HUMAN RESOURCE MANAGEMENT, UNEMPLOYMENT AND UNDEREMPLOYMENT IN PAKISTAN

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Abstract. The issue of unemployment is both deep rooted, burning and one of the major economic issues in Pakistan. It is perplexing as the officially reported level of unemployment are understated and underestimated (much owing to the methodology used to calculate it), despite the observed periodic rises in the rate of investment and expansions in economic growth rates. The present study calculates the duration adjusted unemployment rate by applying Boorach, V., K. (2002) formula, which helps to convert under-employment into full open unemployment. Three different scenarios for duration unemployment rates are utilized, as given in the Labor Force Survey 2013-14 & 2017-18. The official unemployment rate has been reported as 5.8% for 2017-18. The results of this study indicated that unemployment under scenario one, is as high as 10.02 percent in Pakistan, while duration of working hours were 15-24 hours in a week; increased by 4.8% higher than that of official unemployment. The estimated unemployment rate is as high as over 25 percent under scenario two and three (sigma = 0.7 & 0.8) respectively. The urban and rural unemployment were 9% and 14%, under scenario one, respectively (sigma = 0.8). The same under scenario two and three were 25% and 31 % in urban (sigma =0.8) and 25% and 28% (sigma = 0.8) for rural areas under scenario two and three, respectively. The unemployment rate is higher for females, i.e. 15.7% (scenario one, sigma =0.8), as compared to males' of 9%. The same rate for females was over 28%

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for inequality of 0.8 for scenarios two and three. However, the same rates for males were 24% and 29% for scenario 2 and 3, respectively. Among all provinces, unemployment was highest in KPK and Punjab, as compared to other provinces. All above, indicated that unemployment rates were much higher than that of the official rate, in all respects. It is also clear that unemployment was hidden in the under-employment definition. There is a need to chalk out better economic policies to manage human resources; focused on to generate employment opportunities to manage unemployment and underemployment.

Keywords: Unemployment rate; Duration-adjusted unemployment rates; Underemployment; Human Resources

JEL Classification: O15, J6, J64

I. INTRODUCTION

Unemployment is one of the most imperative macroeconomic issues in Pakistan, which is often discussed on economic and political forums, especially due to emerging poor economic performance and recessions of 2008-09 and 2018-20; which became more severe since the emergence of COV-19. Its intensity has affected the major economic indicators; such as reduced living standard, per capita income¹ and loss of output; aggregate production below the potential level. It also adversely affected social indicators like high unemployment causes psychological distress, socioeconomic deprivation, increase in crime rate and waste of human resources and increase in poverty, which further intensified the temptation of indulging in illegal activities². Moreover, it raised poverty level and income inequalities, as well as, acted as a bottleneck for acceleration in economic growth³. Aggregate output is a function of available inputs - labor and capital etc. Thus, increasing unemployment above its natural rate of unemployment is associated with falling output below the full employment level of output.

¹. Recently, it has been reported that Per Capita income has been reduced from \$1600 to around \$1350.

² See; Pakistan Economic Survey of 2017-18.

³ Refer to Economic Management and Emerging Economic Issues in Pakistan, forthcoming, HEC publication 2020-21.

Despite the fact that many developing countries have mass unemployed labor force which is a burden on the economy, because of the low investment for human development. It leads to not only increase in unemployment but underemployment has also become a severe issue. Paul Krugman (1991) emphasis that unemployment, productivity and income distribution are the most important and significant factors in the economy. If these are managed well and moving in the right direction then nothing else can go wrong, however, if these factors are not efficiently utilized, then nothing can go right, since these factors are interlinked through various means i.e. unemployment breeds poverty and income inequality. Besides, underemployment also results in low productivity. Therefore, it is utmost important that actual unemployment must be known so that it may be managed properly.

Pakistan's population growth rate is 2.4%⁴, which is higher than the average population growth rate of other South Asian countries. As per World Population Data Sheet 2013, it is expected that the population of Pakistan will reach 363 million; by the end of 2050. Unmatched growth of investment with the growing labor force is another source of increasing unemployment in Pakistan. At present, Pakistan holds the sixth most populous position in the world⁵. Pakistan is the 10th largest country in the world, according to the size of the labor force. The labor statistics shows that total labor force has increased from 50 million, in (2005-06), which has crossed 61 million in 2017-18. It means that about1.2 million people are becoming a part of the labor force every year; it is over and above the backlog of reservoir of unemployed labor force. However, its job creation capacity is not matched with the growth of the labor force.

The employed labor force has increased from 46.95 million, (2005-06), to 56.52 million (2013-14.) and now over 61 million (2017-18). About 3.48 million workers are unable to find a job, therefore, adding up to the reservoir of unemployed persons. The back log of unemployed labor force constitutes over 10 percent of the labor force, whereas, the

⁴ The latest population Census, 2017 indicated that population growth rate is 2.4% for Pakistan. The same for provinces is different than that of overall in Pakistan.

^{5.} See; Pakistan Economic Survey of 2017-18.

official figures show that unemployment is only 5.8% in Pakistan. The official figures hardly represent the real picture of unemployment. Moreover, every year more than half a million people are added to the unemployed pool. It is on the face that the labor force is increasing at a rapid rate, as compared to that of jobs created every year. If this gap persists over a number of years to come, an unemployed labor force will become a serious threat for Pakistan. Above all, economic growth is as poor as 3.5 percent (2014-15) and negative economic growth in 2019-20 and expected more poor economic growth as low as less than one percent per annum. Thus it does not absorb even one percent of the growing labor force. In (2005-06), 3.1 million people were unemployed but this figure has increased to four millions in 2013-14.⁶ The same has increased to over eight million in 2019. It is one of the emerging challenges in Pakistan. If underemployed persons are converted into full unemployed, the unemployment figures will be even much higher than that of the figures reported officially⁷.

The official open unemployment figures are much lower than the actual unemployment in Pakistan. For a few posts of unskilled workers, thousands apply for jobs, with degree level qualification. The real unemployment rates have also been reported much higher in research studies⁸. Over and above this, the definition of unemployment applied by the officials also requires serious revision; as it considers a person employed even if he/she worked for one hour during the reference week. All above affect labor force in the country in a different way⁹; that is the understand the problem of unemployment to and reason underemployment more accurately; needs reliable indicator of duration adjusted unemployment spell, which is hardly addressed in the official estimates of unemployment. Thus, if underemployment is converted into fully unemployed then actual unemployment is much higher than the officially estimated unemployment in Pakistan. Open unemployment as currently reported is 6.0; as stated by the labor force survey 2014. It

^{6.} Labor force survey 2017-18

^{7 .} The underemployment can be converted to full time unemployed by using Time Criterion, Productivity Criterion and Modern Criteria. See for details; Economic Management and Emerging Economic Issues in Pakistan by Chaudhary M. Aslam. (2020-21),HEC, forthcoming, Also see Denison 1982, Krugman 1991 & Lanzadvte A. 20[°]13 for other countries.

^{8.}Kalsoom, Zulfiqar and Chaudhary M. Aslam. (2007).

⁹ It crestes social unrest, increases poverty and political unrest etc.

continued to be the same up till now i.e. 2017-18. It appears to be understated and underestimated.

There is a limited body of literature pertaining to duration adjusted unemployment rate in Pakistan. Only Chaudhary M. Aslam and Hamid A. (1998) have estimated Unemployment by converting underemployment to full unemployed persons; i.e. by utilizing different realistic definitions of unemployment, which also utilized duration adjusted unemployment spells. No other study is conducted to estimate the duration adjusted unemployment rate for Pakistan after 2007. In this context, it is very important to understand and explore unemployment phenomena on a full scale to find out its effects on the economy as well as formulating economic policies for its remedy. It is also important to plan for better management of human resources, as well as, to combat the unemployment problem in Pakistan. It is the very reason that this study is undertaken to fill this gap in research and provide policy guidelines to manage human resources in an efficient manner.

Given the above background, the present study is focused to compute duration adjusted unemployment rates for Pakistan including rural and urban areas, for males & females and province wise for the country¹⁰. Thus, the study will provide detailed up to date real estimates for unemployment in Pakistan. Moreover, guidelines for policy measures to combat the unemployment problem will be proposed.

Hereafter, the research paper is organized as follows. Section two provides literature review pertaining to the issue to be investigated. Section three provides methodology to calculate the values for unemployment (value of inequality) and duration adjusted unemployment rates; on the basis of underemployed labor force. Section four consists upon empirical analysis and new findings of duration-adjusted unemployment rates. Section five, provides conclusions and policy implications, based upon new empirical evidence.

^{10 .} The latest labor Force Survey available so far is 2017-18.

II. REVIEW OF LITERATURE

Unemployment and underemployment reflects underutilization and waste of human resources. It has adverse effects on output, as well as on economic growth. If all the available resources are efficiently utilized, then the problem of unemployment can be resolved. There are a number of studies focusing on causes, effects and determinants of unemployment (*Maqbool, M. S., Sattar, T. M. A., & Bhalli, M. N. (2013)*. The reasons for high unemployment rates have also been the subject matter of these studies. However, less attention has been paid on how unemployment spells can identify the actual level of unemployment. A proper policy can be formulated only after having known the true unemployment rate and its effects on output. Generally, official unemployment rates are based upon faulty definition, as mostly under estimated, is reported in the official documents

Pertaining to Pakistan, comprehensive studies were conducted by Chaudhary M. Aslam. & Abdul H. (1998 and Chaudhary M. Aslam & Zulifqar Kalsoom (2007). The studies were based on the technique developed by Borooah; (2002) for converting unemployment spells into full employment. Atkinsons (1973) also included inequality in the distribution of unemployment. Chaudhary Aslam and Zulifqar *et.al* (2007) compiled intra-Provincial comparison of duration adjusted unemployment rates. The unemployment rate calculated by the government officials of Pakistan was at 7.9 percent in 2004-05 but actually it was underestimated. By incorporating underemployment, the unemployment spell was as high as 14.54 percent. If inequality in distribution of unemployment was 0.8, then actual unemployment would have been double than that of the official unemployment rate. It was found that the official unemployment rate did not reveal the actual level of unemployment.

Unemployment was a widespread phenomenon in all the provinces of Pakistan¹¹. As stated above, the unemployment rate was much higher than the officially reported unemployment rate for Pakistan. Moreover, the female population was the main victim of unemployment; as compared to males. If age wise unemployment is considered, duration

¹¹ See ChaudharyAslam and Zulfiqar K. (2007).

unemployment rate was higher in females from the age 20 to 24 and 25 to 39; which was 15% and 12.5%, respectively. For males, for the age group 20 - 24 years and 25 - 29 years, the unemployment rate was 9.3% and 6.2%, respectively. Urban unemployment is higher than rural unemployment; it is justified by the theory of migration, as more and more people migrate to urban cities and they wait longer to find a job¹². On the other hand, higher underemployment in rural areas are characterized by the dependence on the agriculture sector that has seasonal full time employment opportunities. Workers who are associated with the agriculture sector remain unemployed during off seasons of the year. There is a need to update the existing literature and evaluate the current unemployment situation in Pakistan; since these studies are outdated.

Chaudhary, M. Aslam and Abdul Hamid. (1998) & (1999) carried out a study to explore employment patterns in Pakistan; by dividing the economy into nine sectors, seven professions and for education levels. The results showed that employment elasticity for the construction sector was highest and lowest employment elasticity was observed for the manufacturing sector. It was proposed that employment opportunities should be promoted in those sectors that have higher employment elasticities. Besides, a comprehensive employment generation policy is required to eradicate the problem of unemployment. The main contribution of this study was to establish that the actual level of unemployment was higher than the official figures. This study also measured underemployment and unemployment through different methods. The study did not focus on duration adjusted unemployment rates rather elasticities of employment were identified for this purpose; which does not remain constant over time, therefore, may not be applied for the policy formulation for longer time.

Qayyum, W. *et al* (2007) estimated the causes for youth unemployment in Pakistan. It may be noted that there are more than 50% of the labour force who consist of the youth population; peak time for high productivity. The above study suggested that lack of education, poor skills, and divergence between demographics of rural and urban areas,

^{12.} Labor force survey 2017-18 rural to urban migration rate.

structural mismatch, inappropriate experience and gender discrimination are major sources of unemployment in Pakistan. The aim of the study was to find out the reasons for unemployment especially in youth. The data utilized was from a labor force survey from 2003-04. The dependent variable of youth unemployment was a dichotomous variable, as it was qualitative and quantitative in nature. The independent variables included demographic profile, personal profile and level of education. Province variables were also included in order to find out how much each province was responsible for youth unemployment. The level of education variable showed the level of unemployment corresponding to every level of education. Similarly, age group signified the burden of unemployment associated with a particular age group and region which elucidates the level of unemployment in rural and urban areas. The results showed that age was negatively associated with youth unemployment. The NWFP (now Khayber Pakhtunkhwa (KPK) was highly affected by youth unemployment. Moreover, lack of training was also inversely correlated with youth unemployment.

Chaudhary M. Aslam and Abdul Hamid. (1998) and (1999)¹³ were the first to estimate unemployment while considering time criterion, productivity criterion and modern criteria. The above cited approaches indicated that actual unemployment was almost double than that reported in the official documents like Pakistan Economic Survey and Labor Force Survey. Thereafter hardly any comprehensive study was conducted which may have further explored actual unemployment in Pakistan. Therefore, it is the utmost need that the actual rate of unemployment must be pointed out, not only to know about the severity of the issue but also to find out the solution of the problem, as well as, for better management of the issue and human resources.

All above indicates that either research on the subject matter is very limited or it is outdated. Therefore, it is important to carry out an up to date fresh study to analyze the unemployment issue in Pakistan. This study will contribute to literature by filling this gap. For this purpose the methodology adopted to investigate the issue is provided in the following section.

¹³ Also see Kemal 1987, Camron J. and Irfan 1991.

III. METHODOLOGY

Following Booroah, V. K. (2002), duration adjusted unemployment rates are estimated, which consists upon three scenarios. Scenario one, is based upon the assumption that if there is no underemployment, as a result, the outcome will be the same as reported official unemployment rate. Scenario two, is based upon the assumption that one-third of the labor force is underemployed¹⁴. Scenario three, undertakes 40 percent of the labor force employed only for three months in a year or remained underemployed equivalent to three months full time unemployed in a vear. The value of sigma (Σ) is used to represent the value of inequality in the distribution of under-employment. It is calculated on the basis of underemployed labor force in a year, given in the labor force survey. Three categories of working hours, as stated above, is based upon survey data, in a reference week; selected as 5-9 hours, 10-14 hours and 15-24 hours; in a week. It may be noted that full time employment requires at least thirty five hours work in a week. The value of sigma indicates as if labor force is fully unemployed then what would be the duration, as percentage of these unemployed labor i.e. say, if partially employed labor is working for 5-9 hours in a week then average working in a week is 7 hours. If "x" is the average number of hours in one week then, in a month, "x' " is the average working hour, while "n" is the number of weeks in a month. The total employed hours for a month should be 140, (35 * 4) = 140 hours, which are denoted by the variable "y". Each person should work for 140 hours in a month, being fully employed. The variable "H" shows the unemployed working hours out of total employed working hours in one month and h' is the ratio of unemployed working hours out of total employed hours; i.e. 'h' will represent the value of sigma. The values of sigma for those who work for 10-14 hours and 15 - 1524 hours in a week are $\Sigma = 0.7$ and $\Sigma = 0.4$, respectively. The following formula is developed, based upon above cited rationale; to calculate the value of sigma.

^{14.} This segment of labor force will be unemployed for two months in a year. In other words, partially underemployed for the year, which accounts for two months' full time unemployed. These underemployed percentages of people are taken from the labor force survey table "percentage of employed person as per working hours.

 $\frac{5+9}{2} = 7 = x$ i.e average working hours for 5-9 hours of work.

Once the value of sigma is calculated then underemployment can be converted to full time unemployment in a year. Thus, the result will be official open unemployment plus underemployment converted figure in to full unemployment, will represent the aggregate unemployed labor force; under different scenarios, as explained above. The duration adjusted unemployment rate will be calculated by taking the ratio of adjusted unemployment months to total unemployment months. Thus, duration adjusted unemployment rate for the scenarios is calculated, as given below.

In the above equation; where N is for total number of labor force, L_{months} are total employed months, SR is scenario based unemployment rate, LU_{months} is the unemployed months based on the scenario, $a_{inequality}$ is the value of inequality in the distribution of unemployment, I_{months} is unemployed month based on the value of epsilon (Σ) and U is the open unemployment rate.

The above formula can be applied to indicate real full time unemployment in Pakistan.

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IV. EMPIRICAL ANALYSIS: REAL UNEMPLOYMENT RATE

High rate of underemployment reflects that a significant portion of labor force is unemployed; resulting in a full time unemployment rate to rise and waste of the human resources. To explore the actual unemployment situation in Pakistan, the duration rate of unemployment has been calculated based on official data given in the labor force survey 2017-18. The scenarios are based upon the data given for underemployment and open unemployment for the Labor force survey, which states the number of employed labor who worked less than 35 hours in a reference week are: such as 5 - 9 hours, 10 - 14 hours and 15 - 24 hours, showing that they were partially employed i.e. underemployed, which were counted as employed in the labor Force survey. For a fully employed person, one should have worked for a minimum of 35 hours in a week; in the reference period¹⁵. Based upon partially employed people for the above stated hours, the value of sigma is calculated. The difference between fully employed and partially unemployed labor force is represented by the value of sigma (Σ); inequality in the distribution of unemployment. Those who worked 5 – 9 hours in a reference week, the value of $\Sigma = 0.8$, those who worked for 10 - 14 hours the value of $\Sigma = 0.7$ and those who worked for 15 - 24 the value of $\sum = 0.4$. Official open unemployment rate was 5.8 percent in the year 2017-18, as reported in the official documents. Duration unemployment rates are calculated under the different scenarios of unemployment in a country, as reported above. The estimates are based upon the following scenarios.

Scenario 1. Partially unemployed labor force (out of total labor force given in the labor force survey) is considered zero.

Scenario 2. In scenario 2, underemployed labor is 30% of the total labor force; they were employed for two months in a year, except those who are fully unemployed.

