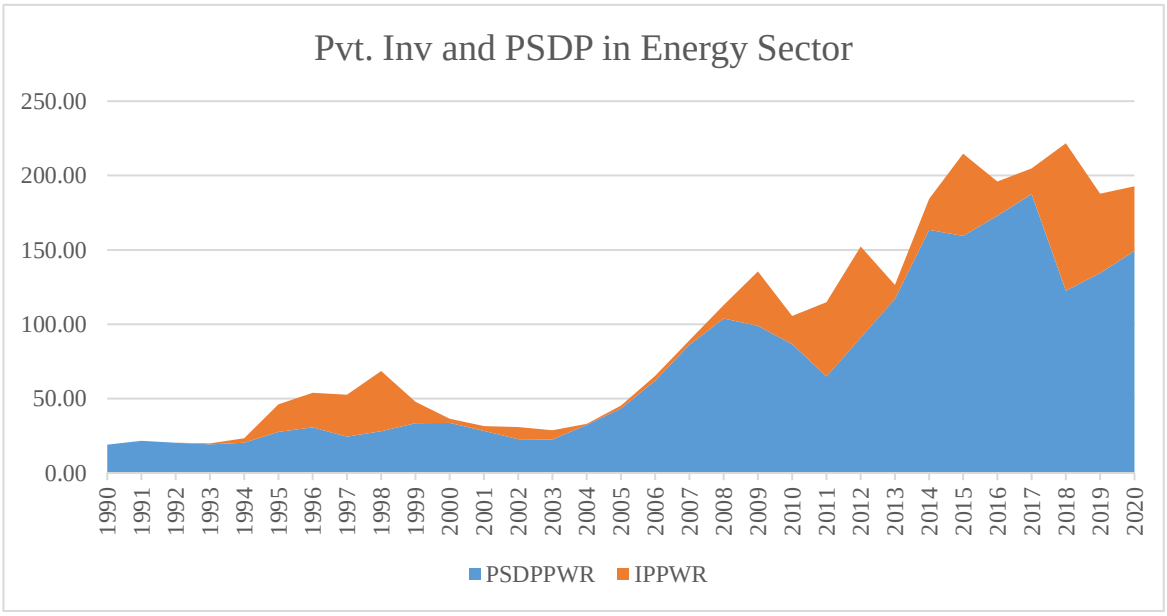
The figure below shows the trend of both PSDP and Private investment in construction sector over last 30 years. It's evident that there is uncertain trend in both variables.



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.



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.



Annexure-B1

Granger Causality Test

Dependent variable: LPSDP

Excluded	Chi-sq	df	Prob.
LEMP	1.356	1	0.244
LIP	0.977	1	0.322
LGOVEXP	0.803	1	0.370
GDPG	1.546	1	0.213
INFL	3.255	1	0.071
All	8.117	5	0.149

Dependent variable: LEMP

Excluded	Chi-sq	df	Prob.
LPSDP	0.083	1	0.773
LIP	24.457	1	0.000
LGOVEXP	0.071	1	0.788
GDPG	2.501	1	0.113
INFL	11.448	1	0.000
All	39.860	5	0.000

Dependent variable: LIP

Excluded	Chi-sq	df	Prob.
LPSDP	2.032	1	0.154
LEMP	3.064	1	0.080
LGOVEXP	0.973	1	0.323
GDPG	4.040	1	0.044
INFL	0.271	1	0.602
All	7.270	5	0.201

Dependent variable: LGOVEXP

Excluded	Chi-sq	df	Prob.
LPSDP	0.019	1	0.890
LEMP	15.151	1	0.001
LIP	0.306	1	0.579
GDPG	2.323	1	0.127
INFL	7.449	1	0.006
All	33.710	5	0.000

Dependent variable: GDPG

Excluded	Chi-sq	df	Prob.
LPSDP	0.008	1	0.927
LEMP	0.226	1	0.634
LIP	0.065	1	0.798

LGOVEXP	0.999	1	0.317
INFL	0.533	1	0.465
All	3.158	5	0.675

Dependent variable: INFL

Excluded	Chi-sq	df	Prob.
LPSDP	1.215	1	0.270
LEMP	1.068	1	0.301
LIP	0.384	1	0.535
LGOVEXP	2.658	1	0.103
GDPG	0.609	1	0.434
All	7.820	5	0.166

Annexure B-2

Private Investment and PSDP Spending Estimations with different Lag Order

Lag Order 1

Sample: 1991 - 2020				Number of obs	= 30
Log likelihood = -357.8387				AIC	= 24.25591
FPE = 1.17e+08				HQIC	= 24.34556
Det(Sigma_ml) = 7.86e+07				SBIC	= 24.53615

Equation	Parms	RMSE	R-sq	chi2	P>chi2
IP	3	76.599	0.9967	9111.653	0.0000
PSDP	3	128.943	0.9242	365.8301	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
IP						
IP						
L1.	1.072134	.0387061	27.70	0.000	.9962712	1.147996
PSDP						
L1.	.0579086	.1033467	0.56	0.575	-.1446471	.2604644
_cons	30.05455	19.51123	1.54	0.123	-8.186768	68.29586
PSDP						
IP						
L1.	.1377929	.0651558	2.11	0.034	.0100899	.2654958
PSDP						
L1.	.626757	.1739685	3.60	0.000	.2857851	.9677289
_cons	22.13899	32.8442	0.67	0.500	-42.23446	86.51243

Lag Order 2

Sample: 1992 - 2020				Number of obs	= 29
Log likelihood = -357.7425				AIC	= 25.08569
FPE = 2.69e+08				HQIC	= 25.17428
Det(Sigma_ml) = 1.78e+08				SBIC	= 25.36858

Equation	Parms	RMSE	R-sq	chi2	P>chi2
PSDP	3	141.405	0.9098	292.4801	0.0000
IP	3	105.94	0.9937	4597.173	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
PSDP						
PSDP						
L2.	-.4909251	.2483089	-1.98	0.048	-.9776016	-.0042486
IP						
L2.	.5918291	.1002815	5.90	0.000	.3952809	.7883773
_cons	-6.289262	38.26442	-0.16	0.869	-81.28614	68.70762
IP						
PSDP						
L2.	.0695157	.1860313	0.37	0.709	-.295099	.4341303
IP						
L2.	1.166059	.0751302	15.52	0.000	1.018806	1.313311
_cons	65.22752	28.66744	2.28	0.023	9.040373	121.4147

Lag Order 3

Sample:	1993 - 2020			Number of obs	= 28
Log likelihood	= -346.3134			AIC	= 25.16524
FPE	= 2.92e+08			HQIC	= 25.25252
Det(Sigma_ml)	= 1.90e+08			SBIC	= 25.45072