Scenario 3. In scenario 3, 40% of the labor force only worked for three months in year, except those who are fully unemployed.

¹⁵ For more details see table "percentage of employed people who worked less than 35 hours in a reference week" in labor force survey 2017-18

OVERALL REAL UNEMPLOYMENT: ADJUSTMENT OF DURATION UNEMPLOYMENT RATE

The following Table 1 shows duration adjusted unemployment rates for three scenarios; based upon different values of sigma (Σ), reported above. Under scenario one, which takes exactly the same unemployed labor force as given in the labor force survey. Based on scenario one, (Σ = 0; then duration adjusted unemployment rate is same as official unemployment rate. If labor force worked 5 - 9 hours in a reference week, partially unemployed labor force, then the value of inequality sigma is $\Sigma = 0.8$. Similarly, $\Sigma = 0.7$ denotes the people who worked for 9-14 hours in a reference week.Under scenario one, the unemployment will be same as reported in the official documents i.e. 5.8%. However, actual unemployment increased to 8.4 percent in 2014 and further increased to 8.6% in 2018; for duration adjusted unemployment rate, while $\Sigma = 0.4$. It is based upon 15 - 24 hours employment in a reference week. Scenario two states that if 30 percent of the labor force only worked for two months, except those who were fully unemployed then Σ = 0.4 and duration adjusted unemployment rate was 10.02 percent; increase to 10.6 percent, when the value of sigma increases from $\Sigma = 0.7$ to $\Sigma = 0.8$. Lastly; under scenario two and three, while 40 percent of the labor force worked only for three months, and $\Sigma = 0.7$ & 0.8, the unemployment increases from 27.2% to 33.76%, respectively. It is also generally believed that about one-third of the new entrance (labor) does not find a job and they have to suffer from unemployment and underemployment for longer period or depend upon others.

TABLE 1

	Scenario 1	Scenario 2	Scenario 3
$\sum = 0$	5.8%	5.8%	5.8%
$\sum = 0.4$	8.62%	10.6%	21.8%
$\sum = 0.7$	10.02%	26.8%	27.20%
$\Sigma = 0.8$	10.62%	29.8%	33.76%

Pakistan: Duration Unemployment Rates 2017-18

Source: Calculated by the authors; based on unemployment and underemployment rate, given in the labor force survey 2017-18.

RURAL UNEMPLOYMENT IN PAKISTAN

Official unemployment rate for the rural labor force is reported as 5 percent in Pakistan for the year 2017-18. Table 2 provides duration adjusted unemployment rates for rural areas for 2018. Under scenario one, with zero the value of inequality, the duration unemployment rate is the same as the official unemployment rate.

	Scenario 1	Scenario 2	Scenario 3
$\sum = 0$	5.00%	5.00%	5.00%
$\sum = 0.4$	7.29%	14.00%	16.99%
$\sum = 0.7$	9.0%	22.50%	25.99%
$\sum = 0.8$	9.58%	24.9%	28.09%

TABLE 2

Pakistan Rural: Duration Unemployment Rates 2017-18

Source: Calculated by the authors; based on unemployment data given in the labor force survey 2017-18

If underemployed labor worked for 5 - 9 hours in a reference week, then duration adjusted unemployment rate is increased to 9.6% percent; (sigma =0.8), scenario three. Similarly, duration adjusted unemployment rate is 24.9 percent and 28.09 percent, while the value of $\Sigma = 0.8$, under scenario 2 and 3, respectively. Duration adjusted unemployment rates are 22.5 percent and 25.99 percent when the value of inequality is $\Sigma = 0.7$ under scenario two and three, respectively. The higher duration adjusted unemployment rate under scenario three is justified because inequality value is higher along with higher portion of labor force is Underemployed, which is common in the rural areas. Highest duration adjusted unemployment rate in rural area can be as high as 28.09 percent, with the inequality of $\Sigma = 0.8$. Moreover, in rural areas work is seasonal, therefore, labor force hardly worked full time or full time work is not available to everyone for the whole of the year. Furthermore, this duration adjusted unemployment rates are not only hidden but the definition used for unemployment, at the time of survey, is misleading,¹⁶

¹⁶ As per the labor force survey 2017-18, definition "Employment comprises all persons ten years of age and above who worked at least one hour during the reference period and were either "paid employed" or "self-employed".

which also leads to underestimate open unemployment. The above cited figures are alarming, which calls for appropriate planning to solve unemployment, as well as, underemployment issue.

URBAN DURATION OF UNEMPLOYMENT IN PAKISTAN

In Pakistan, urban labor force comprises 22.5 million (2017-18), with an official unemployment rate of 7.2 percent, during 2017-18. The open unemployment rate is higher in urban areas, as compared to overall unemployment in rural areas and in Pakistan. The very reason could be that rural populations migrate to urban areas and become a part of unemployed reservoirs in urban areas.

TABLE 3

Pakistan Urban: Duration Unemployment Rates 2017-18

	Scenario 1	Scenario 2	Scenario 3
$\sum = 0$	7.2%	7.2%	7.2%
$\sum = 0.4$	11.1%	17.2%	19.2%
$\sum = 0.7$	12.8%	23.7%	28.2%
$\sum = 0.8$	13.6%	27.0%	31.2%

Source: Calculated by the authors; based on unemployment rate given in the labor force survey 2017-18

Table 3 shows duration adjusted unemployment rates for urban areas of Pakistan. Scenario one indicates that unemployment increases from $\Sigma = 0$ to $\Sigma = 0.8$. Similarly, under scenario two, those who worked for 5 - 9 hours the duration adjusted unemployment rate is 27.0 percent, for sigma equal to 0.8 (scenario 2). Those who worked for 15 - 24 hours, the duration adjusted unemployment rate is 19.20 percent, ($\Sigma = 0.4$); scenario 3. The duration adjusted unemployment rate of 28.2% signifies those who worked for 10 -14 hours in a reference week when sigma is equal to 0.7. It can clearly be observed that the duration adjusted unemployment rate increases to highest level for sigma equal to 0.8; under scenario 3, which reflects unemployment rate equal to 31.2%. It appears that unemployment is very high in urban areas, as compared to rural areas.

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DURATION UNEMPLOYMENT FOR FEMALE

The females are almost 14.8 million; of the total labor force¹⁷. Official unemployment rate for female in Pakistan is higher than the overall official unemployment rate for the same in Pakistan. It shows that females are more victim of unemployment.

TABLE 4

Pakistan Female: Duration Unemployment Rates 2017-18

	Scenario 1	Scenario 2	Scenario 3
$\sum = 0$	8.3%	8.3%	8.3%
$\sum = 0.4$	11.8%	18.30%	20.30%
$\sum = 0.7$	14.30%	25.8%	29.30%
$\sum = 0.8$	15.30%	28.30%	32.30%

Source: Calculated by the authors, based on unemployment rate given in the labor force survey 2017-18.

Table 4 provides estimates for duration adjusted unemployment rates for females in 2017-18. The females who worked for 15 - 24 hours in a week, having the value of inequality $\Sigma = 0.4$, converted into full time unemployed leads to duration adjusted unemployment rate to increase to 11.8 percent, scenario one i.e. higher than that of official open unemployment. It indicates that females are more victim of underemployment. Moreover, those who worked for 10 - 14 hours a week, with a value of inequality Σ =0.7, duration adjusted unemployment rate is 14.3 percent (scenario one). The extreme case under scenario one indicates 15.3 percent duration adjusted unemployment rate if labor worked for 5 - 9 hours in a week (sigma = 0.8). Other scenarios, two and three show the similar pictures but with more degree of intensity, having 30 percent and 40 percent of the labor force underemployed; which was partially unemployed for 10 months and 9 months, respectively. Under scenario two, duration adjusted unemployment rate is 28.30 percent (sigma =0.8), almost 10 percent more unemployment added to official unemployment rate, when inequality is just $\Sigma = 0.8$, scenario 2. The

¹⁷ Labor force survey 2017-18; females are less active as a part of labor force. It is increasing rapidly, since their participation rate is increasing.

highest unemployment rate in scenario three is 32.3%, having inequality of $\Sigma = 0.8$. All above indicates worse position of unemployment of female labor force, which calls for proper attention of the policy makers.

DURATION UNEMPLOYMENT FOR MALE

Duration adjusted unemployment rates for male present analogous pictures to female duration adjusted unemployment rates. Total labor force for male is 50.7 million in (2017-18), with official unemployment rate of 5.1 percent in 2017-18. Over 2.5 million male are unemployed. As it is earlier explained that these unemployed males are those who are fully unemployed. Situation gets worse when partially unemployed male labor is converted into fully unemployed labor, which is indicated by the different scenarios, as reported in table 4.5 below. Under scenario one, with sigma equal to 0.8, the duration adjusted unemployment increases to over 9.1%. The same is as high as around 24.9%, under scenario 2, having sigma equal to 0.8. The same rate with the same sigma value, the duration adjusted unemployment increases to 29%, which represents a worse condition of open and underemployment. The above analysis indicates that not only open unemployment is very high, as compared to official unemployment rates but also the problem of underemployment is even more severe for males. Other values for duration adjustment may also be seen as given in the following Table 5 below.

TABLE	5
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	Scenario 1	Scenario 2	Scenario 3
$\sum = 0$	5.10%	5.10%	5.10%
$\sum = 0.4$	7.14%	15.10%	17.10%
$\Sigma = 0.7$	8.70%	22.60%	26.10%
$\sum = 0.8$	9.10%	24.90%	29.10%

Pakistan Female: Duration Unemployment Rates 2017-18

Source: Calculated by the authors based on unemployment rate given in the labor force survey 2017-18.

The provinces of Pakistan differ in economic growth, per capita income and resources. The province of Baluchistan is the largest province in Pakistan; in terms of area. However, its economic conditions are very poor. Female literacy is low; the rural female literacy is not even 5%.

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Therefore, unemployment rates are expected to be different in all provinces. The identification of unemployment in each province could further help to bring the neglected provinces into the main frame of the economy. For provinces, real unemployment, including duration adjusted unemployment is calculated, which is reported below. It was equally important to estimate the duration adjusted unemployment spells by province wise, as it reflects the real picture of the issue under discussion *i..e.* identification of the province which is extremely affected the most from high rate of unemployment.

PROVINCE WISE DURATION ADJUSTED UNEMPLOYMENT

Duration Unemployment for Punjab

Table 6 indicates the unemployment situation in Punjab. It is the largest province of Pakistan, having over 60% of the labour force of Pakistan (36.9 million). Following Table 6. Provides estimates of duration adjusted unemployment in Punjab. It has over 37 million population (2014), unemployment of 5.97 percent. In 2017-18, the official unemployment rate is 6.4% in Punjab. Under scenario one, unemployment is as high 11.5%; when sigma equal to 0.8, i.e. when under-employed labor force work for 5-9 hours are considered.

Punjao. Duration Onempioyment Rates 2017-18				
	Scenario 1	Scenario 2	Scenario 3	
$\sum = 0$	6.4%	6.4%	6.4%	
$\sum = 0.4$	8.9%	16.4%	18.4%	
$\sum = 0.7$	10.9%	27.9%	27.4%	
$\Sigma = 0.8$	11.5%	28.4%	30.4%	

TABLE 6

Punjab: Duration Unemployment Rates 2017-18

Source: Calculated by the authors; based on unemployment rate given in the Labor force Survey 2017-18.

Scenario two and three are also analogous to scenario one. The unemployment rates are increasing with the higher value of inequality (sigma value). If 40 percent of the labor force is underemployed for 9 months and works only for 15 - 24 hours in a week, then unemployment rate is around 28.4%, for sigma being 0.8 (scenario 2). Under scenario 3,

the same value exceeded to 30%; while labor force is underemployed and is working for 5-9 hours in a week. These figures indicate deep rooted issue of underemployment and unemployment in this province. Other values for the value of sigma (0.4 & 0.7) are also provided in the table (4.6). As the value of sigma increases, the figures for unemployment are also increasing. Under scenrio3, the unemployment is estimated as high as 30.4% for sigma =0.8, which reflects very high level of unemployment. It may be noted that it is highly populated province having 60% of the total labor force of Pakistan

Duration Unemployment in Sindh

TABLE 7

	Scenario 1	Scenario 2	Scenario 3	
$\sum = 0$	4.92%	4.92%	4.92%	
$\sum = 0.4$	6.62%	14.93%	16.93%	
$\sum = 0.7$	8.03%	22.43%	25.93%	
$\sum = 0.8$	8.33%	24.93%	28.93%	

Sindh: Duration Unemployment Rates 2017-18

Source: Calculated by the authors; based on unemployment rate given in the labor force survey 2017-18

Table 7 indicates the duration adjusted unemployment rates for the province of Sindh. The official unemployment rate is 4.92 percent in Sindh, which is less than the overall unemployment rate in Pakistan. It is the second largest province having a labor force of around 14.3 Million. Under scenario one, with sigma equal to 0.8, unemployment increased to 8.33 percent i.e. 3.4% higher than the officially reported open unemployment for Sindh. It is based on the underemployed labor workers which worked for 5 - 9 hours in a week. Under scenario 2, the same unemployment rate is 24.2 percent. Under scenario three, the same figures increased to 28.20 percent, when the value of inequality is Σ =0.8. It may note that these unemployment rates are six to seven times higher than that of official unemployment and significant under-reporting of actual unemployment conditions in Sindh. Although official and actual

unemployment rates are lower in Sindh as compared to Punjab, but these are still very high, which calls for immediate action to address the issue.

Duration Unemployment in Khyber Pakhtunkhwa (KPK)

The official unemployment rate for KPK is reported as 8.3 percent, which is higher than the national unemployment rate. The total labor force of KPK is 6.6 million and it is the third largest province of Pakistan. Under scenario one, with sigma equal to 0.8, indicated duration rate of unemployment as high as 14.9 percent, which reflects the highest duration adjusted unemployment rate, among all provinces. Under scenario two, if 30 percent of the labor force is underemployed for the 10 months then, the unemployment rate increases to over 28 percent; having the value of sigma equal to 0.8. The values for the same increased to 32.4%, under scenario three 3 (sigma=0.8). It may be noted that the duration adjusted unemployment is four times higher than that of official unemployment.

	Scenario 1	Scenario 2	Scenario 3
$\sum = 0$	8.3%	8.3%	8.3
$\sum = 0.4$	11.6%	18.3%	20.3%
$\Sigma = 0.7$	14.1%	25.4%	29.3%
$\sum = 0.8$	14.9%	28.3	32.4%

TABLE 8

Khyber Pakhtunkhwa: Duration Unemployment Rates 2017-18

Source: Calculated by the authors; based on unemployment rate given in the labor force survey 2017-18

All above reflects poor management of the labor force and its employment. First, there is hardly any proper planning to address the issue. Secondly, even if there is any policy directed towards this issue, still then the problem remains unresolved. As a result, there is hardly any impact on the reduction of the unemployment issue in Pakistan.

Duration Unemployment in Baluchistan

Baluchistan is the largest province of Pakistan, in term of area, however, total labor force of Baluchistan is 3.2 million, having official

unemployment rate of 4.1 percent, the lowest in Pakistan. The reported official unemployment in Baluchistan is 4.1% in 2017-18. Under scenario one, if underemployed labor force works for 5 – 9 hours in a week; then the unemployment rate increases to 7.1%, for sigma =0.8. (Table 9). Under scenario two, the same rate increases to 24 percent (for sigma =0.8). The last scenario three, assumes that 40 percent of the labor force is not fully employed. The highest unemployment rate can reach up to 28 percent of the labor force, if value of inequality is $\Sigma = 0.8$. It still remains low, as compared to all other provinces. It is important to note that under the worst conditions and scenario, the duration of unemployment remains around 28% of the labor force, which is still very high.

	Scenario 1	Scenario 2	Scenario 3
$\sum = 0$	4.1%	4.1%	4.1%
$\sum = 0.4$	5.6%	14.1%	16%
$\sum = 0.7$	6.8%	21.6%	25.1%
$\Sigma = 0.8$	7.1	24%	28%

TABLE 9

Baluchistan: Duration Unemployment Rates 2017-18

Source: Calculated by the authors based on unemployment rate given in the labor force survey 2017-18

Province Wise Unemployment Rate: A Comparison

Table 10 presents comparative figures of different unemployment rates in all four provinces in Pakistan; for different values of inequalities. The value for sigma equal to zero represents the official rate of unemployment in all provinces. Scenario one is chosen for more detailed comparison. Overall unemployment rate is higher in Khyber Pakhtunkhwa, official is unemployment rate is 8.3 percent in 2017-18. However, duration adjusted unemployment rate is 14.7%., for sigma equal to 0.8. The reason could be that, this area is affected by the war on terrorism and development process is slow as well. Second higher unemployment rate is 11.5 percent in the Punjab, for sigma equal to 0.8. Punjab accommodates the largest part of the labor force and, moreover, people migrate to Punjab seeking jobs because it is a relatively developed province and has better employment and business opportunities. Under the same value for sigma, the unemployment rate is 7.6 percent in the province of Sindh. If this rate is compared with the other provinces, Sindh is having less unemployment. Official unemployment rate in Baluchistan is 4.1 percent and it increases to 7.1 percent when the value of inequality (sigma) is $\Sigma = 0.8$. Duration adjusted unemployment rate for all provinces is increasing with the change in sigma value. The unemployment rate increases around 3 percent, for the change (increase) in sigma value of inequality from $\Sigma = 0.0$ to $\Sigma = 0.8$.