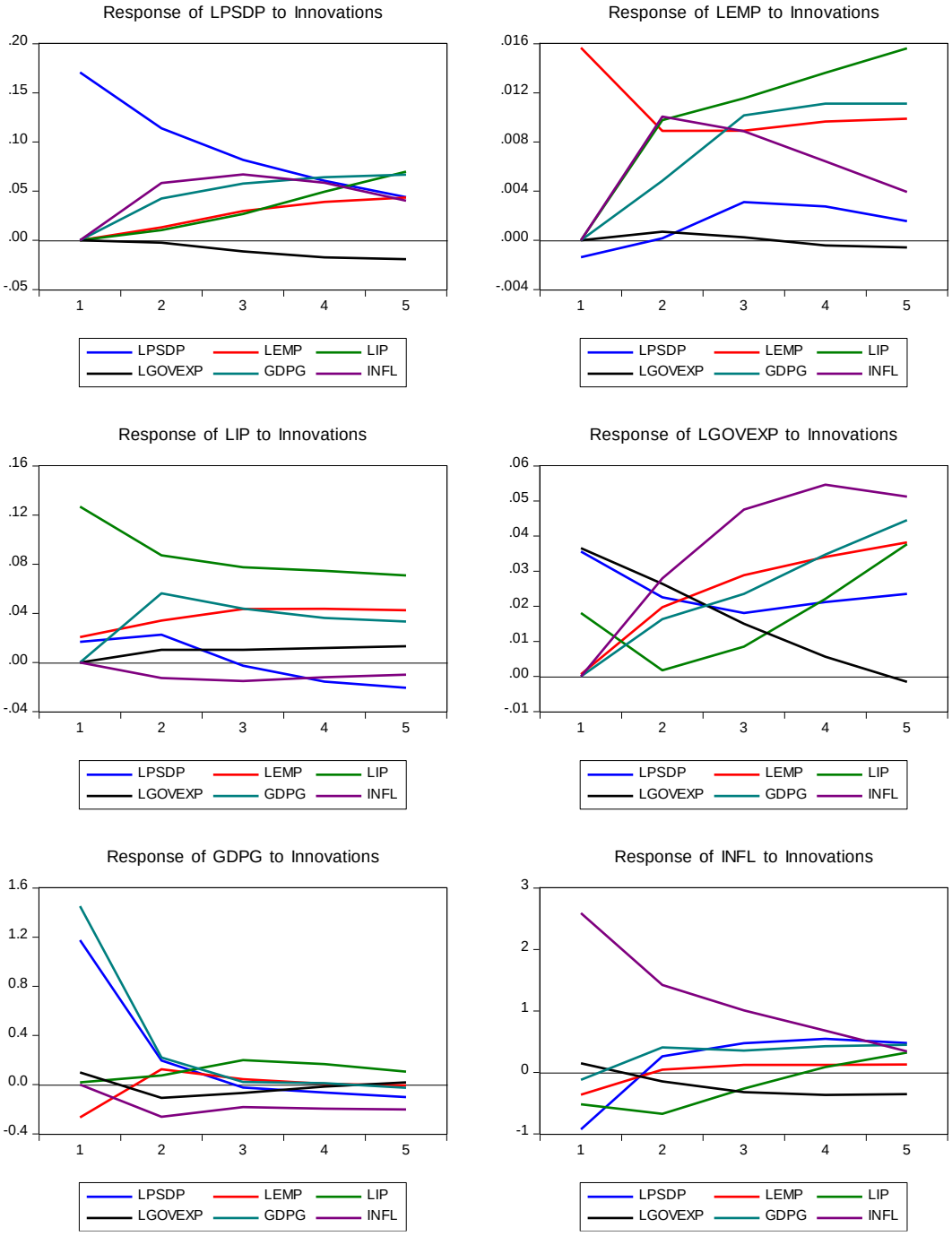
Equation	Parms	RMSE	R-sq	chi2	P>chi2
PSDP	3	132.247	0.9221	331.4591	0.0000
IP	3	116.749	0.9924	3651.444	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
PSDP						
PSDP L3.	-.7848612	.2342071	-3.35	0.001	-1.243899	-.3258238
IP L3.	.7415257	.093619	7.92	0.000	.5580358	.9250157
_cons	-8.248989	36.246	-0.23	0.820	-79.28985	62.79187
IP						
PSDP L3.	-.0300823	.206761	-0.15	0.884	-.4353264	.3751619
IP L3.	1.319526	.0826481	15.97	0.000	1.157539	1.481513
_cons	93.67864	31.99844	2.93	0.003	30.96285	156.3944

Annexure B-3

Impulse Response Function of PSDP Spending and Employment Level

(Innovations are variables mentioned in legend)



Forecasted Error Variance Decomposition of Controlled Variables

Variance Decomposition of LIP:

Period	S.E.	LPSDP	LEMP	LIP	LGOVEXP	GDPG	INFL
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

Variance Decomposition of LGOVEXP:

Period	S.E.	LPSDP	LEMP	LIP	LGOVEXP	GDPG	INFL
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

Variance Decomposition of GDPG:

Period	S.E.	LPSDP	LEMP	LIP	LGOVEXP	GDPG	INFL
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

Variance Decomposition of INFL:

Period	S.E.	LPSDP	LEMP	LIP	LGOVEXP	GDPG	INFL
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

Annexure 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 & Communication Sector

	LPSDPTC	LEMPTC	LIPTC	GDPG	LGOVEXP	INFL
LPSDPTC(-1)	0.225 **	-0.043	-0.061	2.720	0.026	2.831
	(0.206)	(0.063)	(0.262)	(1.818)	(0.077)	(2.992)
	[1.091]	[-0.691]	[-0.233]	[1.496]	[0.341]	[0.946]
LEMPTC(-1)	1.604	0.268	1.7325	12.625	0.113	-21.152
	(0.940)	(0.288)	(1.197)	(8.284)	(0.354)	(13.632)
	[1.706]	[0.932]	[1.446]	[1.524]	[0.320]	[-1.551]
LIPTC(-1)	-0.102	0.074	0.612 ***	-1.532	0.064	4.196 *
	(0.161)	(0.049)	(0.205)	(1.420)	(0.060)	(2.336)
	[-0.634]	[1.50988]	[2.984]	[-1.079]	[1.062]	[1.795]
GDPG(-1)	-0.009	0.006	0.075 **	0.271	0.005	0.297
	(0.025)	(0.007)	(0.032)	(0.221)	(0.009)	(0.364)
	[-0.396]	[0.810]	[2.359]	[1.224]	[0.527]	[0.817]
LGOVEXP(-1)	0.434 *	0.098	0.211	-3.351	0.853 ***	-3.702
	(0.210)	(0.064)	(0.267)	(1.853)	(0.079)	(3.049)
	[2.067]	[1.525]	[0.788]	[-1.808]	[10.751]	[-1.214]
INFL(-1)	0.004	-0.004	-0.001	-0.027	0.008 **	0.558 ***
	(0.013)	(0.004)	(0.01666)	(0.115)	(0.004)	(0.189)
	[0.366]	[-1.071]	[-0.05881]	[-0.236]	[1.813]	[2.943]
C	-1.193	-0.214	-1.246	13.779	0.611	18.987
	(0.794)	(0.243)	(1.012)	(7.003)	(0.299)	(11.525)
	[-1.502]	[-0.879]	[-1.230]	[1.967]	[2.037]	[1.647]