TABLE 10

Scenario 1 Scenario 2 Scenario 3 4.9% 8.3% $\Sigma = 0$ 6.2% 8.5% 6.6% 11.3% $\Sigma = 0.4$ 10.5% 7.3% 13.8% $\Sigma = 0.7$ 11.5% 7.6% 14.7% $\Sigma = 0.8$

Province wise Unemployment Rates Comparison Scenario One 2017-18

Source: Calculated by the author based on unemployment rate given in the labor force survey 2017-18

In short, the above analysis indicates that there is a very high unemployment in Pakistan. It appears to be one of the major economic issues in Pakistan, which requires immediate attention of the policy makers and managers of the economy. The unemployment figures are alarming in all respects; i.e. in rural & urban areas, among males, females and in all provinces of Pakistan. The official figures do not portray a real picture of the issue; due to ignoring underemployment. Applying the value of inequality of 0.8, almost one-third of the labor force is suffering from unemployment. Once under-unemployment is converted to full time unemployment, by applying the duration rate of unemployment; the unemployment figures are as high as more than 25% and for the inequality level of 0.8, it exceeds 30%. It means that one-third of the labor force is affected by unemployment or by under-employment. The problem calls for immediate attention and calls for serious efforts to address the issue. As the real magnitude of the issue has been identified, therefore, it must be addressed on priority; since it is not only loss of output but also waste of human resources. The comparative picture of unemployment, under other values of sigma are provided in appendix (Table 1).

V. CONCLUSION AND POLICY IMPLICATION

Pakistan's unemployment issue today is still at least as relevant and deep rooted, as it was in the late decades, particularly because much of the unemployment rates are hidden in the veil of under-employment, which we have revealed by employing Booroah's method. On the same hand, duration adjusted unemployment rates are also calculated for different dimensions of labor force; such as rural & urban labor force, males & females and for each province. The latest Labor Force survey (2017-18), available so far, was utilized to calculate unemployment. The analysis shows that the official unemployment rate does not portray the real picture of unemployment of the labor force. Widespread unemployment prevails in the provinces of Pakistan, which is much higher than the official figures.

The urban unemployment is higher than the unemployment in the rural areas. It may be so due to the rural-urban migration as portrayed i.e. people migrate, from rural to urban, for better job opportunities and increases the reservoir of unemployed in the urban areas. Mostly people in rural areas are engaged in the agriculture sector and due to seasonal working period, majority of agriculture workers become underemployed during the year. Therefore, underemployment is higher in rural areas. People also migrate to urban areas in search of jobs and businesses.

In addition to above, another significant outcome of the study is that actual unemployment is much higher for females as compared to males'. Females have hardly 10 percent of the labor force participation rate and still they face high unemployment. They also suffer from high underemployment too. The finding of the current study is consistent with the study already conducted by Zulfigar, K. and Chaudhary, M. Aslam (2007). The contribution of this study is the identification of spell of province of Pakistan. unemployment for each Comparatively unemployment is higher in Khyber Pakhtunkhwa and then in Punjab, Sindh and Baluchistan, respectively. Although, Punjab is a highly populated province of Pakistan, but more job opportunities are also available in Punjab. Khyber Pakhtunkhwa is not populated province but it is relatively less developed, therefore, less job opportunities are available, therefor it has the highest level of unemployment in Pakistan.

Given the above empirical evidences, open unemployment (adjusted for duration rate of unemployment), the policy makers need not only emphasis on more employment generation but there is also a need to convert underemployment into full time employment. Moreover, the creation of jobs should not be concentrated in any particular region or area but economic policies need to be directed towards deprived regions and provinces too; where unemployment is very high. The Province of KPK has an alarming level of unemployment which needs to be addressed. The government should promote those sectors which can create more jobs; i.e. the sectors having high elasticity of employment like construction, housing and services, as well as industrialization.

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APPENDIX

TABLE 1

Comparative Unemployment Rate (Scenario One) 2017-18 Rural-Urban and Male-Female

Value of Inequality	Pakistan Unemployment Rate	Rural Area	Urban Area	Male	Female
$\sum = 0$	5.8	5.00%	7.2%	5.10%	8.3%
$\sum = 0.4$	8.62	7.29%	11.1%	7.14%	11.8%
$\sum = 0.7$	10.02	9.0%	12.8%	8.70%	14.30%
$\sum = 0.8$	10.62	9.58%	13.6%	9.10%	15.30%

Compiled by the authors, from Labor Force Survey 2017-18, FBS

INVESTIGATING ASYMMETRY IN FISCAL THEORY OF PRICE LEVEL: INSIGHTS FROM PAKISTAN

IBRAR HUSSAIN, MUHAMMAD RAFIQ AND ZAHOOR KHAN*

Abstract. This study investigates the asymmetric impact of fiscal deficit on inflation under the framework of Fiscal Theory of Price Level (FTPL) in the context of Pakistan. To test the FTPL, keeping in view the characteristics of Pakistani economy for the sample period, the empirical estimation has been calibrated on the New-Keynesian model of small economy. Specifically, the calibration has been made on the models of Gali and Monacelli (2008) adopted by Cekin (2017) and the model of Cerisola and Gelos (2009). The estimates of the Non-Linear ARDL are found reliable as the model does not suffer from the degenerate problems. Remarkably, the finding conforms with the view of the FTPL and therefore evidences that the theory holds in the long run. However, the tests of asymmetry show that the impact of the fiscal deficit on inflation is likely to be asymmetric only in the long run. Our analysis also reveals that the impact of money supply and exchange rate depreciation becomes insignificant when the influence of the fiscal deficit is allowed to be asymmetric under the framework of NARDL model. Their signs are however in line with the expectations of their respective theories. Besides fiscal deficit, this study finds external factors as the main cause of inflation in the country. The estimates show that the current account deficit and the international oil prices have a significant positive impact on the domestic inflation in Pakistan. To reduce domestic inflation, fiscal austerity

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measures would work and such impact would become more visible if other associated policies are accommodative.

Keywords: Fiscal Deficit; Inflation; NARDL

JEL Classification: H62, E3, C22

I. BACKGROUND OF THE STUDY

The role of fiscal policy in the achievement of the internal and external equilibrium, simultaneously, has been extensively debated in the turn of the twenty-first century. The low and unsustainable economic growth with high inflationary pressure on the pace of twin-deficit has put Pakistan on the line of default and was therefore thought to be addressed by the current study. Currently, the economy is confronted with unprecedented pressure on both the fiscal side and external front in the form of high budget and current account deficits. The public debt liabilities have reached to the level where a sizeable portion of the federal budget is consumed by debt servicing on the face of the depleted foreign exchange reserves.

Official statistics indicate that over the past five years, Pakistan's economy has grown on an average rate of 4.7 percent against the 5.4 percent target which was mainly driven by consumption led growth. Unplanned and unproductive expenditures with low revenue growth, coupled with stagnant exports and sky-rocketed imports, have led to twin-deficit problem on the pace of inflation in the country. Against a pensive target of 6.2 percent, the economy grew at a meager speed of 3.29 percent in FY 2018-19. During the same year, saving-investment gap was recorded as 4.7 percent of the GDP with total investment of 15.4 percent and savings of 10.7 percent of the GDP. The average fiscal deficit over the past five years remained 5.6 percent whereas average total revenue reached to 14.9 percent against the average total expenditure recorded at 20.5 percent of the GDP. The average inflation on the basis of Consumer Price Index (CPI) over the last five years remained 4.8 percent with 7 percent during July-April 2018-19, while current account deficit stood at 6.3 percent of the GDP in 2017-18 amounting to US \$19.9 billion. During 2017 and 2018, a persistent

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increase in budget deficit has put unprecedented pressure on aggregate demand and hence aggravated inflation situation in the country (Economic Survey of Pakistan [ESP], 2018-19).

Looking at the tax structure over the past decade, it is evident that Pakistan is facing dramatic shifts in its revenue structure and is on the move from indirect to direct taxation. Similarly, political instability, inconsistent macroeconomic policies, floods and internal insurgency did not leave the fiscal space for rainy days. Such situation often leads to domestic inflationary pressure and therefore the need for further research over the issue at hand increases. The headline inflation (measured CPI) during 2013 and 2018 remained on average at 4.8 percent. In FY 2018, inflation was recorded at 3.9 percent, with an end-period inflation of 5.2 percent and 4.2 percent during FY 2017. The prices of non-food items have been largely responsible for domestic inflation which rose by 5.4 percent (ESP, 2018-19). Figure 1.1 depicts a quick review of annual inflation on the basis of CPI, money supply growth, current account balance, and primary fiscal balance for the sample period. The figure reveals a relatively clearer picture of the relationship among inflation, current account balance and primary fiscal balance, while money supply growth has no visible relationship with inflation trends.

Figure	1
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Selected Macroeconomic Variables

In Pakistan, more recently, the focus has been on the fiscal consolidation and attempts are being made to encompass both revenuebased and expenditure-based consolidations in order to curtail the overall fiscal deficit to a manageable level. In this regard, Fiscal Responsibility and Debt Limitation Act have been implemented since 2005 to keep the public finance on a sustainable path. However, internal insurgency, world financial crises of the 2007-08 and floods of 2010 in Pakistan put unprecedented pressure on the public exchequer. Nevertheless, the fiscal consolidation measures including prudent expenditure management, rising revenue receipts, and rationalization of subsidies have curtailed the overall budget deficit from 8.2 percent in FY 2013 to 4.6 percent of GDP in FY 2016. The total expenditures decreased from 21.5 percent of GDP to 19.9 percent, while the total revenue took upward trajectory and rose from 13.3 percent of the GDP to 15.3 percent during the same period (ESP, 2016-17). Such austerity measures have contained domestic inflation in the country from 9.68 percent to 3.76 percent as evident from Figure 1.

Price stability has been the prime concern of public policy (Christiano & Fitzgerald, 2000). However, there is lack of studies that address the FTPL and its interaction with Monetary Theory of Price Level (MTPL) in Pakistan to get insights into the optimal stabilization policy. In case of the fiscal activism as is the case of majority of the developing countries including Pakistan, the researchers often associate the domestic inflationary pressure to expansionary monetary policy and exchange rate depreciation. For example, in the case of Pakistan, the studies of Chaudhry, Ismail, Farooq, and Murtaza (2015), Chaudhry, Qamber, and Farooq (2012), and Khalid (2005) have attributed domestic inflation to monetary expansion and exchange rate depreciation besides fiscal deficit and other external factors. In situation of inflation targeting by the central bank on the pace of the fiscal activism, it seems that fiscal policy directly influences monetary policy and indirectly, the inflation.

In the similar way, Farmer and Zabczyk (2019) claim that FTPL does not lead to a unique price level determination and reject the theory in case of overlapping generation model. Other studies like Kemal (2006) and Qayyum (2006) declare monetary expansion as a major cause behind the domestic inflation in Pakistan. Likewise, Khan and Schimmelpfennig (2006), in case of Pakistan, point out other factors including the structural

bottlenecks besides money supply as the main contributing factors towards inflationary pressure. The failure of some studies to the find the causal connection of the fiscal deficit and inflation in Pakistan and elsewhere, may be attributed to the irrelevant estimation methods and the omission of the fiscal policy variable from the empirical models. Similarly, the use of overall fiscal balance instead of primary fiscal balance may influence the findings of such studies which hold monetary policy being responsible for domestic inflation. Moreover, the use of unadjusted fiscal balance with business cycles may make their results different from the established notion of FTPL. Another flaw seems to lie in the assumption of equal impact of expansionary fiscal policy with that of contractionary one in the form of so-called symmetric impact.

Although, in the emerging economies, monetary policy is assigned the role of inflation targeting with stable growth; nonetheless, it is not always a successful story elsewhere. The failure of inflation targeting in controlling inflation in some emerging economies like Brazil and Turkey in the early 1990s or Indonesia and Philippines in 2008, demonstrate that tightening monetary policy was unable to contain inflation (Tran, 2018). This failure could be attributed to persistent fiscal deficit and the resulting fiscal dominance that impedes the ability of the monetary policy in reducing inflation (Mishkin, 2004). Inflation targeting, therefore becomes a difficult assignment in countries with low price credibility, weak institutions and fiscal un-sustainability (Eichengreen, 2002). Today Pakistan is confronted with low price credibility, weak institutions, corruption and fiscal un-sustainability. In such situation, the assignment of inflation targeting by the central bank via monetary policy changes in Pakistan seems knocking at the wrong door.

Besides this, there are certain drawbacks in the empirical studies conducted in Pakistan. Most of the studies have assumed a linear impact of fiscal policy on domestic inflation, which seems a bit restrictive as such impact could be of asymmetric nature. Such asymmetry presumes that the impact of an increase in the fiscal deficit on general price level is not necessarily equal to the impact of a decrease in the fiscal deficit. Another issue is that these studies either use government spending or the overall fiscal deficit to proxy fiscal policy. In a nutshell, the empirical literature lacks comprehensive analyses on the issue of FTPL and has investigated such impact of the relationship in a linear way. It is therefore open to debate to re-investigate the possible asymmetric effect of the fiscal deficit on inflation at least on empirical grounds. Moreover, investigation of FTPL in the developing countries seems to have practical relevance as they issue debt in domestic currency, often fail to raise sufficient revenue and are more concerned with capital flows (Beck-Friis & Willems, 2017). This is what exactly happening in Pakistan and has made the fiscal policy more active with pushing monetary policy on the back foot, thereby making it passive.

The current study, therefore, aims to conduct dynamic asymmetric analysis of FTPL, keeping in view many developments in Pakistan including the exchange rate volatility, mounting public debt, unsustainable current account balance, and international oil embargo. Moreover, to quantify the dynamic asymmetric impact of the fiscal policy on general price level, the Shin, Yu, and Greenwood-Nimmo (2014) NARDL techniques will be complemented with augmented ARDL method of Sam, McNown, and Goh (2019). Besides this, a unique feature of this study is the application of rich dynamic approach of NARDL techniques that would allow and test asymmetries between the fiscal deficit and inflation over both the short and long runs. In a nutshell, the present study attempts to cover the deficiencies of the previous studies in terms of their poor proxy and irrelevant econometric methods. Such analyses of the fiscal policy are expected to bring forth important insights that may help in the macroeconomic management of the economy of a developing country.

II. REVIEW OF LITERATURE

Inflation bothers every segment of an economy. These segments can be households, business firms or even governments. High inflation is generally associated with business uncertainty and redistribution of income from poor segments of the society to rich segments and hence leads to mass poverty. But the question is what causes inflation in an economy? Disagreement exists between the two schools of thought in their pursuit of an answer to such eternal question. Of these schools, the conventional view is based on Ricardian Fiscal Policy Regime (RFPR), while the Fiscal Theory of Price Level (FTPL) relies on non-Ricardian fiscal policy regime. The conventional view is also known as the monetarist view and FTPL is coined as the so-called Keynesian view. Leeper (1991) and Cochrani (2001) were among the first who advocated FTPL, while Sargent and Wallace (1981); McCallum (2001); and Bassetto (2002) were among those who have strongly criticized the FTPL and support the monetarist's view.

FTPL indicates that the fiscal deficit causes inflation in an economy, while monetarists argue that it is the supply of money which causes inflation. According to Kocherlakota and Phelan (1999) FTPL is an alternative selection device towards equilibrium price path as against the traditional monetarist's view. Consequently, FTPL has been emerged as an alternative to the traditional analysis of inflation, and associates domestic inflation with budgetary policies (Carlstrom & Fuerst 2000). Irrespective of the time and location, the monetarist approach declares inflation as a monetary phenomenon. Apparently, the disagreement between the two schools of thought can plausibly be explained by the differences over the interpretation of how adjustment takes place in intertemporal budget constraints¹. Such disagreement is based on whether economic agents behave in Ricardian or non-Ricardian passion (Tkacevs, 2006). RFPR presumes the endogeneity and automatic movement of the primary fiscal balance in order to ensure fiscal solvency for any price level and therefore the fiscal policy is ineffective in influencing the general price level. Whereas money supply changes by the central bank has the potential to influence price levels in an economy through the Quantity Theory of Money. But Sargent and Wallace (1981), in their monetary policy arithmetic, argue that growth of the monetary base would be directly determined by the strategy of the fiscal authority in the form to finance fiscal deficit. The model with forward-looking behavior predicts that seigniorage gains arising from money creation will lead to inflation hike even on the pace of tight monetary policy.

Moreover, in a situation of 'fiscal dominance' when intertemporal budget constraint is viewed as equilibrium condition, then current primary surplus has no role in determining the future surpluses; rather

¹ The intertemporal budget constraints requires that the discounted value of both the current and expected future surpluses shall be just enough to repay the initial debt (Tkacevs, 2006).

equality is restored by the price level changes (Beck-Friis & Willems, 2017; Łyziak & Mackiewicz-Łyziak, 2020). Leeper (1991) terms such autonomous form as 'active', while Woodford (1995) has characterized such mechanism as 'non-Ricardian' FTPL.

Theoretically, there are two difficulties in the analysis of the fiscal policy: firstly, it depends on the theoretical description in which the policy maneuvers and hence makes both the micro and macroeconomic theory relevant; secondly, time spans influence such analyses and become more complicated when done over the long-run on the pace of the changing financial and real stock of assets (Palley, 2013). Further, among macroeconomic perspectives, there has been a complex debate over the fiscal policy effects. Such perspectives compare Classical with Keynesian; Neo-classical with Neo-Keynesian; New-classical with New-Keynesian; and Post-Keynesian with Monetarists. However, numerous analytical issues remain intact despite ruling out microeconomic effects arising from the tax distortion and the inclusion of the public spending in production and utility functions. Other important elements include the sources of deficit financing, type of fiscal adjustment, and the question of whether the economy behaves in Ricardian or non-Ricardian passion (Palley, 2013).

There is dearth of empirical studies on how the fiscal deficit determines inflation in the emerging and developing economies with conclusive results (Tran, 2018). A strand of research grounded in the conventional IS-LM model indicates that expansionary fiscal policy increases the interest rate, but does not explain the response of exchange rate depreciation to such shocks (Enders, Müller, & Scholl, 2011). On the contrary, some studies (Corsetti, Meier, & Müller, 2012) affirm that expansionary spending policy exerts negative impact on interest rate. Whereas the studies of Celasun, Gelos, and Prati (2004) and Canzoneri, Cumby, and Diba (2010) report that higher fiscal imbalances lead to higher inflation rate. However, countries confronted with the problem of long-run stagnation can boost their GDP by increasing their public purchases through a multiplier process. Sometimes such implications of the multiplier process become quite different from the conventional Keynesian view and work via increase in disposable income through moderation of deflation (Murota & Ono, 2015). Even in the conventional framework, the multiplier effect may be often misunderstood and the true

effect seems to depend not only on the amount of spending, but on the benefits directly generated by such spending (Ono, 2011).