Water & Power Sector

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

Construction Sector

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

Education Sector

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

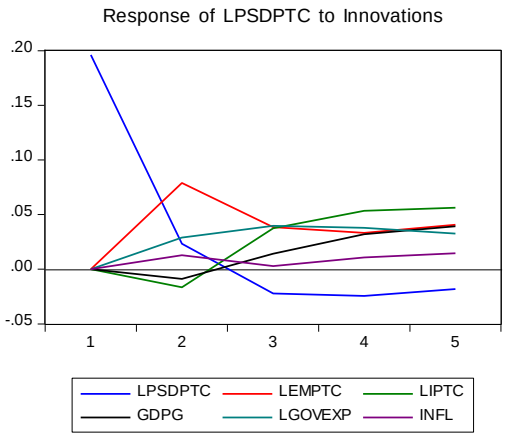
Health Sector

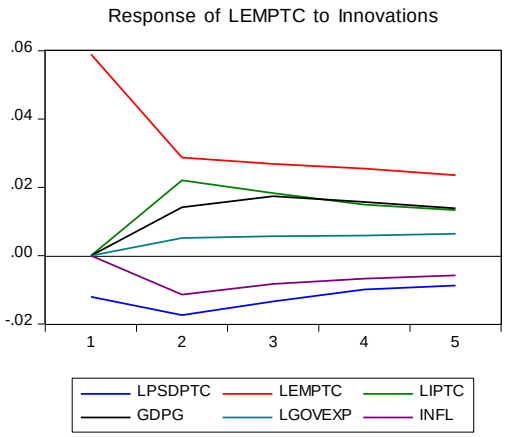
	LPSDPHH	LEMPHH	LGOVEXP	GDPG	INFL
LPSDPHH(-1)	0.501 ***	0.003	0.019	0.139	-0.546
	(0.226)	(0.012)	(0.031)	(0.850)	(1.363)
	[2.212]	[0.219]	[0.613]	[0.164]	[-0.401]
LEMPHH(-1)	1.609	0.838***	0.432	8.371	-5.789
	(2.086)	(0.109)	(0.291)	(7.842)	(12.566)
	[0.771]	[7.729]	[1.483]	[1.067]	[-0.461]
LGOVEXP(-1)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