In case of Uganda, Ssebulime and Edward (2019) have recently confirmed the view of FTPL. The study finds the long-run relationship based on the estimates of Johansen co-integration. On the basis of Granger causality test, the study suggests that causality runs from deficit to inflation. Catão and Terrones (2005), in case of those emerging economies which suffer from high inflation, find strong nexus between the two, but find low links in the case of advanced nations. Similar conclusions were derived by Levin and Piger (2002) in a group of twelve industrial countries. Habibullah, Cheah, and Baharom (2011) in case of the Asian developing countries find the influence of the budget deficit to be inflationary and attribute it to the deficit financing by the central banks. Ndanshau (2012) in case of Tanzania finds unidirectional causality running from deficit to inflation, while Bwire and Nampewo (2014), in the context of Uganda, reveal that causality runs from inflation to deficit. Others (Aghevli & Khan, 1978) find bidirectional causality stemming from Olivera-Tanzi effect. According to Tanzi (1991) such bidirectional effect will hold when budget deficit not only influences inflation, but there exists a feedback from inflation through lags in tax collection. Real revenue falls due to inflation hike leads to further deficit in the budget and hence becomes a self-fulfilling phenomenon. Still other studies (Vieira, 2000; Akcay, Alper, & Özmucur, 2001) find evidence of no such causality. Despite the fact that FTPL is controversial, yet it has attracted prominent critics including Buiter (2002) and McCallum (2001, 2003) as well as vocal proponents like Leeper (1991), Cochrane (2001), and Leeper and Walker (2013). In a very recent attempt, McClung (2020) illustrates important cases in which fiscal policy remains non-Ricardian thereby determining inflation and still the forward guidance puzzles are there. Brunnermeier, Merkel, and Sannikov (2020) in their paper highlight the importance of bubble term in FTPL. They argue that although FTPL distinguishes between monetary and fiscal dominance, however, the bubble term cannot be ignored in situations of policy shifts.

In Pakistan, few studies have been attempted to analyze the effect of budget deficit on inflation. Shabbir and Ahmad (1994) employed OLS; Mughal, Khan, and Aslam (2011) used Granger causality and cointegration techniques; Agha and Khan (2006), Serfraz and Anwar (2009) used Johansen co-integration analysis and VECM, while Jalil, Tariq, and Bibi (2014) employed ARDL techniques in their analyses. Similarly, Wakeel and Ullah (2013) employed 3-Stage Least Square method to ascertain the impact of the fiscal deficit on output, inflation and balance of trade. These studies have found significant positive impact in case of Pakistan. On the contrary, Khan and Gill (2010) in their pursuit of factors determining inflation in Pakistan find no evidence of such relationship in the long run. The study adopts OLS in their estimation and finds currency depreciation, import price hike and support prices to sugarcane, wheat, rice and cotton as the major factors that fuel domestic inflation. This study, however, suffers from serious methodological errors. The authors justify the applications of OLS to time series data on the basis of one criterion: that the value of Durban-Watson (DW) statistic exceeds the value of R-square.

In classical regression model, very low value of DW statistic with high R-square indicates that the underlying series is non-stationary (Newbold & Granger, 1974). This is the initial step towards more formal test of stationarity on the pace of availability of a wide array of tests of stationarity (Nkoro & Uko, 2016). Similarly, time series data often possess trend and structural breaks; hence OLS and VAR are not appropriate methods of estimation in cases of non-stationary data (Shresta & Bhatta, 2018). However, Bashir, Nawaz, Yasin, Khursheed, Khan, and Qureshi (2011) have gone one step further and have applied Johansen co-integration in their analysis. The paper shows positive effect of public expenditure on inflation, besides money supply, import prices and GDP; while revenue influence was found to be negative.

However, in a study Farmer and Zabczyk (2019) demonstrate that in the overlapping-generations model the FTPL fails to uniquely² determine the general price level. The authors challenge the established view regarding the optimal combination of the fiscal policy with monetary policy for the achievement of the desirable goals and argue that both can be active simultaneously. The reason lies in that as long as the primary

²FTPL indicates that active fiscal policy in combination of passive monetary policy lead to a unique price level determination.
fiscal balance in not too large, the authority can conduct the fiscal policy that is unresponsive to endogenous movement of public debt. In case of Brazil, Cerisola and Gelos (2009) constructed a distributed lag model to ascertain the relationship between the fiscal policy and inflation. The study regressed inflation expectation on nominal interest rates, fiscal deficit, real wages and real exchange rate in the model. Very recent studies of Tran (2019), in case of BRICS countries, while Sriyana and Ge (2019) in the context of Indonesian economy, applied Shin et al. (2014) NARDL approach to determine the asymmetric effect of the fiscal deficit on inflation. Estimating the model over data spanning from 1971 to 2017, Sriyana and Ge (2019) reveal asymmetric effect of the fiscal deficit on inflation. Ajaz, Nain, and Kamaiah (2016), in case of India, employ the NARDL framework that shows the asymmetric impact of openness on domestic inflation in both the long and short runs. The authors reject the hypothesis of Romer (1993) regarding the negative impact of openness on inflation. The study, however, does not carry out the asymmetric impact of the components of fiscal deficit on inflation.

III. DATA AND ECONOMETRIC MODEL

DATA, SOURCE AND VARIABLES' DEFINITIONS

The annual data, on the selected variables for the empirical model testing the FTPL in Pakistan, have been taken from three main sources: World Development Indicators WDI, State Bank of Pakistan (SBP) and ESP. The data range from 1976 till 2017. The data on Current Account Balance (CAB) as percent of the GDP, inflation rate (based on CPI) and broad money as percent of the GDP were taken from the WDI. The primary fiscal balance and public debt as percent of the GDP were obtained from various issues of the ESP. The output gap and nominal effective exchange rate were obtained from the handbook of statistics published by the SBP, while data on the price of crude oil (nominal dollar) per barrel were retrieved from www.InflationData.com. The detailed description of the data, sources of data and variables' definitions is presented in Appendix A.

Model Specification

To test the FTPL, keeping in view the characteristics of Pakistan's economy for the sample period, the empirical estimation has been calibrated on the New-Keynesian model in case of small economy. Specifically, the calibration is being made on the models of Gali and Monacelli (2008) adopted by Çekin (2018) and the model of Cerisola and Gelos (2009). The general form of the FTPL model is as:

$$Inf_{t} = \lambda_{0} + \lambda_{1}FP_{t} + \lambda_{2}X_{t} + \varepsilon_{t} - \dots - \dots - (1)$$

Where Inf_t indicates inflation; FP_t is the fiscal policy variable; X_t is the set of control variables and would include growth of money supply, exchange rate and external balance.

Non-Linear ARDL (NARDL)

To ascertain the techniques of NARDL and analyze their distinguishing features, the ECM version of Linear ARDL of FTPL equation is as:

$$\Delta Inf_{t} = \alpha + \sum_{i=1}^{p_{1}} \beta_{1i} \Delta Inf_{t-i} + \sum_{i=0}^{p_{2}} \beta_{2i} \Delta CAPB_{t-i} + \sum_{i=0}^{p_{3}} \beta_{3i} \Delta CAB_{t-i} + \sum_{i=0}^{p_{4}} \beta_{4i} \Delta GBM_{t-i} + \sum_{i=0}^{p_{5}} \beta_{5i} \Delta GNEER_{t-i} + \sum_{i=0}^{p_{6}} \beta_{6i} \Delta OIL_{t-i} + \lambda_{1} Inf_{t-1} + \lambda_{2} CAPB_{t-i} + \lambda_{3} CAB_{t-i} + \lambda_{4} GBM_{t-i} + \lambda_{5} GNEER_{t-i} + \lambda_{6} OIL_{t-i} + \varepsilon_{t} - - - - (2)$$

In this model, the explanatory variables including fiscal policy have linear impact on the dependent variable. Shin et al. (2014) methodology is suitable to be employed when the impact of one or more explanatory variables is hypothesized to be non-linear. To implement the techniques, first changes in the primary fiscal deficit have to be constructed as $\Delta lnFP_{t-i}$. This newly constructed variable incorporates both the positive and negative changes denoted by $\Delta \ln FP^+$ and $\Delta \ln FP^-$ respectively. From these, two new variables would be constructed; the one reflecting contractionary fiscal policy denoted by NEGt. Such partial sums of positive and negative changes are shown as:

$$POS_{t} = \sum_{i=1}^{t} \Delta CAPB_{t-i}^{+} = \sum_{i=1}^{t} \max(\Delta CAPB_{t-i}, 0)$$
$$NEG_{t} = \sum_{i=1}^{t} \Delta CAPB_{t-i}^{-} = \sum_{i=1}^{t} \min(\Delta CAPB_{t-i}, 0) - - - -(3)$$

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Following Shin *et al.* (2014), $\Delta CAPB$ of equation-2 is substituted by POSt and NEGt as below:

$$\Delta Inf_{t} = \alpha + \sum_{i=1}^{p_{1}} \beta_{1i} \Delta Inf_{t-i} + \sum_{i=0}^{p_{2}} \beta_{2i}^{+} \Delta POS_{t-i} + \sum_{i=0}^{p_{3}} \beta_{3i}^{-} \Delta NEG_{t-i} + \sum_{i=0}^{p_{4}} \beta_{4i} \Delta CAB_{t-i} + \sum_{i=0}^{p_{5}} \beta_{5i} \Delta GBM_{t-i} + \sum_{i=0}^{p_{6}} \beta_{6i} \Delta GNEER_{t-i} + \sum_{i=0}^{p_{7}} \beta_{7i} \Delta OIL_{t-i} + \lambda_{1} Inf_{t-1} + \lambda_{2}^{+} POS_{t-i} + \lambda_{3}^{-} NEG_{t-i} + \lambda_{4} CAB_{t-i} + \lambda_{5} GBM_{t-i} + \lambda_{6} GNEER_{t-i} + \lambda_{7} OIL_{t-i} + \varepsilon_{t} - - - - (4)$$

The above specification in equation-4 is another ECM which is not only estimable by the OLS, but also the conventional ARDL techniques of Pesaran et al. (2001) are uniformly applicable to it (Shin *et al.*, 2014).

IV. EMPIRICAL ESTIMATION

Before the application of the ARDL techniques, the variables of the model were checked for stationarity via DF-GLS and PP tests (see Table 1). Since many authors (Harris, 1992, 2009; Elliot, Rothenberg, & Stock, 1996) have shown that the conventional ADF test is not reliable in small sample studies and prefer DF-GLS test. Both the tests report that cyclically adjusted primary balance (CAPB) and oil prices (Oil) are stationary at the first difference, while inflation (Inf), current account balance (CAB), growth of broad money (GBM) and growth of real effective exchange rate (GNEER) are stationary at their levels. In short, both the tests justify the application of the NARDL techniques.

Variables	DF-GLS				Philips-Perron			
	D	Prift	Drift & Trend		Drift		Drift & Trend	
	Level	Δ	Level	Δ	Level	Δ	Level	Δ
Inf	-2.92*	-6.75*	-2.97***	-7.67*	-3.02**	-7.87*	-2.97	-7.78*
CAPB	-0.40	-2.52**	-1.66	-3.66**	-2.60	-3.03**	-2.19	-4.31*
CAB	-2.55**	-6.37*	-2.82	-6.37*	-2.97**	-6.31*	-2.87	-6.27*
GBM	-5.40*	-7.24*	-5.50*	-7.66*	-7.85*	-16.15*	-8.15*	-15.83*
GNEER	-5.05*	-8.94*	-5.21*	-9.33*	-5.14*	-24.07*	-5.11*	-23.94*
Oil	-1.51	-6.72*	-2.17	-6.73*	-1.69	-6.66*	-2.12	-6.58*

TABLE 1

Evidence from DF-GLS (ERS) and PP Tests

Note: *, **, and *** symbolize significance at 1%, 5% and 10% respectively.

The results of the FTPL model under the frameworks of both the LARDL and NARDL are presented in Table 2. The value of F-statistic (2.471) of LARDL is less than the lower critical value at even 10 percent level, and hence shows no long-run relationship. The bound F-Statistic (5.575) under the NARDL is greater than the upper critical value at conventional level of significance. This confirms the existence of co-integration. The empirical model includes other explanatory variables besides proxy of fiscal policy including CAB, growth of money supply (GBM), growth of nominal effective exchange rate (GNEER) and price of crude oil per barrel in the US dollar.

To detain the effect of the output gap and debt to GDP ratio in excess of 60 percent, two dummy variables have been created. The one represented by DUM_{Debt} takes the value of '1' when the public debt exceeds 60 percent of the GDP and '0' if otherwise; while the other is denoted by DUM_{Gap} , taking the value of '1' if the output gap is positive and '0' if otherwise. The study of Jašová, Moessner, and Takáts (2019) shows the importance of both the domestic and global output gaps in influencing the domestic level of inflation, with positive output gap having positive impact. Similarly, public debt in excess of 60 percent of the GDP is considered as growth retarding and inflationary. In a study, Cherif and Hasanov (2012) reveal that high levels of public debt and fiscal deficit create vulnerabilities and a debt-reduction strategy should therefore constitute the elements of the fiscal adjustment, high growth, low interest rate and large inflation. The current study therefore includes a dummy variable to capture such possible impact of higher debt to GDP ratio.

TABLE 2

Level of	Linear-ARDL	(1, 0, 0, 0, 1, 0)	NARDL (1, 2, 1, 2, 3, 0, 0)		
Significance	F-Statist	tic =2.471	F-Statistic = 5.575		
	I(0)	I(1)	I(0)	I(1)	
10%	3.032	4.213	2.831	4.04	
5%	3.577	4.923	3.327	4.7	
1%	4.885	6.55	4.527	6.263	

Bound F-test of FTPL Model

Note: DGP is assumed to be case-V; while lag selection is based on SIC. Critical values are obtained from Narayan (2005) for n=40.

Pesaran et al. (2001) and other recent studies (for example, Goh, Yong, Lau, & Tang, 2017; McNown, Sam, & Goh, 2018; Sam et al., 2019) have warned to test the degenerate cases in the application of the ARDL techniques. The study therefore conducted tests for the degenerate-dependent and degenerate-independent cases which may arise in both the LARDL and NARDL modeling of the co-integration relationship. The LARDL model suffers from degenerate-dependent problem (Table 3) as the t-bound value (-3.366) in absolute term falls below the upper critical value at 10 percent probability level.

TABLE 3

Degenerate-Dependent and Degenerate-Independent Cases of FTPL Model

Level of	LARDL			NARDL					
Significance	t-Stat	t-Stat = 3.366		Wald-F = 4.289		t-Stat = 4.742		Wald-F = 4.639	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
10%	-3.13	-4.21	2.03	3.54	-3.13	-4.37	1.98	3.45	
5%	-3.41	-4.52	2.51	4.24	-3.41	-4.69	2.42	4.11	
1%	-3.96	-5.13	3.69	5.96	-3.96	-5.31	3.46	5.68	

Note: The lower and upper critical bound values for Wald-F under DGP case-V are taken from Sam et al. (2019), while that of t-static. are obtained from Pesaran et al. (2001) table.

However, NARDL model does not suffer from either of the degenerate problems. The t-bound value (-4.742) in absolute term is greater than the upper critical bound value at 5 percent level of probability, while in testing the degenerate-independent case the Wald test (4.639) indicates that NARDL model does not suffer from this problem. Similarly, for NARDL model, the weak exogeneity tests of explanatory variables have been conducted via the Likelihood Ratio (L.R.) test (reported in Table 4). The L.R. test shows that CAPB, CAB, and Oil are weakly exogenous at 5 percent level of probability, while the test statistic rejects the null hypothesis of weak exogeneity in cases of GBM and GNEER.

NARDL Weak Exogeneity Test (Likelihood Ratio) of FTPL Model

	a capb	α_{GBM}	$\alpha_{\rm CAB}$	α_{OIL}	α_{gneer}
χ^2	0.096	19.129	1.610	0.195	24.350
Prob.	0.953	0.000	0.447	0.907	0.000

The long-run estimates of both the LARDL and NARDL are reported in Table 5. The estimates of LARDL are not reliable as the model did not confirm the co-integration relationship and also suffers from the degenerate-dependent problem; whereas, that of NARDL are reliable. The coefficient associated with (CAPB_POS) is significant at standard level of probability. This implies that positive change in the fiscal balance (contractionary fiscal policy) reduces inflation. Similarly, expansionary fiscal policy (CAPB_NEG) positively and significantly affects inflation over the long run. Remarkably, this finding conforms with the view of FTPL and therefore evidences that the theory holds in Pakistan.

TABLE 5

Variable	Linear-ARDL			Variable	NARDL		
	Co-efficient	t-Stat	Prob		Co-efficient	t-Stat	Prob
CAPB	0.49	0.56	0.58	CAPB_POS	-12.41	-3.12	0.01
-	-	-	-	CAPB_NEG	12.46	3.38	0.00
GBM	-11.63	-0.75	0.46	GBM	29.62	1.29	0.21
CAB	-1.03	-2.18	0.04	CAB	-1.55	-3.66	0.00
OIL	0.10	1.05	0.30	OIL	0.24	3.51	0.00
GNEER	0.25	0.03	0.98	GNEER	3.47	0.55	0.59

Long-Run Estimates of FTPL Model

Reverting to the speed of adjustment measured by the ECM term for both LARDL and NARDL (see Table 6), it is apparent that the ECM term is significant for the NARDL-model only. The size of ECM term indicates that 64.8 percent errors are being restored each year when a shock occurs.