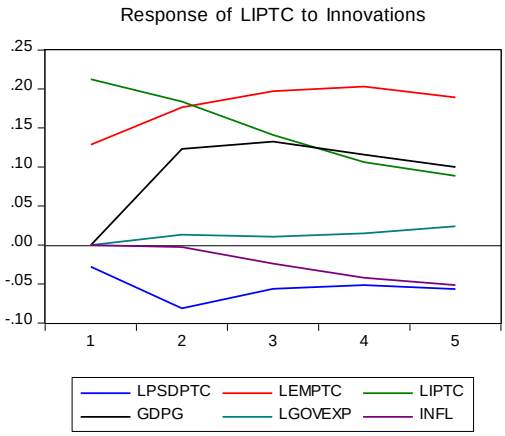
Annexure C-2

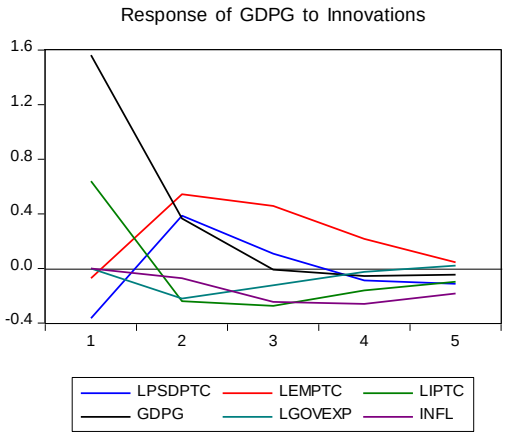
Impulse Response Function

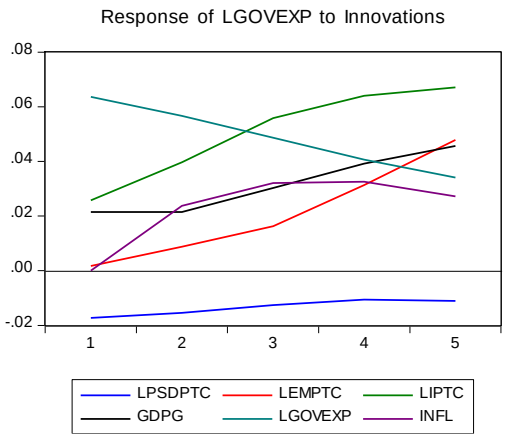
Transport & Communication

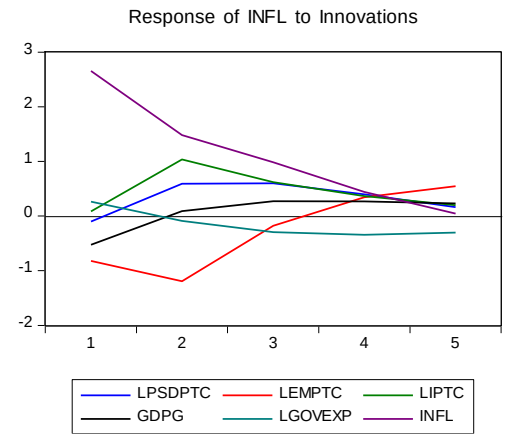




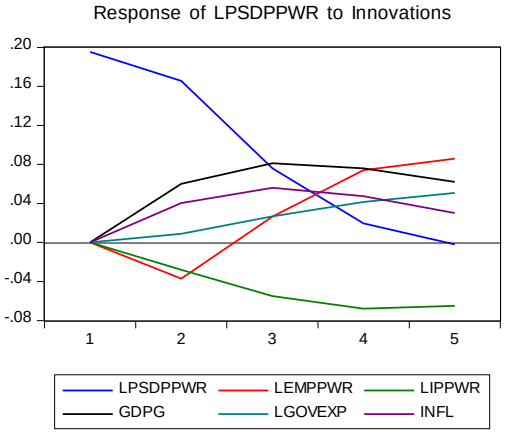


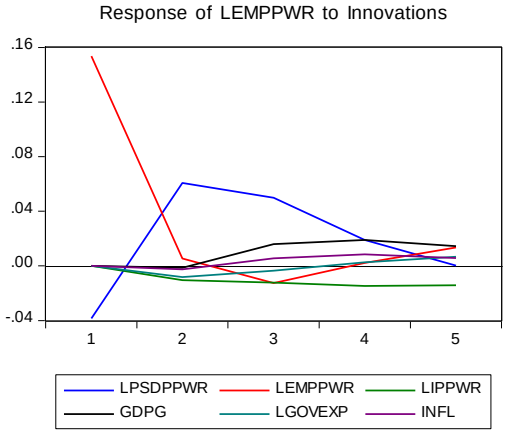


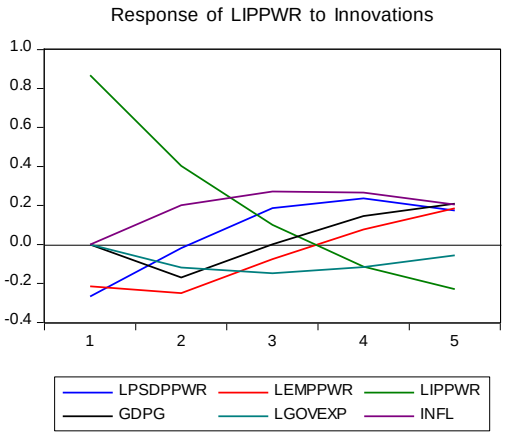


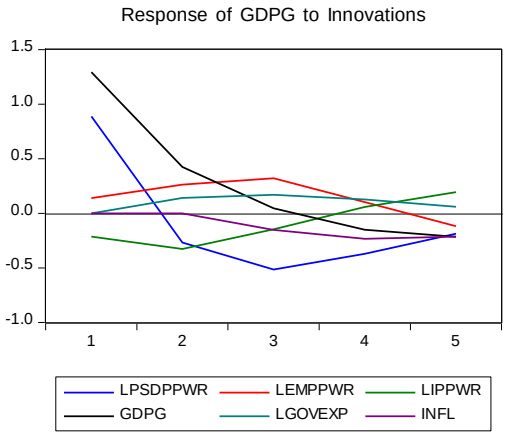


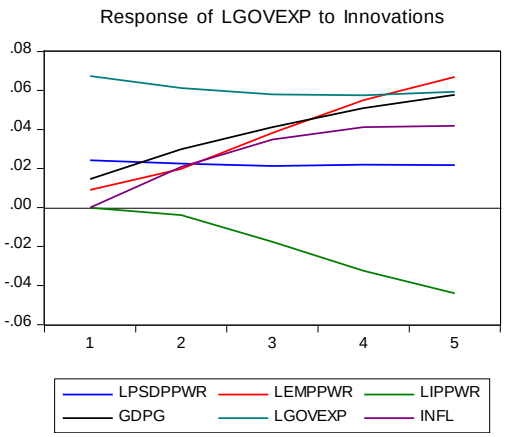
Water and Power Sector

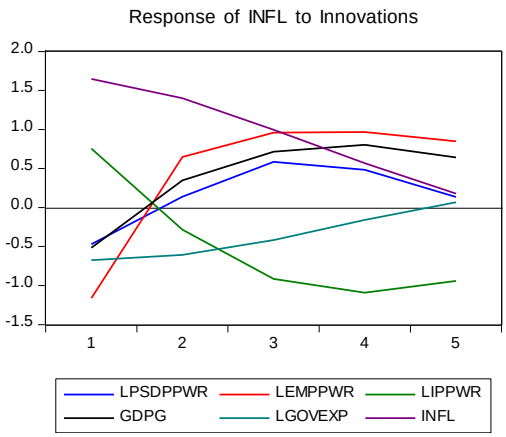




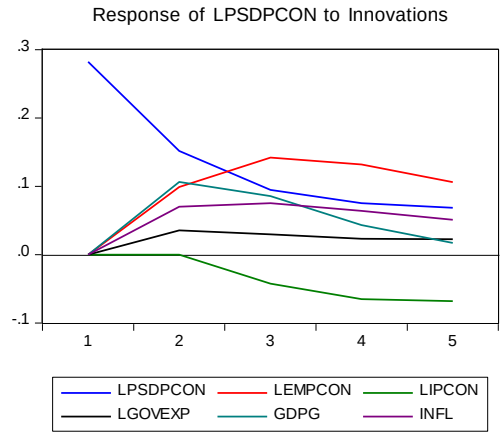


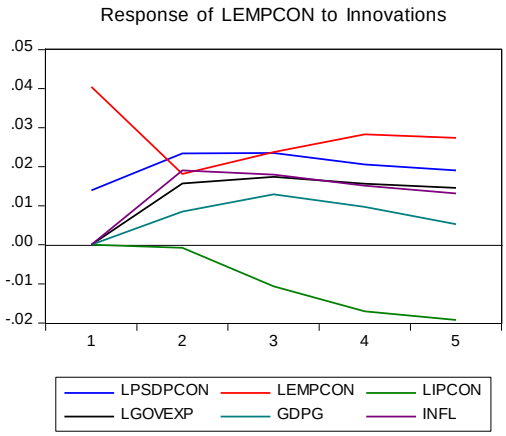


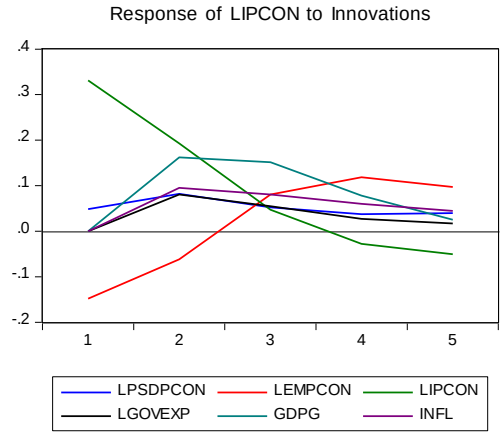


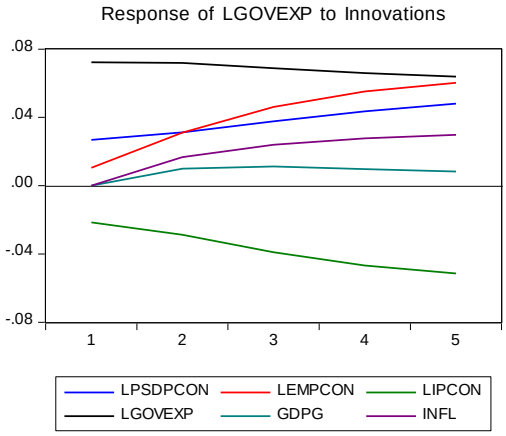


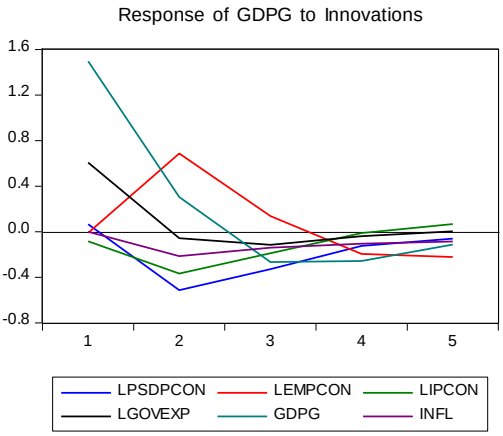
Construction Sector

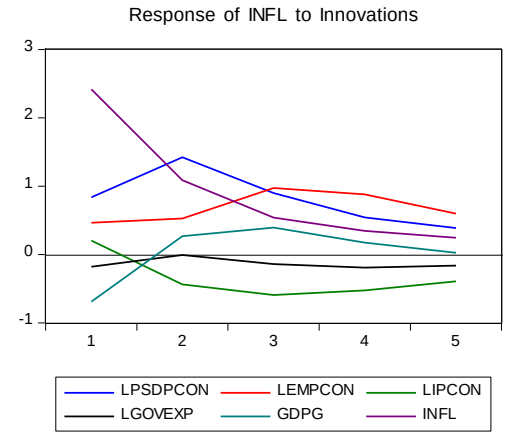




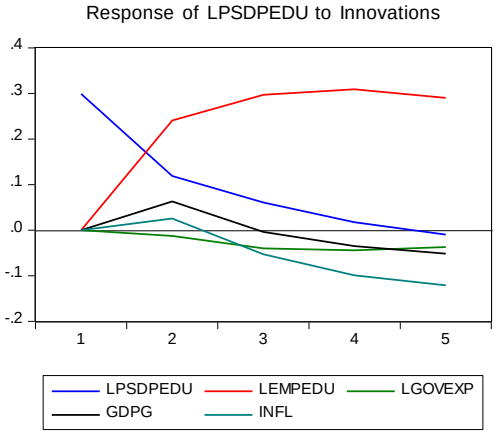


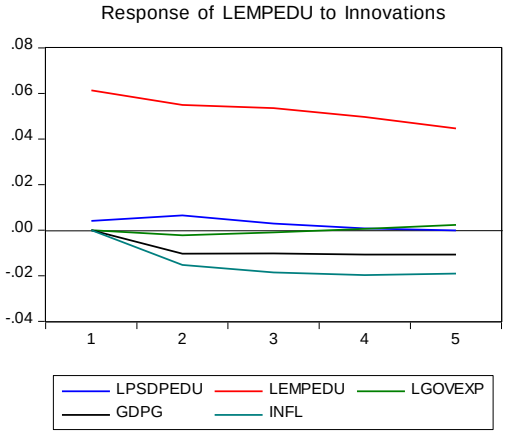


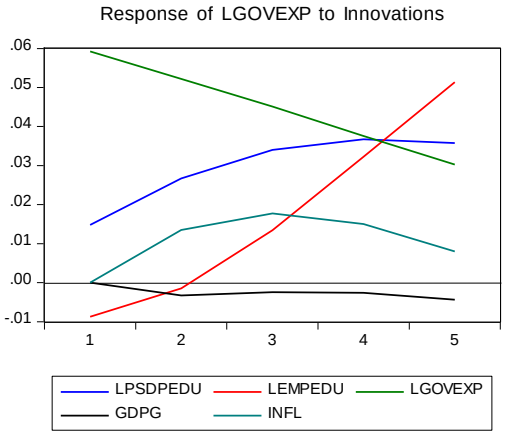


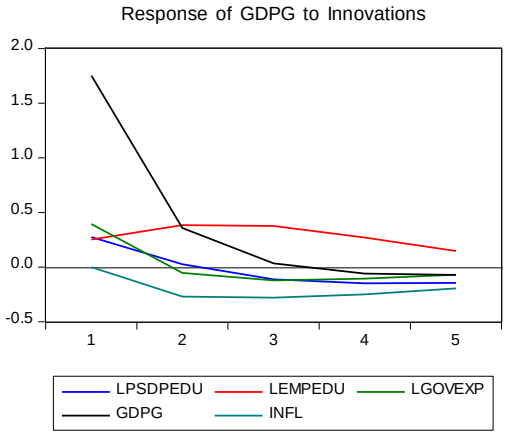


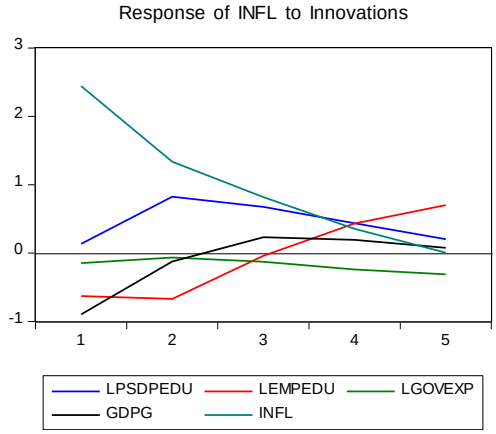
Education Sector



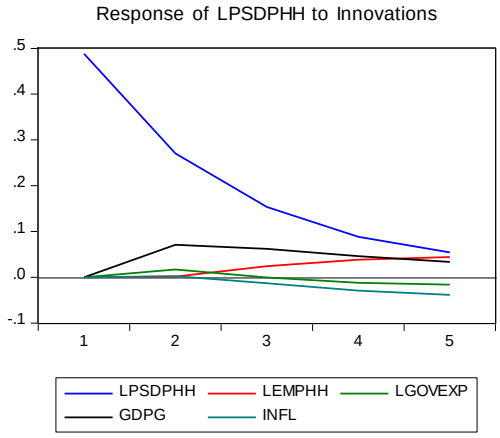


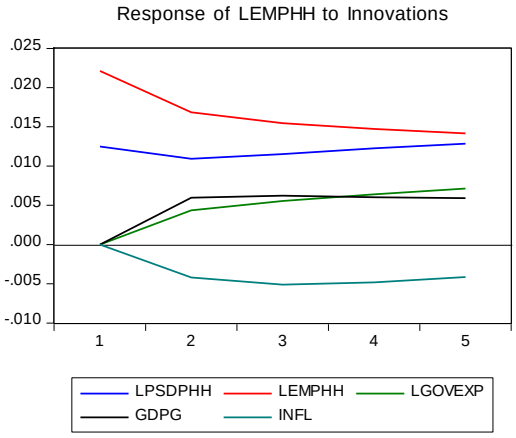


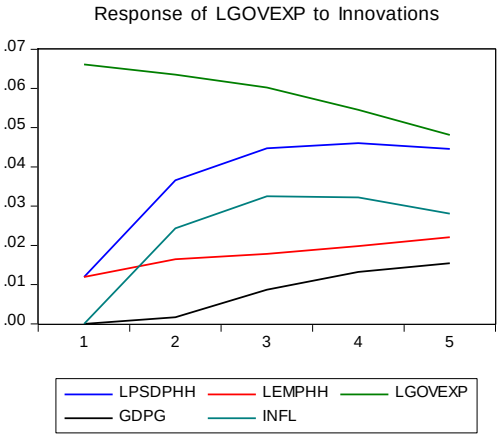


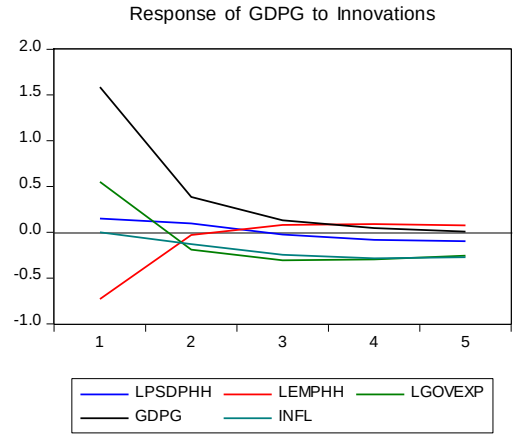


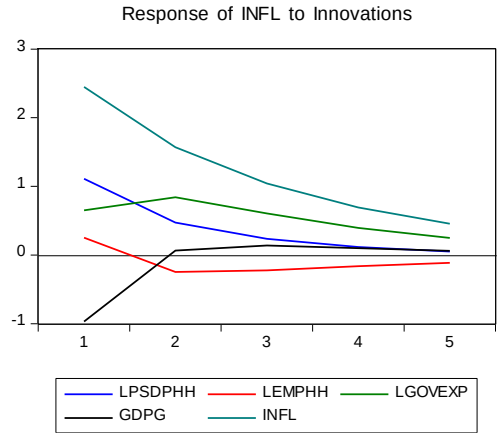