Level of	Linea	ar-ARDL	NARDL		
Significance	$ECM_{t-1} = -0.45$	4 t-bound = -4.159	$ECM_{t-1} = -0.648 \text{ t-bound} = -7.123$		
	I(0) I(1)		I(0)	I(1)	
10%	-3.13	-4.21	-3.13	-4.37	
5%	-3.41	-4.52	-3.41	-4.69	
1%	-3.96	-5.13	-3.96	-5.31	

ECM t-Bound Test of FTPL Model

The short-run estimates of both the LARDL and NARDL are presented in Table 7. The impact of the fiscal consolidation, represented by the coefficient associated with D(CAPB_POS), is not only negative but also significant in the short run. This implies that contractionary fiscal policy would successfully reduce inflation, however, in the next period, the fiscal consolidation increases inflationary pressure. The expansionary fiscal policy, represented by the coefficient associated with D(CAPB NEG), significantly increases inflation. The short-run impact of the money supply is negative and significant in the first two consecutive periods. This highlights that the expansionary monetary policy reduces inflation. This can plausibly be attributed to the impact of the monetary expansion on the pace of stable demand for money that results in a significant fall in the domestic interest rate. The declining interest rate reduces the cost of production on the one hand, while encourages investments on the other hand, thereby boosting the supply of goods and services. As a consequence, more goods and services become available which reduce the domestic inflation. Shortage of certain commodities may fuel inflation in the short run, but falls soon after the supply situation improves.

ECM Estimates of FTPL Model

NARDL			LARDL		
Variable	Co-eff.	Prob.	Variable	Co-eff.	Prob.
С	4.018	0.056	С	2.699	0.104
TREND	2.593	0.000	TREND	-0.077	0.046
D(CAPB_POS)	-24.052	0.000	D(OIL)	0.128	0.000
D(CAPB_POS(-1))	20.875	0.000	DUM _{Debt}	0.431	0.660
D(CAPB_NEG)	1.743	0.640	DUM _{GAP}	-0.495	0.544
D(GBM)	-9.949	0.025	ECM _(t-1) *	-0.454	0.000
D(GBM(-1))	-19.299	0.001			
D(CAB)	0.093	0.550			
D(CAB(-1))	0.655	0.003			
D(CAB(-2))	0.302	0.065			
DUM _{Debt}	3.025	0.012			
DUM _{GAP}	0.425	0.566			
ECM _(t-1) *	-0.648	0.000			

Note: * indicates that p-value is not compatible. The t-bound critical values for the ECM terms are reported in Table 6.

The results of our study also highlight that improvement in the current account balance enhances the domestic inflationary pressure in the short run against its negative impact in the long run. This positive impact is statistically insignificant in the first period but becomes significant over the next two consecutive periods. Such positive impact of the improved current account balance on the domestic inflation may be attributed to the relative elasticities of the imports and exports. It is obvious that the current account balance improves when the imports fall and/or exports rise. Intuitively, when the demand for exports rises in the international market, the domestic suppliers often rush to exports at the cost of squeezing supply from the domestic market. On the pace of inelastic supply in the short run, such exports are expected to add to the domestic inflationary pressure. Imposition of custom duties on the import of essential raw materials and consumption goods is another factor that adds to the domestic inflation.

Similarly, the results of estimated model show that public debt in excess of 60 percent of the GDP is found to fuel inflation and the impact

is significant at conventional level of probability. This finding conforms to the findings of Ahmad, Sheikh, and Tariq (2012) who found high domestic debt as the main cause of inflation in Pakistan. Positive output gap is also found to add to inflationary pressure, but this effect is statistically insignificant.

TABLE 8

Type of Asymmetry	Wald/F-Stat.	I(0)	I(1)	Conclusion
Long-Run Impact Asymmetry	29.454	5.387	6.437	Asymmetry
Short-Run Impact Asymmetry	2.476	4.510	5.643	No Asymmetry

Testing Impact Asymmetry under FTPL Model

The tests of asymmetry (reported in Table 8) do not confirm the short-run impact asymmetry. The value of Wald = 2.476 does not exceed the upper critical value at 5 percent level of probability. The Wald test only evidences the long-run asymmetric impact of the CAPB on inflation. The calculated value of this statistic (29.454) is greater than the upper critical value at 5 percent level of probability.

Both models were scanned for the conventional diagnostic tests (see Table 9). The LARDL model passes the test of normality, serial correlation and heteroskedasticity, but could not qualify the RESET test, and hence suffers from wrong functional form. The model rejects the hypothesis of correct specification under Ramsey RESET test at 1 percent level of significance. This may be attributed to the underlying assumption of symmetry. Contrarily, the NARDL model passes all these tests including the functional form test. Similarly, parameters of the NARDL model are found to be stable. These tests have been conducted on the basis of both the CUSUM and square of CUSUM tests, and are reported in Appendix B.

Problem LARDL-Model NARDL-Model test-Stat. Prob. test-Stat. Prob. Normality J.B. =1.036 0.596 J.B. = 0.4970.780 Serial Correlation FLM =0.256 0.776 $F_{LM} = 2.013$ 0.162 Heteroskedasticity 0.218 $\chi^2_{B,P,G} = 20.088$ 0.328 $\chi^2_{B,P,G} = 13.100$ FRESET = 8.270 Specification 0.007 $F_{RESET} = 4.828$ 0.041

TABLE 9

Diagnostic Checking of FTPL Model

IV. CONCLUSION AND POLICY RECOMMENDATION

In case of the fiscal activism as is the case of majority of the developing countries including Pakistan, the researchers often associate the domestic inflationary pressure to expansionary monetary policy and exchange rate depreciation. In situation of inflation targeting by the central bank on the pace of the fiscal activism, it is the fiscal policy that directly influences monetary policy and indirectly, the inflation. Our analysis shows that the impact of money supply and exchange rate depreciation becomes insignificant when the influence of the fiscal deficit is allowed to be asymmetric under the framework of NARDL model. Their signs are however in line with the expectations of their respective theories. Besides domestic factors, this study finds external factors as the main cause of inflation. The estimates reveal that the current account deficit and the international oil prices have a significant positive impact on the domestic inflation in Pakistan.

To test the FTPL, keeping in view the characteristics of Pakistani economy for the sample period, the empirical estimation has been calibrated on the New-Keynesian model of small economy. Specifically, the calibration has been made on the models of Gali and Monacelli (2008) adopted by Çekin (2017) and the model of Cerisola and Gelos (2009). The dynamic relationship between the fiscal policy and inflation is captured by the application of LARDL and more specifically, the possible asymmetric effect that the fiscal policy has on the general price level via NARDL techniques. The estimates of LARDL are not reliable as the model does not confirm the co-integration relationship and even

suffers from the degenerate-dependent problem. The estimates of the NARDL are reliable as the model does not suffer from the degenerate problems. Remarkably, the finding conforms with the view of the FTPL and therefore evidences that the theory holds in the long run. However, the impact of the fiscal deficit on inflation is found to be asymmetric. From the tests of asymmetry under the NARDL modeling, the present study only confirms the long-run asymmetric impact of CAPB on inflation. The NARDL techniques isolate the impact of the expansionary fiscal policy from the contractionary fiscal policy and assume that both the impacts are not equal. Contrarily, the LARDL techniques presume such impact to be equal and co-integration relation is therefore lost in the present case.

Based on the outcomes, the study carries important policy implications and recommendations to the government of Pakistan in general and the fiscal managers in particular. To reduce the domestic inflationary pressure, the fiscal austerity measures would work and such impact would become more visible if the other associated policies are accommodative.

It is obvious that the current account balance improves when the imports fall and/or exports rise. Intuitively, when the demand for exports rises in the international market, the domestic suppliers often rush to exports at the cost of squeezing supply from the domestic market. On the pace of inelastic supply in the short run, such exports are expected to add to the domestic inflationary pressure. Imposition of custom duties on the import of essential raw materials and consumption goods is another factor that adds to the domestic inflation. Thus, the domestic inflationary pressure may be minimized by adopting the tax policy that restricts the import of luxury items and exempts essential raw materials and consumption goods. This will not only impact the inflation directly, but would also reduce the inflationary pressure via the channel of improvement in the current account balance, indirectly. Similarly, the analysis has shown high public debt liabilities as inflationary, therefore, the Fiscal Responsibility and Debt Limitation Act need to be implemented in its true spirit to monitor and limit the opportunistic behavior by the political parties in power in creating political business cycle and mounting public debt. Besides this, the current tax structure

carries a variety of tax exemptions and is skewed towards the indirect taxes; therefore the fiscal reforms that may make the tax system fairer and efficient with a switch from the indirect to direct taxes would be helpful in generating sufficient revenue and reducing inflationary pressure in Pakistan.

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APPENDICES

Appendix A

Definitions of Variables, their Measurement and Data Sources

Definition	Notation	Measurement	Data Source
Current Account Balance	САВ	Current Account Balance [net exports of goods and services + net income from abroad + net unilateral transfers] as percent of GDP	WDI-2017
Primary Fiscal Balance	PFB	Primary fiscal balance=Total revenue less total government spending excluding interest payment as a percent of GDP	ESP (Various Issues)
Inflation	Inf	Inflation based on Consumer Price Index (CPI) annual in percent	WDI-2017
Ratio of Debt to GPD	Debt	Total publically guaranteed debt as percent of GDP	ESP (Various Issues)
Output Gap	Gap	Output gap is difference between actual GDP and potential GDP	Handbook of Statistics (SBP)
Growth of Money Supply	GBM	Broad money as percent of GDP [GBM=log(BM)-log(BM) _{t-1}]	WDI-2017
Growth of Nominal Effective Exchange Rate	GNEER	Index of nominal effective exchange rate [GNEER=log(NEER)-log(NEER)t-1]	Handbook of Statistics (SBP)
Oil Price	Oil	Nominal price in US dollar per barrel	InflationData.com

Note: Increase in exchange rate represents depreciation, while decrease indicates appreciation of Pakistani currency. For cyclical adjustment of the variables Hodrick-Prescott Filter with Lambda= 6.25. Hodrick and Prescott suggest to use lambda=100, whereas Ravn and Uhlig (2002) recommend to set Lambda equal to 6.25.



Appendix B CUSUM and Square of CUSUM Tests of FTPL Model

A SPATIAL ANALYSIS OF TERRORIST ATTACKS IN PAKISTAN

AMANAT ALI, SHABIB HAIDER SYED, SOBIA KHURRAM AND LABIBA SHEIKH*

Abstract. The objective of this study is to analyze the temporal and spatial spread of the terrorist attacks in Pakistan. The study uses spatial lag and spatial error models to explain spatial variation in terrorist attacks in the districts of Pakistan for the years 2009 and 2011. The number of attacks in focal districts is associated with the poverty of the neighbouring districts. Another source of variation is the general public's contentment (voter turnout is used as a proxy) with the current regime, which turns out to be negatively correlated with terrorist attacks. A significant spatial variation in terrorism is explained by Federally Administered Tribal Areas (FATA) and Khyber Pakhtunkhwa (KP province). The results also show that clusters of attacks extended to other parts of the country between 2009 and 2011 and terrorism spread through the diffusion of attacks to other districts and provinces. More importantly, the attacks are spatially correlated; hence, hot spots are identifiable.

Keywords: Democracy; poverty; violence; terrorism; spatial analysis

JEL Classification: C32, K42, Z10

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I. INTRODUCTION

The study aims to find out the determinants of terrorism attacks by using temporal and spatial models using the district-level data for the years 2009 (109 districts) and 2011 (113 districts). The data of multidimensional poverty at the district level is developed by Jamal (2012).

Pakistan is among the top five countries with the most terrorist incidents since the violent attack on the World Trade Center on September 11, 2001 (Global Terrorism Index, 2016). In the last one-and-a-half decades, terrorism became a major social, economic, security, and religious issue in Pakistan. Since 9/11, terrorist attacks and terrorism-thwarting security measures have cost Pakistan the precious lives of 60,000 citizens, including 3,500 security personnel, and almost 118 billion dollars.¹ While one may be able to identify many factors that require attention and that may lead to a decline in terrorism in the long-run, short-term measures to control violence are currently the pressing need. Although terrorism, security, and law and order are the most challenging problems facing the country, the problem of terrorism requires thorough investigation.

Based on the literature provided in the next section, one may believe that the regions with the most violence are those with the lowest economic well-being. Pakistan has experienced a devastating wave of violence in terms of terrorist attacks and casualties for the last decade. However, such violence is not uniform across the entire country. The attacks are more concentrated in some districts, while there are fewer in others. Initially, attacks were limited to the tribal region, and only the military and law enforcement agencies were targeted. However, the attacks later spread to various adjacent districts in Khyber Pakhtunkhwa (KP) province. Although lower in intensity, attacks have also taken place in various other parts of the country. Thus, there is an apparent spatial variation in violence in the country. Although various studies have been carried out to investigate the causes of terrorism in Pakistan, none of them has empirically modelled the spatial variation in terrorist attacks across the country (see, for instance, Abbas and Syed 2020; Syed et al.

¹Pakistan Economic Survey (2016).

2015; Rehman et al. 2017; Ismail and Amjad 2014; Syed and Ahmad 2013; Nasir et al. 2012). The identification of the hot spots (or clusters) of violence as well as the intensity of spill over to the neighbouring regions is important for the formulation of security policy. Therefore, there is a need to investigate both the pattern of terrorist attacks as well as their determinants. The current study is an attempt to fill this gap in the literature by using spatial analysis of terrorist attacks across the various districts of Pakistan. The study uses district-level data to identify the determinants of attacks as well as the diffusion process of these attacks by employing a spatial econometric approach.

Using spatial lag and spatial error models on cross-sectional data for the years 2009 and 2011, the study finds that poverty within a district is negatively associated with violence in that district.² However, poverty in neighbouring districts is linked with a high number of attacks in that district. The voter turnout, a proxy for the general public's contentment with the incumbent government, is negatively correlated with terrorism incidents. Federally Administered Tribal Areas (FATA) and Khyber Pakhtunkhwa (KP) are found to explain a significant amount of the spatial variation in terrorism. The results also show that clusters of attacks also spread to other parts of the country between 2009 and 2011.

The rest of the study is organized as follows: Section II discusses the relevant literature on the issue of terrorism. Section III provides a preview of the spatial and temporal variations in terrorist attacks in Pakistan. The theoretical framework is discussed in Section IV. Section V presents the data and relevant econometrics methodology. Section VI provides the results, while Section VII concludes the study with some policy suggestions.

II. REVIEW OF LITERATURE

There are two broadsides of the issue that have been investigated: the determinants of terrorism and the consequences of terrorist attacks. Both aspects have been extensively researched. While there is general agreement regarding the consequences of terrorism, academicians usually

² For the years 2009 and 2011, we have used data on voters turn out from the elections in 2008 and 2013, respectively.

differ on what drives terrorist activities. A point of concern here is that these studies tend to ignore the spatial aspect of the issue of terrorism. Studies on terrorism that consider the spatial aspect are very limited³. This study will be an addition to such literature generally and contribute to the spatial dynamics of terrorism of Pakistan specifically.

The literature on violence and terrorism dates to the 1960s. Nonetheless, it was the unfortunate event of 9/11 that attracted enormous attention from political and development economists to explore this issue with more intensity. One school of thought, led by Gurr (1970), relates variables such as poverty and inequality to political violence and terrorism. The other, led by Tilly (1978), associates violence and terrorism with the structure of political opportunity. Both ideas have received empirical support.

The original work that considered economic variables to be responsible for violence is that of Gurr (1970), who coined the term "relative deprivation" to describe the feeling of discontent resulting from discrimination by the 'haves' against the 'have-nots' that eventually translates into violence. Other works that found support for the economic dimension include Seligson (1987) for income disparity; Landon and Robinson (1989) for income inequality within domestic economies; Blomberg et al. (2002) for dissatisfaction with the economic environment; Fearon and Laitin (2003) for poverty, political instability, and rough terrain; and Bravo and Dias (2006) for low values on the Human Development Index (HDI).

On the other hand, Tilly (1978) was supported by Hamilton and Hamilton (1983), Muller (1985), Muller and Weede (1990), Abadie (2004) and Testas, (2004). Piazza (2006) argued that the structure of party politics is also important. Another stream of literature tries to apply the rational-choice framework to predict terrorists' behavior [see, for example, Wilkinson (1986); Hoffman (1998); Pape (2005); Dugan et al. (2005); Kydd and Walter (2006); Enders and Sandler (2006); and Clarke

³ Some distinguished Spatial terrorism studies include the work of Siebeneck et al. (2009), Braithwaite and Li (2007), LaFree et al. (2012).

and Newman (2006)]. It is obvious from this literature that there is no consensus concerning the causes of terrorism. One reason could be that these studies were conducted on diverse regions across different periods using different techniques.

Siebeneck et al. (2009), who conducted a geographic and temporal analysis of terrorist incidents in Iraq for the period 2004-2006. The study concluded that terrorists' actions are predictable and are not random events. Similarly, Braithwaite and Li (2007) explored transnational terrorism hot spots and their geography. The study argued that countries within the range of hot spots were expected to experience an increase in terrorist attacks in the future. In a recent attempt, LaFree et al. (2012) examined the spatial and temporal patterns of terrorist attacks by the Spanish group ETA between 1970 and 2007. The study found that after the ETA moved towards a more attrition-based attack strategy, the subsequent attacks were significantly more likely to occur outside the Basque region and to target non-adjacent regions. This outcome is consistent with the hierarchical diffusion argument.

III. TERRORISM IN PAKISTAN: SPATIAL AND TEMPORAL VARIATIONS

Throughout the world, terrorism has become a major concern as it has developed into a potential threat to national security. Consequently, efforts are being made to curb terrorism. While long-term solutions may require changes in the political structure and improvements in the economic conditions of the country being affected, short-term strategies rely heavily on pre-empting such acts. The most dangerous aspect of this issue is the randomness of terrorist attacks. Thus, the success of any security strategy is linked to how accurately the time and place of attacks are anticipated. The correct identification of the time and place of attacks can help the government and security agencies develop effective counterterrorism measures through the efficient allocation of time and resources.