Health Sector











Annexure C-3

Forecasted Error Variance Decomposition

Transport & Communication Sector

Variance Decomposition of LPSDPTC:

Period	S.E.	LPSDPTC	LEMPTC	LIPTC	GDPG	LGOVEXP	INFL
1	0.196	100.000	0.000	0.000	0.000	0.000	0.000
2	0.216	83.725	13.385	0.582	0.164	1.796	0.347
3	0.227	76.319	14.904	3.233	0.540	4.675	0.329
4	0.243	68.083	14.969	7.681	2.223	6.553	0.490
5	0.259	60.435	15.662	11.503	4.278	7.365	0.756
6	0.275	53.797	17.241	14.341	6.145	7.576	0.899
7	0.291	48.152	19.362	16.368	7.718	7.505	0.895
8	0.308	43.441	21.631	17.773	9.012	7.323	0.821
9	0.324	39.570	23.785	18.725	10.060	7.119	0.741
10	0.340	36.416	25.695	19.370	10.902	6.938	0.680

Variance Decomposition of LEMPTC:

Period	S.E.	LPSDPTC	LEMPTC	LIPTC	GDPG	LGOVEXP	INFL
1	0.060	4.021	95.979	0.000	0.000	0.000	0.000
2	0.075	8.052	76.900	8.672	3.578	0.469	2.329
3	0.085	8.720	69.431	11.344	6.942	0.806	2.756
4	0.092	8.556	66.484	12.230	8.771	1.085	2.874
5	0.098	8.399	64.825	12.712	9.780	1.385	2.899
6	0.103	8.317	63.489	13.176	10.450	1.712	2.856
7	0.106	8.256	62.277	13.685	10.976	2.042	2.764
8	0.110	8.181	61.170	14.225	11.426	2.352	2.646
9	0.113	8.085	60.170	14.769	11.825	2.627	2.524
10	0.116	7.976	59.272	15.296	12.185	2.864	2.408

Variance Decomposition of LIPTC:

Period	S.E.	LPSDPTC	LEMPTC	LIPTC	GDPG	LGOVEXP	INFL
1	0.250	1.236	26.476	72.288	0.000	0.000	0.000
2	0.386	4.924	31.953	52.859	10.143	0.117	0.005
3	0.479	4.575	37.738	43.055	14.253	0.125	0.255
4	0.548	4.378	42.609	36.685	15.375	0.171	0.783
5	0.600	4.537	45.440	32.749	15.586	0.303	1.385
6	0.640	4.860	46.769	30.377	15.625	0.528	1.841
7	0.671	5.178	47.270	28.971	15.674	0.821	2.085
8	0.695	5.419	47.362	28.153	15.757	1.145	2.164
9	0.716	5.575	47.259	27.691	15.863	1.467	2.146
10	0.733	5.662	47.066	27.442	15.980	1.766	2.084

Variance Decomposition of GDPG:

Period	S.E.	LPSDPTC	LEMPTC	LIPTC	GDPG	LGOVEXP	INFL
1	1.728	4.461	0.177	13.675	81.686	0.000	0.000
2	1.918	7.669	8.193	12.689	69.985	1.322	0.142
3	2.012	7.250	12.603	13.395	63.559	1.582	1.611
4	2.050	7.175	13.252	13.532	61.332	1.540	3.169
5	2.064	7.373	13.111	13.564	60.514	1.527	3.911
6	2.070	7.449	13.085	13.605	60.215	1.542	4.103
7	2.074	7.441	13.207	13.630	60.054	1.556	4.112
8	2.077	7.418	13.379	13.628	59.913	1.562	4.100
9	2.080	7.403	13.533	13.611	59.784	1.561	4.108
10	2.082	7.399	13.644	13.591	59.680	1.558	4.128

Variance Decomposition of LGOVEXP:

Period	S.E.	LPSDPTC	LEMPTC	LIPTC	GDPG	LGOVEXP	INFL
1	0.074	5.473	0.054	12.139	8.432	73.902	0.000
2	0.108	4.645	0.684	19.315	7.939	62.555	4.862
3	0.140	3.582	1.768	27.562	9.440	49.473	8.175
4	0.170	2.800	4.596	32.746	11.659	39.036	9.162
5	0.199	2.339	9.089	35.088	13.700	31.274	8.511
6	0.228	2.146	14.309	35.508	15.245	25.587	7.206
7	0.256	2.161	19.317	34.869	16.293	21.456	5.905
8	0.282	2.318	23.589	33.789	16.958	18.474	4.870
9	0.307	2.552	26.991	32.636	17.368	16.327	4.125
10	0.329	2.813	29.597	31.587	17.622	14.778	3.603

Variance Decomposition of INFL:

Period	S.E.	LPSDPTC	LEMPTC	LIPTC	GDPG	LGOVEXP	INFL
1	2.844	0.128	8.368	0.092	3.440	0.865	87.106
2	3.626	2.748	16.000	8.201	2.180	0.591	70.281
3	3.880	4.772	14.193	9.702	2.400	1.097	67.836
4	3.981	5.531	14.229	10.061	2.729	1.793	65.657
5	4.045	5.515	15.615	9.990	2.973	2.301	63.606
6	4.098	5.373	17.036	9.773	3.102	2.560	62.156
7	4.139	5.317	17.935	9.580	3.140	2.653	61.374
8	4.166	5.334	18.332	9.474	3.132	2.670	61.057
9	4.180	5.372	18.431	9.445	3.115	2.665	60.972
10	4.187	5.400	18.415	9.459	3.106	2.658	60.962

Cholesky Ordering: LPSDPTC LEMPTC LIPTC GDPG LGOVEXP INFL

Water & Power Sector

Variance Decomposition of LPSDPPWR:

Period	S.E.	LPSDPPWR	LEMPPWR	LIPPWR	GDPG	LGOVEXP	INFL
1	0.195	100.000	0.000	0.000	0.000	0.000	0.000
2	0.270	89.761	1.876	1.078	4.940	0.109	2.236
3	0.305	76.742	2.230	4.093	10.956	0.853	5.126
4	0.337	63.365	6.696	7.438	14.087	2.217	6.198
5	0.364	54.275	11.316	9.567	14.991	3.851	6.001
6	0.383	49.039	14.141	10.516	15.137	5.575	5.592
7	0.395	46.011	15.560	10.771	15.103	7.265	5.291
8	0.404	44.070	16.248	10.727	15.048	8.806	5.101
9	0.411	42.619	16.631	10.595	15.023	10.133	4.999
10	0.417	41.351	16.919	10.458	15.050	11.237	4.984

Variance Decomposition of LEMPPWR:

Period	S.E.	LPSDPPWR	LEMPPWR	LIPPWR	GDPG	LGOVEXP	INFL
1	0.158	5.879	94.121	0.000	0.000	0.000	0.000
2	0.170	17.832	81.533	0.376	0.007	0.231	0.022
3	0.179	23.885	74.142	0.811	0.801	0.247	0.113
4	0.182	24.237	71.873	1.439	1.865	0.260	0.327
5	0.184	23.756	70.987	2.011	2.443	0.386	0.417
6	0.185	23.492	70.560	2.318	2.625	0.588	0.417
7	0.186	23.387	70.328	2.408	2.659	0.798	0.419
8	0.186	23.338	70.182	2.414	2.660	0.977	0.430
9	0.186	23.303	70.083	2.410	2.659	1.113	0.432
10	0.186	23.276	70.011	2.408	2.661	1.213	0.433

Variance Decomposition of LIPPWR:

Period	S.E.	LPSDPPWR	LEMPPWR	LIPPWR	GDPG	LGOVEXP	INFL
1	0.933	8.156	5.294	86.550	0.000	0.000	0.000
2	1.086	6.050	9.181	77.682	2.436	1.197	3.454
3	1.151	8.002	8.597	69.876	2.167	2.706	8.651
4	1.227	10.767	7.958	62.376	3.320	3.280	12.298
5	1.308	11.250	9.005	57.934	5.489	3.067	13.255
6	1.373	10.521	10.950	55.919	7.080	2.786	12.744
7	1.413	9.946	12.522	54.953	7.724	2.764	12.091
8	1.431	9.837	13.251	54.323	7.801	2.959	11.829
9	1.439	9.960	13.374	53.850	7.732	3.208	11.877
10	1.443	10.064	13.306	53.550	7.706	3.390	11.984

Variance Decomposition of GDPG:

Period	S.E.	LPSDPPWR	LEMPPWR	LIPPWR	GDPG	LGOVEXP	INFL
1	1.588	31.209	0.766	1.821	66.203	0.000	0.000
2	1.723	28.913	2.974	5.150	62.302	0.661	0.000
3	1.847	32.912	5.599	5.112	54.276	1.417	0.683
4	1.913	34.491	5.505	4.858	51.251	1.759	2.136
5	1.960	33.768	5.609	5.600	50.036	1.770	3.217
6	2.001	32.459	6.599	6.760	48.959	1.697	3.526
7	2.030	31.567	7.563	7.583	48.110	1.701	3.477
8	2.043	31.207	8.045	7.901	47.614	1.792	3.441
9	2.049	31.134	8.162	7.931	47.371	1.910	3.493
10	2.052	31.123	8.150	7.911	47.251	2.002	3.563

Variance Decomposition of LGOVEXP:

Period	S.E.	LPSDPPWR	LEMPPWR	LIPPWR	GDPG	LGOVEXP	INFL
1	0.074	10.771	1.501	0.000	3.909	83.819	0.000
2	0.107	9.551	4.150	0.132	9.670	72.690	3.806
3	0.141	7.743	9.742	1.635	14.090	58.522	8.268
4	0.179	6.311	15.491	4.304	16.827	46.638	10.430
5	0.218	5.244	19.850	6.975	18.355	38.847	10.729
6	0.255	4.400	22.863	9.028	19.133	34.375	10.201
7	0.288	3.733	24.902	10.366	19.456	32.086	9.457
8	0.318	3.225	26.255	11.117	19.520	31.122	8.762
9	0.343	2.851	27.128	11.465	19.457	30.900	8.199
10	0.365	2.578	27.674	11.573	19.355	31.040	7.780

Variance Decomposition of INFL:

Period	S.E.	LPSDPPWR	LEMPPWR	LIPPWR	GDPG	LGOVEXP	INFL
1	2.363	3.985	24.222	10.256	4.772	8.178	48.587
2	2.924	2.827	20.714	7.628	4.520	9.628	54.684
3	3.512	4.743	21.827	12.086	7.294	8.080	45.970
4	3.960	5.228	23.127	17.091	9.843	6.513	38.198
5	4.214	4.722	24.486	20.077	11.015	5.779	33.921
6	4.326	4.629	25.241	21.047	11.126	5.705	32.251
7	4.373	5.034	25.228	20.922	10.921	5.895	32.000
8	4.402	5.446	24.896	20.655	10.857	6.040	32.106
9	4.432	5.608	24.696	20.655	10.957	6.054	32.029
10	4.457	5.594	24.712	20.832	11.072	6.004	31.786

Cholesky Ordering: LPSDPPWR LEMPPWR LIPPWR GDPG LGOVEXP INFL

Construction Sector

Variance Decomposition of LPSDPCON:

Period	S.E.	LPSDPCON	LEMPCON	LIPCON	LGOVEXP	GDPG	INFL
1	0.282	100.000	0.000	0.000	0.000	0.000	0.000
2	0.360	78.995	7.538	0.000	0.964	8.711	3.792
3	0.418	63.897	17.127	1.041	1.215	10.661	6.058
4	0.456	56.252	22.701	2.913	1.275	9.829	7.031
5	0.482	52.473	25.190	4.612	1.364	8.940	7.421
6	0.499	50.439	26.274	5.854	1.520	8.342	7.572
7	0.512	49.159	26.820	6.720	1.735	7.935	7.631
8	0.522	48.217	27.152	7.346	1.991	7.638	7.657
9	0.531	47.450	27.381	7.824	2.270	7.406	7.668
10	0.538	46.789	27.548	8.213	2.562	7.215	7.674

Variance Decomposition of LEMPCON:

Period	S.E.	LPSDPCON	LEMPCON	LIPCON	LGOVEXP	GDPG	INFL
1	0.043	10.602	89.398	0.000	0.000	0.000	0.000
2	0.058	21.876	58.009	0.017	7.252	2.128	10.718
3	0.074	23.912	46.759	2.104	10.141	4.418	12.666
4	0.087	22.928	44.433	5.392	10.595	4.452	12.200
5	0.097	22.167	43.439	8.238	10.722	3.851	11.583
6	0.105	21.908	42.363	10.299	10.993	3.341	11.096
7	0.112	21.869	41.306	11.737	11.398	2.974	10.716
8	0.118	21.866	40.391	12.765	11.863	2.707	10.410
9	0.123	21.840	39.627	13.537	12.334	2.502	10.159
10	0.128	21.793	38.985	14.146	12.787	2.339	9.950

Variance Decomposition of LIPCON:

Period	S.E.	LPSDPCON	LEMPCON	LIPCON	LGOVEXP	GDPG	INFL
1	0.366	1.774	16.387	81.839	0.000	0.000	0.000
2	0.473	4.081	11.528	65.658	2.891	11.777	4.065
3	0.517	4.432	12.071	55.717	3.548	18.414	5.818
4	0.542	4.498	15.739	50.932	3.476	18.834	6.521
5	0.557	4.769	17.947	49.047	3.384	18.039	6.814
6	0.567	5.201	18.878	48.188	3.360	17.441	6.932
7	0.573	5.633	19.308	47.648	3.396	17.035	6.979
8	0.579	5.985	19.577	47.230	3.474	16.734	7.001
9	0.583	6.257	19.784	46.877	3.576	16.493	7.014
10	0.587	6.472	19.956	46.567	3.692	16.289	7.024

Variance Decomposition of LGOVEXP:

Period	S.E.	LPSDPCON	LEMPCON	LIPCON	LGOVEXP	GDPG	INFL
1	0.081	11.063	1.669	7.091	80.176	0.000	0.000
2	0.122	11.452	7.277	8.672	70.031	0.680	1.887
3	0.159	12.310	12.673	11.081	59.660	0.894	3.380
4	0.194	13.306	16.611	13.249	51.677	0.850	4.308
5	0.226	14.279	19.274	14.894	45.900	0.757	4.896
6	0.257	15.136	21.112	16.079	41.701	0.678	5.294
7	0.285	15.846	22.448	16.932	38.573	0.621	5.581
8	0.311	16.418	23.466	17.560	36.179	0.580	5.798
9	0.335	16.878	24.267	18.035	34.303	0.550	5.967
10	0.358	17.251	24.910	18.406	32.803	0.527	6.103

Variance Decomposition of GDPG:

Period	S.E.	LPSDPCON	LEMPCON	LIPCON	LGOVEXP	GDPG	INFL
1	1.618	0.158	0.004	0.269	14.036	85.532	0.000
2	1.905	7.401	12.974	3.936	10.212	64.204	1.273
3	1.974	9.681	12.568	4.580	9.854	61.617	1.699
4	2.008	9.751	13.093	4.434	9.570	61.230	1.922
5	2.027	9.658	14.046	4.458	9.388	60.379	2.071
6	2.036	9.657	14.481	4.571	9.303	59.831	2.157
7	2.041	9.706	14.633	4.661	9.258	59.543	2.198
8	2.044	9.755	14.698	4.716	9.233	59.379	2.218
9	2.046	9.789	14.736	4.749	9.219	59.278	2.230
10	2.047	9.811	14.762	4.770	9.210	59.210	2.237

Variance Decomposition of INFL:

Period	S.E.	LPSDPCON	LEMPCON	LIPCON	LGOVEXP	GDPG	INFL
1	2.703	9.600	2.937	0.562	0.435	6.551	79.915
2	3.323	24.630	4.435	2.109	0.288	4.976	63.561
3	3.690	25.911	10.539	4.310	0.376	5.170	53.693
4	3.891	25.237	14.570	5.708	0.580	4.845	49.060
5	3.987	24.993	16.129	6.414	0.720	4.620	47.125
6	4.030	25.000	16.662	6.732	0.788	4.522	46.296
7	4.050	25.044	16.873	6.869	0.821	4.476	45.916
8	4.060	25.069	16.975	6.929	0.838	4.455	45.735
9	4.065	25.079	17.027	6.956	0.847	4.444	45.647
10	4.067	25.082	17.053	6.968	0.853	4.440	45.604

Cholesky Ordering: LPSDPCON LEMPCON LIPCON LGOVEXP GDPG INFL

Education Sector

Variance Decomposition of LPSDPEDU:

Period	S.E.	LPSDPEDU	LEMPEDU	LGOVEXP	GDPG	INFL
1	0.299	100.000	0.000	0.000	0.000	0.000
2	0.407	62.291	34.852	0.099	2.370	0.387
3	0.512	40.833	55.651	0.677	1.506	1.332
4	0.609	28.928	65.055	1.009	1.399	3.608
5	0.689	22.661	68.678	1.079	1.656	5.926004
6	0.747	19.342	69.849	1.017	2.006	7.78543
7	0.787	17.546	70.088	0.927	2.338	9.101
8	0.813	16.539	70.040	0.875	2.609	9.937
9	0.829	15.944	69.954	0.887	2.811	10.404
10	0.839	15.570	69.895	0.966	2.950	10.620