After the 9/11 attacks, the US and coalition forces attacked Afghanistan to end the Taliban regime in the country. The Taliban had no answer to the invaders' airstrikes and were ordered to disperse by their supreme commander, Mulla Omer. However, after a couple of years, they emerged from their hideouts and started attacking the coalition forces in Afghanistan. The perception was that militants and their supporters had found safe sanctuary in the rugged Pakistan-Afghanistan border region. This led Pakistan to conduct a military operation in 2004 in Waziristan, one of the seven agencies in the FATA of Pakistan. This military operation together with drone attacks by the US-led to the creation of what is now called the Pakistani Taliban in 2006. The Tahreek-e-Taliban Pakistan (TTP) - one of the most influential and dangerous groups among the Pakistani Taliban -initially declared war against the Pakistan Army. In retaliation for the collateral damage, this war spread to the entire FATA region. Later, the terrorist attacks spread to the rest of Pakistan, resulting in numerous casualties. This domestic terrorism in Pakistan has become a serious problem for the major Pakistani cities. Maps 1 to 4 show the temporal and spatial spread of the terrorist attacks in Pakistan (see Appendix Figure A).

IV THEORETICAL MODEL

This section discusses the theoretical underpinnings of the determinants of terrorism. The theoretical model utilizes the rational-choice framework to generate predictions of terrorism. In the context of the terrorism literature, this framework assumes a rational decision-making process by a representative terrorist group that maximizes expected payoffs from terrorist activities given resource constraints [Enders and Sandler (1993); Landes (1978); Sandler et al. (1983)]. This approach can be demonstrated by modifying a simplified version of the rational-choice terrorism equilibrium model developed by Lakdawalla and Zanjani (2005).

Suppose there exists a terrorist group that holds a total of M resources that can be used for terrorist activities. Let there be K potential targets for the terrorist group. The group invests resources m_i into attacking target *i*. If the attack is successful, it acquires value W_i , which may vary across targets. To bring in the spatial aspect, we assume that these targets vary across space. Spending more resources raises the probability of success, but success may be easier to achieve with one target than another. In other words, the marginal productivity of a given amount of resources varies across targets and therefore across space. A productive attack is a successful attack that results in destruction/damage that hurts the government, gains media attention, and spreads terror. Let

this productivity be represented by d_i . The probability of a successful attack on target *i* can be defined as $\phi(m_i, d_i)$, where $\phi_m > 0$ and $\phi_d > 0$. The parameter d_i is the 'bang for the buck', or the marginal productivity of a given amount of investment at location *i*. In this environment, the terrorist group maximizes its expected utility according to the following equations:

$$\max_{m_i} \sum_{i=1}^{K} \phi(m_i, d_i) W_i \tag{1}$$

subject to

$$\sum_{i=1}^{K} m_i = M \tag{2}$$

The group's optimal behaviour is characterized by the following first-order conditions:

$$\phi_m(m_i, d_i)W_i = \lambda_i \ ; \ i = 1, \dots, K$$
(3)

where λ is the group's marginal utility of financial resources. Equation (3) states that the terrorist group tries to diversify its attacks over a wider range of space up to the extent where the expected marginal payoff from its resources is equal to λ for all potential targets.⁴ In other words, all else equal, more resources will be spent on striking higher-value targets and targets where spending is more productive (i.e., those with higher values ofd). Hence, resources will be diverted from lower-value (or productivity) targets to higher-value (or productivity) targets.

Because W_i shows the value that is acquired through a successful attack, it is higher for high-value targets. In our empirical model, we capture this by using a multidimensional poverty measure for a district. High poverty in a district means lower importance of that district; hence, targeting it would result in a lower value for the terrorist group. Instead,

⁴ This result requires that we impose the condition of an interior solution, which therefore implies that this model considers only those districts that have experienced at least one attack. This is a caveat of the model because the empirical model also includes districts with zero attacks.

the terrorist group would want to target a district that is economically well off and is, therefore, more important to the government. In this sense, we would expect a negative relationship between poverty and terrorism in a district.

The probability of a successful attack using resources m_i increases with the ease of attacks d_i . In other words, the terrorist group will prefer to attack those targets that are easily accessible, as accessibility reduces the cost of an attack (in terms of being caught or the use of other financial resources). Easily accessible targets are those that are closer to their home base. Additionally, lower-cost targets include those areas where the terrorists can easily sneak. In our empirical model, we capture this aspect by using a FATA dummy. FATA stands for the Federally Administered Tribal Areas, which is a region full of mountains and difficult terrain that provides natural hideouts for terrorists. Moreover, FATA shares a large border with Afghanistan, which is useful for terrorists to cross the border in times of military operations in the region.⁵ Hence, it is less costly for the terrorists to enter settled areas, execute the attacks, and escape back to FATA. The Khyber Pakhtunkhwa (KP) province shares a border with the FATA region through its 10 districts. Hence, attacking KP province is always easier than attacking other provinces for terrorist groups, which is why we also include a KP dummy in our analysis. We expect positive coefficients for both dummy variables.

Another important factor that can contribute to decreasing the cost of terrorism by a terrorist group is sympathy among the public for the terrorist group. If the masses are dissatisfied/discontent with the prevailing regime and system, there is a higher likelihood that they may tend to support the terrorist group by providing it with financial aid and/or shelter/hideouts. Prominent reasons for such discontent may be relative deprivations, both economic and political. Deprivation enhances rebellious tendencies in the public. There are three types of individuals in any functional democracy. The first is fully satisfied with the system and whole-heartedly participates in democratic processes. The second type is dissatisfied but still believes that positive change may be possible

⁵ This border is so large that it is practically impossible for both countries to safeguard it at each point.

through constitutional/democratic means; hence, this type participates in democratic processes despite their grievances. The third type is those who feel completely dissatisfied with the system. In their opinion, any positive change is impossible within the constitutional/democratic framework, so they pull themselves out of the democratic processes by either abstaining or boycotting. This type is also the most vulnerable to becoming either facilitators/aides or active members of a terrorist group. In the context of the present study, a plausible gauge of peoples' satisfaction with the regime is their participation in the electoral process through voting. Hence, a low voter turnout is expected to have a positive correlation with terrorism incidents in any specific area.

We make another modification to the model of Lakdawalla and Zanjani (2005) by allowing for resource constraints to change in our empirical model. We do so by including the poverty of neighbouring districts in the analysis. A high poverty rate should lead to more unemployed people whose opportunity cost of being involved in terrorist activities may not be very high. From the terrorist group's perspective, they can hire more people, obtain logistical support, or improve their support base for a lower price. That is the real resource constraint changes. In other words, the budget line will shift outward, resulting in the availability of more resources (in real terms) for the terrorist group to use. This increase in resources could in turn lead to an increase in terrorism. Hence, we expect a positive association between poverty in neighbouring districts and terrorist attacks in that district. Considering the above theory, we estimate the following equation and its variants:

$$\ln(TA) = \beta_0 + \beta_1 Pov + \beta_2 Neighbor _Pov + \beta_3 Turnout + \beta_4 FATA + \beta_5 KP + \varepsilon$$
(4)

where *TA*, *Pov*, *Neighbour*, *Turnout*, *FATA*, and *KP* respectively denote the number of terrorist attacks in the district, the poverty index for the district, the poverty index in the neighbouring (or adjacent) district, voter turnout, the FATA dummy, and the KP dummy, which take the value of one of the districts is in FATA and PK, respectively.

The above model distinguishes between the preferences and productivity of terrorists when deciding on their attacks. They will attack targets that are easily accessible and that are highly valued. However, in practice, it might be difficult to make this distinction. A target may be easily accessible and highly valued at the same time. For example, the district of Peshawar is not only easily accessible because it is contagious to the FATA region, but it is also highly valued because it is the economic hub of KP province. These characteristics may explain why this district has experienced the highest number of attacks in KP province.

V. DATA AND ECONOMETRIC METHODOLOGY

DATA AND VARIABLES

In this section, we will discuss the data and variables used in the analysis. The unit of analysis is the district.⁶ The analysis is conducted for the years 2009 and 2011. The sample size is 109 for 2009 and 113 for 2011. Because the sample sizes are different for the two years, we did not create a panel and run the regressions separately for both years. The dependent variable, terrorism, is quantified by the number of terrorist attacks in a given district in a year. The data for this variable are obtained from the Global Terrorism Database (GTD) of the "National Consortium for the Study of Terrorism and Responses to Terrorism." The dependent variable is in log form.⁷

The continuous variable in the covariates is the value on the Index of Multidimensional Poverty (IMP). Unfortunately, district-level data for many important variables are not available from the official statistics for Pakistan. Researchers have therefore made individual efforts to create data for some variables. In line with the theoretical model's prediction, we utilize data from the Index of Multidimensional Poverty (IMP) developed by Jamal (2012). The index ranges from 0 to 100, where higher values mean more poverty. The study uses the unit record household-level data from the Pakistan Social and Living Standard

⁶In Pakistan, a district is the second order of administrative division after a province.

⁷ Some districts have zero attack in a year, we added 1 for log transformation.

Measurement (PSLM) surveys, which were conducted in 2010-11 and 2008-09 and covered 77,500 households across all provinces in Pakistan, to construct the Index for Multidimensional Poverty for the two years. Jamal (2012) used the Principal Component Method, which combined indicators for human poverty, poor housing, and deprivation in household physical assets to generate a district-level multidimensional poverty index for the years 2009 and 2011. Data on voter turnout are taken from the website of the Election Commission of Pakistan (ECP).⁸ These data are available at the constituency level in terms of the percentage of votes polled to total votes. In our analysis, the estimation is conducted at the district level, so a simple average is calculated from the constituencies falling in any district. The FATA Dummy is a dummy variable where the value of 1 is assigned to any district that is contiguous with the FATA region. This information is obtained from the website of the Global Security Organization.⁹ The KP_Dummy is a dummy for districts in the KP province. Table 1 shows the summary statistics for these variables for the two years.

TABLE 1

Variable	Observations	Mean	Std Dev.	Minimum	Maximum
Log (Attacks_2009)	109	0.840	1.057	0	4.22
IMP_2009	109	62.201	23.146	8.04	99.43
Neighbour_IMP_2009	109	61.960	17.561	20.903	91.796
FATA_Dummy_2009	109	0.119	0.325	0	1
KP_Dummy_2009	109	0.220	0.416	0	1
Log (Attacks_2011)	113	1.153	1.078	0	5.25
IMP_2011	113	63.638	23.251	6.06	98.58
Neighbour_IMP_2011	113	63.592	6.971	22.843	92.357
FATA_Dummy_2011	113	0.115	0.320	0	1
KP_Dummy_2011	113	0.212	0.410	0	1

Summary Statistics

⁸http://www.ecp.gov.pk.htm

⁹http://www.globalsecurity.org/military/world/pakistan/fata.htm

ECONOMETRIC METHODOLOGY

We now discuss the econometric methods that are used in the analysis. The objective of the study is to investigate the correlates of terrorism across districts. We can begin with the classical OLS regression in the following form:

$$Y = X\beta + \varepsilon \tag{5}$$

Here, Y is the $n \times 1$ vector of the dependent variable, X is the $n \times k$ data matrix of the explanatory variables, β is a vector of k parameters, and ε is the $n \times 1$ vector of error terms, which are assumed to be normally distributed with constant variance. This specification is useful only if the assumptions of a classical linear regression model are met. However, if there is a locational aspect to the data, then there will be spatial dependence between observations. This violates the Gauss-Markov assumptions. Spatial dependence occurs in a collection of sample data where one observation that is associated with a location labelled i depends on other observations at locations $j \neq i$. Formally, we might write this as:

$$y_i = f(y_1 ... y_i ... y_n); \ j \neq i$$
 (6)

Here, the dependence can be among several observations, as the index i can take any value from 1 to n. There are two main reasons commonly given for spatial dependence among observations. In the words of LeSage (1998):

"First, data collection of observations associated with spatial units such as zip codes, counties, states, census tracts, and so on, might reflect measurement error. This would occur if the administrative boundaries for collecting information do not accurately reflect the nature of the underlying process generating the sample data. A second and perhaps more important reason we would expect for spatial dependence is that the spatial dimension of economic activity may truly be an important aspect of a modelling problem. Regional science is based on the premise that location and distance are important forces at work in human geography and market activity. All of these notions have been formalized in regional science theory that relies on notions of spatial interaction and diffusion effects, hierarchies of place and spatial spillovers." Therefore, to account for spatial dependence among observations, we follow Anselin (1988) and introduce a spatial lag model of the following form:

$$Y = \rho WY + X\beta + \varepsilon$$

$$\varepsilon \approx N(0, \sigma^2 I_n)$$
(7)

The 'reduced form' of equation (7) is given by:

$$Y = (I - \rho W)^{-1} X\beta + (I - \rho W)^{-1} \varepsilon \qquad (8)$$

where ρ is the coefficient of the spatially lagged dependent variable that captures the diffusion process, and *W* is a known $n \times n$ spatial weight matrix, usually containing first-order contiguity relations or functions of distance. Equation (8) states that the value of the dependent variable (the log of terrorist attacks in this case) at each location is not only determined x_i at that location but also by x_j all other locations through the spatial multiplier $(I - \rho W)^{-1}$.

The spatial dependence may be due to omitted variables that also happen to be spatially correlated, which would result in the spatial correlation of the error terms. In that case, the spatial error model is used. Formally, this model can be written as:

$$Y = X\beta + u$$

$$u = \lambda Wu + \varepsilon$$
(9)

$$\varepsilon \approx N(0, \sigma^2 I_n)$$

The "reduced form" for this model is given as:

$$Y = X\beta + (I - \lambda W)^{-1}\varepsilon$$
(10)

where λ is the spatial autoregressive coefficient, and W is the spatial weight matrix. Both the spatial lag and spatial error models are estimated using the Maximum Likelihood method. An important concept used in the above equations is that of the spatial weight matrix (W). This matrix features the prior structure of dependence between spatial units, which is essential due to insufficient information for the specification of a full

matrix of interaction $(n \times n)$ from observations into a single cross-section of *n* observations. Each row of a spatial weight matrix has nonzero elements for the columns that correspond to neighbouring units. By this principle, the diagonal elements are set to zero because a unit cannot be its neighbour. To make this point clear, let us consider $a(n \times n)$ spatial weight matrix *W* given as:



with the following characteristics:

$$wij = \begin{cases} 1 & \text{if } i \text{ is contigous to } j \\ 0 & \text{otherwise} \end{cases}$$
(12)

and $w_{ii} = 0$ for all i = 1, ..., n. For ease of interpretation, the elements of each row are standardized such that they sum to one. Consequently, the spatial value of a variable is calculated as the weighted average of the neighbouring units as follows:

$$\bar{y}_j = \sum_j w_{ij} y_j \tag{13}$$

where w_{ij} are row-standardized weights, and y_j is the unit's value as the weighted average of the values of its neighbours.

VI. RESULTS AND DISCUSSION

This section discusses the estimation results. We perform the analysis for two years 2009 and 2011. The analysis begins by testing for the existence of spatial autocorrelation in terrorist attacks. We do so by using the Global Moran's I. For this purpose, the first-order queen contiguity weight matrix is used.¹⁰ As discussed earlier, the queen continuity matrix considers all districts as neighbours that either share a boundary with the district under consideration or just touch it at a particular point. The Global Moran's I values for terrorist attacks in both years are provided in Table-2. It is obvious from the table that the coefficients are positive and significant, meaning that a high amount of terrorist attacks in a district is associated with a high number of attacks in the neighbouring districts, and a lower number of attacks is associated with a lower number of attacks in neighbouring districts for both years of analysis. However, the value for the year 2011 is higher, which indicates that the attacks became more concentrated in certain districts. One should be careful when interpreting this result, however. Looking at the data, it is obvious that the attacks spread to other districts that did not experience any attack in 2009. However, the intensity of the attacks in the already-affected areas increased significantly, such that they stand out as hot spots in Figures B and C in the Appendix.

Next, we attempt to determine whether this spatial autocorrelation in the attacks is due to spatial relationships in the explanatory variables. Hence, we also examine the Moran's I values for the covariates, which are also provided in Table-2. The Moran's I values for all the covariates are positive and highly significant, thus suggesting the existence of spatial relationships for these variables as well. However, the strength of the univariate spatial relationship varies across the covariates for a particular year. Also, to be noted is the observation that the Moran's I values for terrorist attacks increased in 2011 compared to 2009. However, the Moran's I values for the explanatory values declined during the same period. Because FATA and KP are regional dummies, we did not include them here, as the administrative units did not change significantly during this period. Note that the Moran's I value for the Index of Multidimensional Poverty (IMP) declined compared to 2009. However, it is still very high in absolute terms, which should be a point of concern for policymakers.

¹⁰ The results were similar when the second-order queen continuity matrix is used.

Results of Univariate Moran's I

Variables	Moran's I_2009	Moran's I_2011
Log (Attacks)	0.215***	0.318***
Log (Attacks)	(0.049)	(0.522)
IMD	0.566***	0.508***
11v1f	(0.048)	(0.049)
Naighbour IMP	0.821***	0.807***
Neighbour _hvir	(0.029)	(0.030)
Turnout	0.494***	0.581***
Turnout	(0.054)	(0.046)

Note: Standard errors are given in parentheses, and *** indicates significance at 1% level of significance.

Next, turn to the regression results using the queen continuity weight matrix. Table 3 shows the estimation results for various models for the year 2009, while Table 4 presents the results for the year 2011. We begin with the classical OLS regression. Model 1 provides the OLS results from the regression of the log of terrorist attacks on the IMP of a district, and for both years, the coefficients are negative and statistically significant at the 1% level of significance. However, the coefficients on Neighbour IMP, which is the weighted average of the index of multidimensional poverty in neighbouring districts, are positive for both years and are statistically significant at the 5% and 1% levels, respectively. This result suggests that poverty within a district is negatively associated with terrorist attacks in that district. One can justify this result considering the theoretical framework described in Section-4. A high level of poverty in a district is evidence of a lack of concern by the government for that district. Also, a high level of poverty likely means that the district is not doing well economically (in terms of not being an important economic hub). On the other hand, terrorists want to attack high-value targets that hurt the government and gain media attention to spread terror. Because terrorists are assumed to be rational and terrorist resources are limited, they want to utilize such resources optimally. The optimal use of resources (both physical and financial) would mean that they attack targets that can cause the greatest destruction and so that they gain more media attention to spread terror among the masses. Such
targets, however, are generally found in districts that are either economic hubs or that are at least doing economically well. In addition to spreading fear, attacking such districts will also hurt the government. Hence, there is a negative relationship between poverty within a district and the number of terrorist attacks in that district.

The positive association between the terrorist attacks in a district and the level of poverty in neighbouring districts can also be justified using the theoretical model.¹¹ As suggested by the model, terrorist groups have resource constraints. The existence of a high level of poverty in neighbouring districts provides them with the opportunity to garner more resources and services (for example, foot soldiers and logistical support) at a lower cost. For instance, it would be easier for a terrorist group to find someplace to hide at a lower cost in a poor district that happens to be a neighbour of a high-value target district. The terrorists can go to the high-value target district, execute the attack, and return to their hiding place in less time. This proximity also reduces the probability of the terrorists being caught, which would be the gain for the terrorist group. In other words, given their budget constraints, terrorists can increase their real resources, which can lead to an increase in attacks in the given district.

It is evident from the empirical results shown in both Tables 3 and 4 that voter turnout has a negative impact on terrorism incidents, and the results remain highly significant in all variants of the model. The estimated coefficients also show consistency and robustness, as the signs stay negative among different specifications of the models. These results bring an important dimension to the issue of terrorism, which is its linkage to political deprivation and the general public's discontent with the regime. Our results are quite consistent with the expectations of the theoretical model that it is much easier for terrorists to operate and disguise themselves in safe hideouts in an area where the population is generally averse to the current regime. Therefore, when devising any strategy to combat the devastation from terrorism, due consideration must

¹¹ We also tried various regressions using the Index of Multiple Deprivation (IMD) separately in the model because of the high correlation between IMP and IMD (approximately 0.85). The results were almost similar but were less strong than with the IMP and hence are not reported here.

be given to political factors in addition to military-cum-administrative aspects.

In the search for a better specification, however, we include the FATA dummy in Model 2 (Table 3). Although the coefficients of IMP and Neighbour_IMP do not change significantly in terms of sign, significance, and magnitude, the R^2 value indicates that this model now explains 32% of the variation in terrorist attacks in 2009. The coefficient on the FATA dummy is positive and statistically significant. This result confirms the model's prediction that terrorists will attack those targets that are closer to their home bases and hence less costly. Because terrorist groups hide in the mountainous terrain of FATA, it is effective for them to attack the agencies that are at the boundaries of this tribal region because they can execute their attacks with relative ease and go back into hiding.¹² The data also support this outcome. The districts that are contiguous to the FATA region have experienced the highest number of attacks.

More important is the statistics for the Moran's I for the residuals in this model, which are now reduced to 0.058. This result means that the regional variable (FATA_Dummy) explains 47% of the spatial variation in terrorist attacks, and this value is still significant. This result shows that even after controlling for the spatial autocorrelation in terrorist attacks, due to the covariates, there is still a significant amount of the spatial relationship that is left unexplained. This illustrates the inability of the classical OLS model to capture spatial autocorrelation and calls for better estimations of the spatial relationship. The search for the best alternative among these models calls for Lagrange Multiplier (LM) tests. The results of these tests are presented in the diagnostics of the classical model. As is evident, LM_Lagis highly significant, but LM_Error is insignificant. This result suggests that a spatial lag specification should be estimated. However, we estimate both spatial specifications for comparison purposes.

Model 3 in Table 3 provides the results of the spatial lag specification. All the coefficients are statistically significant and have the

¹² An "agency" is an administrative unit in the FATA region. Roughly speaking, an agency is equivalent to a district.

same signs as in Model 2. The spatial autoregressive coefficient is estimated at 0.401 and is highly significant. It is important to note that not only the magnitude of the estimated coefficient of the FATA dummy decreased in value, but it also became insignificant. This result suggests that the explanatory power of this variable that was attributed to its indistrict value was due to the neighbouring locations; thus, we were overestimating the value of its coefficient. This discrepancy is now picked up by the coefficient of the spatially lagged dependent variable. This result is also confirmed by the Moran's I value for the residuals, which illustrates that the model has addressed the spatial autocorrelation. In terms of diagnostics, it is worth noting that R² and PseudoR² are not comparable. The proper measures of fit are the Log-Likelihood and the Akaike Information Criterion (AIC). A comparison of these criteria for the OLS and Spatial Lag models shows an improvement of the spatial lag specification.¹³

The results of the spatial error specification are provided in Model 4. Once again, the results are similar in terms of signs and significance except for the FATA dummy, which is now insignificant. The spatial autoregressive coefficient is also statistically non-significant. Except for IMP and Neighbour_IMP, the magnitudes of all the coefficients on the covariates are smaller than in the classical model in absolute terms. The Moran's I show that the spatial autocorrelation has been addressed. Although this model also addresses the spatial relationship, the diagnostics reinforce the decision of the Robust LM tests that the Spatial Lag model is the best alternative for this specification.

Ten districts in Khyber Pakhtunkhwa (KP) province share a boundary with FATA. Also, the people of the FATA region and KP province share the same culture, as most of the population of this province are Pashtuns. Consequently, KP has always been vulnerable to terrorist attacks, and it, therefore, suffered the most from the surge in terrorist attacks. Hence, in Model 5 (Table 3), we control for this observation by including the KP dummy. The coefficients on the other variables in the model are like those obtained for the earlier model in

¹³ A lower value of AIC and a higher value of Log Likelihood represent an improvement in the model fit.

terms of sign, significance, and magnitude. The coefficient on the dummy variable is positive and statistically significant. Interestingly, the Moran's I value for the residuals was reduced in magnitude and became statistically insignificant. This result suggests that the spatial variation in terrorist attacks is significantly explained by the KP dummy. In other words, the clustering or the hot spots were mostly limited to KP province. This result also accords with the model's prediction that terrorists use their scarce resources as effectively as possible. Because KP is contiguous to the FATA region, terrorists can easily sneak into the province, attack their target, and escape back to the mountains. Although the value of the residuals' Moran's I is insignificant, thereby suggesting that all the spatial variation is explained by these explanatory variables, we run the two spatial models to confirm this finding. Thus, Models 6 and 7 present the results for the spatial lag and spatial error models with the KP dummy included. All the coefficients are statistically significant and have the same signs as in the previous models. As expected, the spatial autoregressive coefficients are non-significant in both models. These results confirm the outcomes observed in Model 5.

Next, we include both regional variables (FATA and KP dummies) in the model. The OLS results of this specification are presented in Model 8. As is obvious from the model, including both regional variables leave the FATA dummy insignificant. This result is not surprising because out of the 13 districts that are contiguous to FATA, 10 are in KP province. Once we control for the KP dummy, the FATA effect mostly vanishes. This result also suggests that the two districts in Baluchistan province and the one in Punjab province that is contiguous to FATA have not experienced significant terrorist attacks. This is also supported by the data. For the period 2005-2011, these three districts experienced only 11 attacks in total. On the other hand, Peshawar, a district in KP province, alone has witnessed 256 attacks over the same period. The coefficients on the other variables in the model are the same as in the previous models. The Moran's I value for the residuals suggests that the entire spatial variation has already been explained. Hence, its coefficient is nonsignificant. The spatial lag and spatial error models provided in Models 9 and 10 in Table 3 validate this finding. The spatial autoregressive coefficients are non-significant in both models.

TABLE 3	

Regression Results [Dependent Variable is Ln(attacks_2009)]

tt 2.454** 2.454** 0.691) (0.677) (0.691) (0.057) (0.001) 0.005) (0.005) (0.002) 0.018** 0.019** 0.018** 0.019** 0.019** 0.019** 2.2008 (0.009) (0.009) 0.009** 0.040**	** 2.002***) 0.678) ** -0.022*** ** -0.021*** ** -0.021*** ** -0.034*** ** -0.034*** ** -0.034*** ** -0.034*** ** -0.034*** ** -0.034***	2.284*** (0.733) -0.020*** (0.005)	1.472** (0.724)	1.316*	1.449**	1.461**	1.312*	1 430**
-0.020** -0.020** -0.020** (0.005) (0.005) -0.019** (0.008) (0.008) -0.040** -0.040** (0.009) (0.009) -0.040** -0.040**	** -0.022*** (0.005) (0.005) (0.007) ** -0.034*** (0.009) (0.009) ** 0.382	-0.020*** (0.005)		(0.1.00)	(0.734)	(0.728)	(0.708)	(0.735)
Jur_IMP 0.018** 0.019** 0.008 (0.008) (0.008) 2008 -0.040** (0.009) 2008 (0.009) (0.009)	* 0.021*** 0.007) ** -0.034*** 0.009)	1V	-0.021*** (0.005)	-0.022*** (0.005)	-0.020*** (0.005)	-0.021*** (0.005)	-0.022*** (0.005)	-0.020*** (0.005)
20080.045***0.040** (0.009) (0.009) (0.009)0.528*	** -0.034***) (0.009)	0.020*** (0.008)	0.026*** (0.007)	0.026*** (0.007)	0.025*** (0.007)	0.026*** (0.007)	0.026*** (0.007)	0.025*** (0.007)
D	0.382	-0.037*** (0.010)	-0.027*** (0.010)	-0.025*** (0.009)	-0.026*** (0.010)	-0.027*** (0.010)	-0.025** (0.009)	-0.026*** (0.010)
(0.272) (0.272)	(0.259)	0.374 (0.285)	I	I	I	0.125 (0.288)	0.087 (0.277)	0.052 (0.289)
	Î	Ī	0.842*** (0.219)	0.723*** (0.236)	0.870*** (0.239)	0.797*** (0.243)	0.694*** (0.257)	0.851*** (0.257)
1	0.401** (0.121)	I	1	0.182 (0.131)	I	1	0.178 (0.131)	I
1	I	0.220 (0.126)	1	I	0.174 (0.146)	1	I	0.167 (0.147)
stics								
0.301 0.325	1	1	0.388	1	1	0.389	I	1
82	0.364	0.340	1	0.401	0.398	1	0.401	0.397
s I _R 0.110** 0.058*	-0.033	0.004	0.061	0.001	0.005	0.054	-0.001	0.005
g 6.829*** 4.632*:	1	1	1.724	1	1	1.611	1	ı
LM_Lag 3.928** 6.910**	*	1	0.663	1	1	0.888	1	1
or 3.663* 1.011	1	I	1.122	1	I	0.895	I	1
LM_Error 0.762 3.288*	1	1	0.061	I	1	0.173	I	I
celihood -140.711 -138.77	4 -136.425	-138.057	-133.496	-132.632	-132.902	-133.396	-132.582	-132.886
289.423 287.54	8 284.851	286.115	276.992	277.263	275.804	278.792	279.164	277.773
tions 109 109	109	109	109	109	109	109	109	109

Next, we conduct the same analysis for the year 2011. The results for all the models are provided in Table-4. Model 1 simply includes the IMP, Neighbour IMPand Turnout 2013 variables. Once again, we obtain the same signs for the coefficients as in Table-3. Therefore, the interpretation is also the same. Model 2 includes the FATA dummy, which significantly improves the model specification, as suggested by the R^2 value. The coefficient on the FATA dummy is positive and significant, suggesting that FATA was still an important factor in 2011 regarding terrorism. The magnitude of the coefficient is larger in 2011 compared to 2009. Although FATA explains the significant spatial variation in terrorist attacks in 2011, the Moran's I for the residuals is still statistically significant, which calls for the use of a spatial model. The LM test points in favour of the spatial lag model, but we estimate both spatial lag and spatial error models to allow a comparison. The results of the spatial lag specification are provided in Model 3. The spatial autoregressive coefficient (Delta) is estimated at 0.365, which is highly significant. Once again, the absolute value of the coefficient of the FATA dummy has decreased because the neighbouring-locations effect has now been addressed by the spatial autoregressive coefficient. Model 4 is estimated for comparison purposes, and it provides the result for the spatial error model. Although the spatial autoregressive term (Lambda) is also significant, the PseudoR², Log Likelihood, and AIC suggest that the spatial lag model should be preferred over the spatial error model.

The next three models include the KP dummy instead of the FATA dummy, as was performed for the year 2009. An interesting finding that calls for attention is the spatial autoregressive coefficient in Model 5. Its value is very high (0.73), and it is highly statistically significant in the presence of the KP dummy. This result implies that the clustering (or the hot spots) is not only in the KP province but has spread to other parts of the country as well. Considering the theoretical model's predictions that terrorists try to use their scarce resources effectively, this empirical result suggests that terrorists have also found support bases in the settled areas of other provinces. The LM test in Model 5 favours the spatial lag model. Although both spatial autoregressive terms (Delta and Lambda) in Models 6 and 7 are statistically significant, the diagnostics favour the spatial lag specification.

Finally, both the FATA and KP dummies are combined in one model. Model 8 provides the OLS results for this specification. As was the case in 2009, the KP dummy captures all the effect and leaves the FATA dummy insignificant. This result is not surprising because the geography during this period did not change much. Interestingly, however, the three districts in the other two provinces that border FATA were still not exploited by terrorists. The terrorists mainly use the KP province channel to attack the cities. Once again, the best alternative to the OLS models is found to be the spatial lag model for this specification. Looking over all the models for both years, one can observe that the diagnostics always favour the spatial lag specifications. This result supports the view that there is a possible diffusion of terrorism across the districts, especially in 2011, when the values of the coefficient of Delta are greater than those of 2009 for all the specifications. Nonetheless, the significance of the spatial term in the spatial error models in some specifications also indicates that this spatial dependence might be due to spatially correlated omitted variables. However, the special lag model by construction addresses that problem (see Equation 8). One might consider using a mixed model that combines the spatial lag and spatial error models. However, a crucial issue would be finding the appropriate weight matrices for the two specifications. If we take the simple approach of using the same weight matrix for both models, we could run into identification issues, which is why such models are not used in the literature.

		Ke	gression Kes	ults [Depend	lent Variable	is Ln(attack	[(1102_S	1110		-
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	
Constant	3.078*** (0.694)	2.803***	2.004*** (0.684)	2.625*** (0.781)	1.984*** (0.749)	1.365* (0.720)	1.828** (0.840)	2.124*** (0.748)	1.499** (0.722)	_
IMP	-0.019*** (0.005)	-0.019*** (0.005)	-0.020*** (0.004)	-0.017*** (0.004)	-0.019*** (0.005)	-0.020*** (0.004)	-0.017*** (0.004)	-0.019*** (0.005)	-0.020*** (0.004)	~ -6
Neighbour_IMP	0.021*** (0.007)	0.021*** (0.007)	0.021*** (0.006)	0.019*** (0.007)	0.026*** (0.007)	0.024*** (0.006)	0.022*** (0.007)	0.025*** (0.007)	0.024*** (0.006)	0.0
Turnout_2013	-0.040*** (0.008)	-0.037*** (0.008)	-0.027*** (0.008)	-0.032*** (0.009)	-0.027*** (0.009)	-0.020** (0.008)	-0.023** (0.009)	-0.029*** (0.009)	-0.021** (0.008)	~ ~
FATA_Dummy	I	0.798*** (0.269)	0.553** (0.253)	0.563** (0.282)	I	I	1	0.501 (0.303)	0.325 (0.282)	-
KP_Dummy	I	I	I	I	0.730*** (0.228)	0.550*** (0.228)	0.823*** (0.282)	0.521** (0.260)	0.427* (0.254)	0.0
Delta	L	I	0.365*** (0.115)	I	Î	0.367*** (0.117)	I	I	0.342*** (0.119)	
Lambda	I	1	I	0.310*** (0.132)	I	I	0.370*** (0.126)	I	I	(0
Diagnostics										
R ²	0.270	0.325	1	I	0.333	I		0.350	1	
PseudoR ²	I	I	0.349	0.360	I	0.403	0.392	I	0.408	
Moran's IR	0.183***	0.105**	-0.060	-0.006	0.165***	-0.025	-0.010	0.130***	-0.034	
LM_Lag	16.742***	10.534***	-	I	12.042***	I	-	9.718***	1	
Robust_LM_Lag	7.911***	12.230***	I	I	4.025**	I	Î	6.137**	I	
LM_Error	10.398***	3.453*	I	I	8.455***	I	I	5.252**	1	
Robust_LM_Error	1.567	5.149**	I	I	0.438	I	I	1.672	I	
Log-Likelihood	-150.487	-146.061	141.519	-144.142	-145.394	-140.632	-141.697	-143.972	-139.994	Ŀ
AIC	308.974	302.122	295.038	298.285	300.787	293.264	293.396	299.945	293.988	2
Of	113	112	112	112	113	113	113	113	113	

TABLE 4

Moran's I_{R} represents Moran's I values for the residuals. . c c ÷ .

VII. CONCLUSION

This study addresses the spatial dependence in terrorist attacks in Pakistan using data for the years 2009 and 2011 for 109 and 113 districts, respectively. For this purpose, the study uses the first-order queen contiguity weight matrix. The coefficients are estimated using the classical OLS, Spatial Lag, and Spatial Error models under various specifications.

The results indicate that poverty in neighbouring districts is associated with a higher level of terrorist attacks in that district. The poverty within a district and voter turnout are negatively related to terrorism in that district. FATA is found to be an important factor in the spread of terrorism. The results also reveal that clusters of attacks extended to other parts of the country between 2009 and 2011 and that terrorism has spread through the diffusion of attacks in other districts and provinces. Most importantly, the attacks are spatially correlated; hence, hot spots are identifiable. That is, terrorist attacks are not random across districts, although they may be random within a district.

Considering these findings, one can propose several short-run and long-run policy suggestions. For example, in the short run, the spillover of terrorism from FATA to the settled districts can be restricted by the allocation of more resources to those districts that are contagious to the FATA region. This may include an increase in the deployment of police and military forces and the installation of scanners at the borders of these districts. These measures should be taken on a priority basis for KP province for frontline defence in the war on terror, as it is a hot spot that has become one of the terrorists' main targets because it is easily approachable.

The spread of terrorist attacks to other parts of the country that do not border either FATA or KP province indicates that terrorists have been able to find support bases in areas that provide them with logistics. It is simply not possible for them to execute attacks and go into hiding without having sympathizers in the same or neighbouring districts. In response, the government needs to improve its street-level intelligence to try to locate such sympathizers. Because civil intelligence institutions such as the police already have an established structure, this responsibility should be assigned to them. However, the police should be strengthened in terms of training and resources. Because terrorists have resource constraints, a better plan for security checks would increase their probability of arrest, thereby increasing their cost. There should be several security checkpoints on the border of each province to prevent the free movement of terrorists and the explosives that they use. A sound security plan to protect high-value targets would also increase the costs for terrorists.