Variance Decomposition of LEMPEDU:

Period	S.E.	LPSDPEDU	LEMPEDU	LGOVEXP	GDPG	INFL
1	0.061	0.430	99.570	0.000	0.000	0.000
2	0.085	0.806	94.348	0.074	1.500	3.273
3	0.102	0.629	91.745	0.060	2.022	5.543
4	0.116	0.495	89.796	0.049	2.435	7.225
5	0.126	0.418	88.332	0.073	2.784	8.392
6	0.134	0.372	87.265	0.154	3.070	9.139
7	0.140	0.344	86.502	0.297	3.290	9.566
8	0.144	0.339	85.953	0.492	3.451	9.765
9	0.148	0.362	85.543	0.721	3.561	9.812
10	0.151	0.417	85.224	0.960	3.633	9.766

Variance Decomposition of LGOVEXP:

Period	S.E.	LPSDPEDU	LEMPEDU	LGOVEXP	GDPG	INFL
1	0.062	5.760	2.012	92.227	0.000	0.000
2	0.086	12.514	1.058	83.832	0.147	2.448
3	0.106	18.760	2.335	74.293	0.151	4.461
4	0.123	22.676	8.567	63.845	0.155	4.757
5	0.142	23.494	19.592	52.789	0.212	3.913
6	0.162	21.833	32.493	42.335	0.361	2.979
7	0.185	19.026	44.187	33.618	0.602	2.567
8	0.209	16.149	53.243	26.986	0.903	2.719
9	0.233	13.699	59.669	22.188	1.225	3.219
10	0.255	11.781	64.044	18.787	1.538	3.850

Variance Decomposition of GDPG:

Period	S.E.	LPSDPEDU	LEMPEDU	LGOVEXP	GDPG	INFL
1	1.834	2.232	1.901	4.628	91.239	0.000
2	1.927	2.038	5.679	4.268	86.051	1.964
3	1.991	2.227	8.897	4.381	80.682	3.813
4	2.034	2.673	10.291	4.476	77.389	5.171
5	2.056	3.115	10.577	4.495	75.843	5.971
6	2.065	3.433	10.512	4.481	75.244	6.330
7	2.069	3.608	10.527	4.463	74.976	6.425
8	2.073	3.674	10.749	4.452	74.713	6.411
9	2.078	3.679	11.122	4.443	74.366	6.389
10	2.083	3.661	11.534	4.433	73.973	6.398

Variance Decomposition of INFL:

Period	S.E.	LPSDPEDU	LEMPEDU	LGOVEXP	GDPG	INFL
1	2.685	0.251	5.493	0.294	11.174	82.787
2	3.185	6.877	8.340	0.254	8.096	76.432
3	3.367	10.184	7.475	0.371	7.715	74.255
4	3.455	11.272	8.662	0.842	7.637	71.587

5	3.546	11.026	12.127	1.573	7.299	67.975
6	3.653	10.388	16.027	2.283	6.881	64.420
7	3.756	9.923	18.931	2.790	6.573	61.783
8	3.835	9.761	20.523	3.077	6.415	60.225
9	3.885	9.816	21.125	3.206	6.365	59.487
10	3.910	9.961	21.202	3.247	6.369	59.221

Cholesky Ordering: LPSDPEDU LEMPEDU LGOVEXP GDPG INFL

Health Sector

Variance Decomposition of LPSDPHH:

Period	S.E.	LPSDPHH	LEMPHH	LGOVEXP	GDPG	INFL
1	0.488	100.000	0.000	0.000	0.000	0.000
2	0.563	98.332	0.001	0.090	1.576	0.002
3	0.587	97.128	0.168	0.083	2.570	0.051
4	0.598	95.949	0.567	0.123	3.075	0.286
5	0.604	94.723	1.084	0.190	3.312	0.691
6	0.609	93.577	1.617	0.240	3.420	1.146
7	0.613	92.606	2.111	0.260	3.473	1.550
8	0.616	91.828	2.550	0.260	3.505	1.857
9	0.619	91.211	2.935	0.259	3.529	2.066
10	0.622	90.707	3.275	0.270	3.551	2.197

Variance Decomposition of LEMPHH:

Period	S.E.	LPSDPHH	LEMPHH	LGOVEXP	GDPG	INFL
1	0.025	24.152	75.848	0.000	0.000	0.000
2	0.033	24.563	68.971	1.692	3.188	1.586
3	0.040	25.680	63.725	3.133	4.693	2.770
4	0.045	27.160	59.757	4.416	5.389	3.278
5	0.050	28.667	56.591	5.616	5.773	3.353
6	0.055	30.040	53.989	6.728	6.025	3.218
7	0.059	31.224	51.827	7.734	6.211	3.005
8	0.063	32.218	50.021	8.627	6.357	2.777
9	0.066	33.043	48.509	9.406	6.477	2.564
10	0.070	33.727	47.238	10.082	6.578	2.374

Variance Decomposition of LGOVEXP:

Period	S.E.	LPSDPHH	LEMPHH	LGOVEXP	GDPG	INFL
1	0.068	3.058	3.071	93.872	0.000	0.000
2	0.104	13.590	3.804	77.131	0.026	5.450
3	0.134	19.376	4.079	66.932	0.437	9.176
4	0.157	22.706	4.565	60.808	1.026	10.895
5	0.175	24.890	5.290	56.806	1.612	11.402
6	0.188	26.474	6.195	53.934	2.135	11.262
7	0.199	27.695	7.210	51.693	2.585	10.816
8	0.208	28.671	8.277	49.826	2.966	10.260
9	0.215	29.469	9.348	48.203	3.286	9.694
10	0.222	30.133	10.388	46.756	3.556	9.167

Variance Decomposition of GDPG:

Period	S.E.	LPSDPHH	LEMPHH	LGOVEXP	GDPG	INFL
1	1.835	0.662	15.774	8.977	74.588	0.000
2	1.892	0.881	14.868	9.453	74.326	0.472
3	1.938	0.856	14.336	11.497	71.257	2.054
4	1.986	0.992	13.858	13.188	67.947	4.015
5	2.024	1.186	13.470	14.276	65.381	5.686

6	2.051	1.350	13.192	14.915	63.672	6.871
7	2.069	1.463	13.009	15.275	62.627	7.625
8	2.079	1.537	12.896	15.475	62.023	8.070
9	2.085	1.583	12.828	15.585	61.687	8.317
10	2.088	1.612	12.789	15.646	61.505	8.448

Variance Decomposition of INFL:

Period	S.E.	LPSDPHH	LEMPHH	LGOVEXP	GDPG	INFL
1	2.940	14.276	0.735	4.895	10.855	69.238
2	3.480	12.036	1.034	9.358	7.786	69.787
3	3.699	11.059	1.282	10.940	7.031	69.688
4	3.791	10.629	1.402	11.496	6.768	69.704
5	3.828	10.438	1.464	11.688	6.661	69.748
6	3.844	10.353	1.501	11.749	6.615	69.781
7	3.851	10.318	1.526	11.763	6.594	69.799
8	3.854	10.306	1.544	11.762	6.584	69.804
9	3.855	10.304	1.557	11.758	6.579	69.802
10	3.856	10.306	1.569	11.754	6.577	69.794

Cholesky Ordering: LPSDPHH LEMPHH LGOVEXP GDPG INFL