In the long run, however, the government needs to review its economic policies. It should not just focus on increasing the national income because the distribution of that income also needs to be more equitable. It is not enough to make one district an economic hub and ignore the rest. Pakistan's economic policy should be inclusive to bring more people out of poverty, thereby increasing the opportunity cost of being involved in terrorist activities. The view that this war is fought only on an ideological basis no longer carries weight. People have also started to join terrorist groups because of their economic conditions. The confessions of some of the perpetrators of recent attacks are clear evidence of this reality.

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APPENDIX



Figure B Hotspots for Attacks in 2009

Figure C Hotspots for Attacks in 2011



IS IT A DREAM OR REALITY OF FIVE MILLION HOUSING UNITS CONSTRUCTION IN PAKISTAN? A REVIEW OF HOUSE CONSTRUCTION APPROACHES AND MEASURES

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Abstract. Housing is one of the basic necessities of human beings. The rapid urbanization in Pakistan resulted in slums and informal housing. The government of Pakistan has launched a NAYA PAKISTAN HOUSING PROGRAM (NPHP) for constructing 5 million housing units for providing affordable housing to low-income people by the year 2023. This research study extensively reviewed literature on affordable housing policies and strategies in the world to identify the models for provision of affordable housing. A total 85 professional town planners having experience of five years or more were interviewed those are serving in government and private sectors. The cost and land required for the construction of 5 million housing units were calculated. The various successful best practices in Pakistan were explored such as Khuda ki Basti, Orangi Pilot Project, and Safiya Homes besides the international literature. Further, several strategies and policies are examined in this research that can be adopted by Naya Pakistan Housing

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Project to provide 5 million low-income housing units, based on expert opinion in the country. This research concluded that this project required finance of 12330.63 billion PKR with a total land area of 129017.85 acres for 5 million housing units in Pakistan. According to this figure, it can safely be concluded that it will remain a dream for low income people to even construct a 3 Marla house by availing the NPHP. It is recommended that the site and services model for this project is feasible and extensive subsidies should be given to the real estate developers by the Government. This research also suggested the concept of social housing for low income people of Pakistan. This research will be helpful for the policy makers, urban planners, and housing developers which will be directly contribute for the construction of 5 million housing units under the NPHP in the country.

Keywords: Affordable Housing; Low Income Housing; Five Million Housing Units; Naya Pakistan Housing Program; Pakistan

JEL Classification: H11, H24, R21

I. INTRODUCTION

In developing countries, the urban population is increasing rapidly due to urbanization and this leads to slums and informal housing construction to meet the ever-growing housing requirement. Globally, three basic needs of human beings (food, clothing, and shelter) are rights of every human being. However, shelter is the basic need that if fulfilled once then it would be enough for once in one's life. Article 25 of the United Nations Universal Declaration of Human Rights 1948 states as "everyone has the right to the standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing, and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control" (Ronald, 2014). Sustainable Development Goal 11 in its target 11.1 aims at the provision of safe, adequate, and affordable housing and basic urban services and the up-gradation of slums by 2030 (UN-Habitat, 2018).

Further, housing is an essential part of the economy. It has forward and backward associations with other parts of the economy like needs of the people, demand, and supply of land, services and infrastructure, building materials and technology, construction professions, labor, and finance. These connections permit housing to act as a vital engine for poverty reduction and sustainable development in both economy and society (UN-Habitat, 2011). Thus, the housing sector is not a social need but also a tool to enhance economic activity and it can reduce the poverty.

Researchers defined the low income and affordable housing according to the setting and socio-economic status of that region. Lowincome housing is defined as the units specified to be occupied by a group of society whose household income falls below a presets level. Affordable housing can be defined as the housing for those groups whose family income is in a particular ratio, evidently less, to the median household income of that area and that particular ratio is worked out by the housing authorities of the concerned area to make the housing affordable (Fariha et al., 2018). It can also be defined as housing for which the dweller pays up to 30% of his income for gross housing expense (Kalugina, 2016). Therefore, it can be categorized as a relationship between household income and household expenditure, when the ratio of expenditure to income is reasonable that is the housing affordability (Eshruq Labin et al., 2014). Department of Housing and Urban Development in the USA defined housing affordability as "families who pay more than 30% of their income for housing are considered cost-burdened and may have difficulty affording necessities such as food, clothing, transportation and medical care. This 30% figure is also called the rule of thumb for housing affordability" (Cai, 2017).

Eshruq Labin et al. (2014) said that various approaches have been identified for measuring housing affordability including housing price to income ratio (PIR), housing affordability index (HAI), monthly mortgage payment to income ratio, and a residual income approach. Cai (2017) identified the approaches of affordable housing such as the income ratio approach, family target approach, and residual income approach. The six components of affordable housing system has been explored such as (i) policy (ii) planning (iii) design (iv) delivery (v) finance (vi) partnership (Ronald, 2014). For this research, affordable housing is categorized as a person can afford 30% of his or her income for housing.

Housing affordability is a big challenge in developing countries. According to UN-Habitat, more than 1 billion people are living in slums and informal settlements due to a lack of affordability and housing alternatives. Over the next 25 years, more than 2 billion people will be added to this demand for housing and infrastructure services (Un-Habitat, 2011). In Asia, the urban population will be doubled (almost 3.4 billion) and host 50.3% of the total urban population. Daily, the Asian cities will be required to accommodate 120,000 newly inhabitants which would need the construction of housing units at least 20,000 and this phenomenon would also insert pressure on the availability of land and provision of affordable housing in urban areas (Ronald, 2014). According to an estimate, 40% of land in Karachi and the most valuable land in Islamabad was encroached by illegal housing schemes. The trend of borrowing for the construction of houses is high in the USA almost 80% of people construct their houses by loans. In Malaysia, this percentage is 33%, India 11%, Bangladesh 3%, and in Pakistan is only 0.25%. The reason behind low borrowing for housing in Pakistan is also due to limited Islamic banking system in Pakistan.

Housing affordability and access to adequate land is a major problem in Pakistan. Total population of Pakistan is about 207.7 million with number of households 32.2 million (Pakistan Bureau of Statistics, 2017). Every year, the shortage of housing has been rapidly increasing by 270,000 housing units in Pakistan. The housing backlog was 7.5 million units which reached 10 million by the end of 2018 (Nenova, 2010). Twothird of the population is not able to afford housing without some kind of financial support and subsidy (Un-Habitat, 2011). The comparison of the housing shortage in the world is given in Table 1.

TABLE	1
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Comparison of housing shortage in the selected Asian countries

Name of Country	Housing Shortage
Sri Lanka	Annual housing units demand is between 50,000 and 100,000
Indonesia	Needs 735,000 houses annually
Bangladesh	Has current urban housing shortage of 659,000 units
India	Has the current housing deficit of 40 million housing units
Malaysia	Needed 709,400 new housing units from 2006 to 2010
Philippines	The housing deficit was 3.75 million units between 2005 and 2010
Pakistan	Has the current housing shortage of 10 million

Source: Un-Habitat, 2011

To meet the demand government took an initiative in Pakistan for constructing five million houses in five years. It is a big challenge and therefore, this research looking into its feasibility and policy measures could be adopted to achieve the objective of this program.

II. REVIEW OF LITERATURE

There are two main strategies for the provision of affordable housing such as the universal approach and targeted approach. The universal approach has been applied in several countries containing Sweden, Netherlands, Denmark, and Singapore, to provide affordable and decent housing to the public. The most common targeted approach has been implemented in Malaysia, the US, European Union, and Canada. This approach is based on the postulation that the market acts as the main part in the provision of housing, several special programs should be implemented to address the requirement of low-income people omitted from the market distribution system (Asian Development Bank, 2009). The Governments of the USA, England, Malaysia, and Canada have been given several incentives to captivate private developers in the construction of affordable housing, incentives containing density bonuses, tax deductions, land grants, direct subsidies, land classification shifts from commercial to residential use (Asian Development Bank, 2009).

The land is the costly element of housing. Land reservation for a low-income group in housing scheme projects must be compulsory for making social housing viable and affordable. In India, National Urban Housing and Habitat Policy suggested that all housing scheme projects should have a minimum of 15% of the saleable residential area and Floor Area Ratio (FAR) for social housings projects (Government of India, 2007). The housing schemes should spread in several parts of the city and not at one location. There is a need to review FAR/FSI, density, ground coverage for enhancing the land. Mixed land use is needed to make slums viable. The Vijaywada Municipal Corporation joined hands with owners of the land and constructed 18,000 housing units by taking 40% of the total land, reserved for public use and housing for low-income groups (Ram & Needham, 2016).

Many countries in the world are providing affordable housing. In the United States, more than 500 inclusionary planning schemes are operating, in which several require developers to contain low-income housing as a part of development in a certain zone with a fixed percentage of housing units and floor space. California and San Francisco generated 150 – 250 affordable housing units annually (contribute 12% of the total housing supply of the city). The government has permitted additional density and financial contribution to ensure low-income housing (Gurran & Gilbert, 2018). In Scotland and England, 20% - 40% of new housing development will be reserved for low-income people. In England, the Town and Country Planning Act (1990) have the required type and amount of low-income housing to be provided (Hardy, 2004). With this provision in Act, it resulted in several kinds of affordable housing such as shared equity scheme, social housing, discounted house ownership, and affordable rental housing (20% less rent from the market). In the light of the above-mentioned section, 83,790 low-income housing units have been secured between 2005 to 2016, and only 9,640 new housing units were included between 2015 - 2016 (Gurran & Gilbert, 2018). In South Australia, the government declared in 2005, 15% of new housing development will be affordable (share of 17% of new housing supply by 2016) and in New South Wales, inclusionary planning schemes will only supply affordable rental housing. Four components of housing deficit in urban areas has been considered such as houseless population, household living in Katchi Abadies without utility services, living in dangerous and physically dilapidated housing units, and living in congestion which are socially unacceptable conditions (Ram & Needham, 2016).

The Indian government has set a target of constructing fifty million new housing units by 2022 under the Pradhan Mantri Awas Yojana (PMAY) scheme, of which thirty million are to be built in rural areas and the balance in cities. The PMAY scheme has four major components such as In-Situ redevelopment of slums, credit linked subsidy, affordable housing in partnership (AHP), and enhancement and construction of beneficiary led house (Government of India, 2015). The government had adopted the afore-mentioned components and the work is proceeding at a tardy pace. Against the target to build 20 million houses for the urban poor by 2022, only 0.41 million houses have been constructed as of the end of December 2017, while work is underway on 1.56 million units. The Ministry plans to construct 2.6 million houses in 2018-19, 2.6 million in 2019-20, 3 million in 2020-21 and 2.98 million in 2021-22. However, targets look challenging given the slow progress till now. The facts revealed that only 0.149 million houses were constructed against the target of 3.26 million units during 2016 - 2017. Under the rural scheme, the construction of only 1.6 million houses has been completed. Experts said a significant pick-up in the implementation of both the schemes is required for the government to meet respective targets (Ministry of Housing & Urban Poverty Alleviation, Government of India, 2015).

Indicators of Low-Income Housing in the world

Several indicators of low income/affordable housing have been recommended by various countries. World Bank suggested 25 key indicators and 10 alternate indicators in the areas of housing affordability, finance, production, quality, and subsidies in 52 urban areas on 6 continents. Also, 10 regulatory and 10 alternate regulatory indicators collected data from a regulatory and institutional environment (Mayo & Stephens, 1992). These indicators are listed below:

Key Indicators are (1) new household formation (2) homelessness (3) housing investment (4) housing production (5) house price to income ratio (6) rent to income ratio (7) house price appreciation (8) permanent structures (9) floor area per person (10) water connection (11) unauthorized housing (12) journey to work (13) residential mobility (14) owner occupancy (15) vacancy rate (16) residential segregation (17) credit to value ratio (18) housing credit portfolio (19) housing subsidies (20) targeted subsidies (21) infrastructure expenditure per capita (22) land development multiplier (23) cost of construction (24) industrial concentration (25) skill ratio.

Alternate Indicators are (1) persons per room (2) households per housing unit (3) squatter (illegal) housing (4) new housing credit (5) mortgage to prime difference (6) mortgage to deposit difference (7) mortgage default rate (8) land concentration (9) construction time (10) import share of construction. Regulatory Indicators are (1) coverage of land registration (2) restriction on the exchange of land (3) housing finance development (4) rental price distortion (5) involvement of public sector (6) permits delay (7) compliance (8) minimum size of plot (9) rate of effective property tax (10) squatter tolerance.

Alternate Regulatory Indicators are (1) customary land ownership (2) estate land ownership (3) rent control (4) extent of rent control (5) cement price distortion (6) ratio of saleable land (7) foreclosure delay (8) rental eviction delay (9) land development control (10) property tax receipts.

Various indicators for affordable housing units are referred such as (1) income on shelter (2) core housing need (3) substandard housing units (4) changing face of homelessness (5) vacancy rate (6) rental housing starts (7) monthly rent (Echenberg & Jensen, 2009). Indicators for affordable housing has been suggested such as (1) number of built rental housing units (2) number of housing units created by approaches and strategies (3) number of new subsidies housing units (4) number of renter household (5) number of housing units with various rent ranges (6) ratio of housing prices to median household income (7) ratio of average rental housing to medium household income (8) average age of housing units (9) average vacancy rate (10) social assistance gap (11) income gap (12) percentage change in monthly rent (13) gap between minimum wage monthly salary and salary needed to afford one-bed apartment (Berry et al., 2006).

Several indicators used to measure housing affordability including (1) income (2) unit of analysis (3) housing costs (4) non-housing costs (5) location factors (6) composition of household (7) time period of housing affordability (8) housing adequacy (9) choice of benchmarks (10) treatment of housing assistance (Cai, 2017). Eshruq Labin et al. (2014) suggested the affordable housing performance indicators which are (1) house price to income ratio (2) access to employment (3) access to public transport services (4) access to education facilities (5) access to health facilities (6) access to shopping facilities (7) access to leisure facilities (8) access to open green public facilities (9) access to child care services/hospitals (10) safety incidence crime (11) quality of housing (12) energy efficiency (13) land properties (14) new space. The above-

mentioned indicators can be very helpful for initiating the affordable housing program. In Pakistan, the decision makers and policymakers should gain benefits from these indicators for developing the 5 million housing units.

Affordable/Low-Income Housing Models in the World

In the world, several models of affordable and low-income housing have been implemented. Five models of low-income housing initiatives has been proposed such as (1) sites plus development plan and gradual implementation of services (2) site and services (3) up-gradation of existing settlement (4) development of new housing in new settlement (5) redevelopment of degraded existing structures (Nafuna, 2013). There are three models/approaches to provide homes for the extremely lowincome community. Models and their cities of implementation are described in Table 2. Social housing is a big model of housing affordability, there are best implemented international practices are presented in Table 3.

TABLE 2

Sr. No.	Model / Approaches	City of Implementation	Country
1	Cross subsidization between higher and lower-income housing	Ohio, Oregon	United State of America
2	Operating ongoing and maintenance cost	Washington State, Seattle Washington	United State of America
3	Providing project or tenant-based rental assistance	Chicago, Washington DC, Louisiana, New Jersey, North Carolina	United State of America

Models/Approaches to affordable housing

Source: D'Cruz & Satterthwaite, 2005

TABLE 3

Practices of low-income housing in the world

The Dutch Model	The Dutch social rental sector has 31% of total housing. This model implies that the income that housing associations obtain from letting and selling houses is sufficient to cover their investments in new affordable housing, housing refurbishment, and neighborhood regeneration
Inclusionary Zoning (USA)	Inclusionary zoning requires affordable/low-income housings in three ways are (1) 15% of developed units must be affordable (2) off-site construction of affordable units (3) Cash-in-lieu into a housing fund
Density Bonus (USA & UK)	Density bonus gave benefits to affordable housing/social housing
Public-Private Partnership (Vienna)	The government of Vienna owns and manages 220,000 social housing units which were 25% of housing stock. While 200,000 social housing units were constructed by profit private developers in 1980

Source: United Nations, 2015

III. MATERIALS AND METHODS

The extensive literature was reviewed on affordable/low-income housing in the world. Also, models and approaches were studied to get knowledge about low-income housing in developing and developed countries. This research is qualitative and quantitative in nature. For this research, primary and secondary data were collected. Primary data collection including the cost of construction of house for 1 square feet and cost of the development works per Marla were asked from the housing developers and contractors which are working in big cities of Pakistan such as Lahore, Islamabad, Karachi, Multan, and Faisalabad. Primary data also collected to verify the viability of the Five Million Housing Program and for this purpose 85 professional town planners having experience of five years or more were interviewed those are serving in Development Authorities, Local Government, Housing Departments, and private firms in the country. The mostly town planners are working in government department (72.94%) and few are serving in private sector (27.06%). For interview purpose, snowball sampling technique was used and got responses of 85 town planners from 08 October, 2019 to 28 October. 2019.

The expert opinion covered the following aspects such as do you agree with down payment? Is it possible to pay remaining payment in 24 months? How much cost is affordable for low income housing unit? Are you satisfied with the performance of institutions that provides low income housing? What is better model for low income housing? Is rental housing a solution to fulfill social housing requirement? Are land speculations being a reason for shortage of housing? How private developer can help to contract 5 million housing units? How government or NGOs can help to fulfill the mission of 5 million housing units? Are public funds available for 5 million housing units? Is the vertical development best possible solution to meet the target? Is the construction of 5 million housing units fill the current housing backlog in the country?

Cost analysis was also performed by consulting the various developers in big cities of Pakistan to find out the average construction price per square feet in the country. Total land was estimated on the standard sizes of houses which are using in Pakistan. The bestimplemented projects on affordable housing in Pakistan were explored such as Khuda ki Basti (KKB), Orangi Pilot Project (OPP), Safiya Homes, and interview was conducted with the officials about the mechanism of providing housing to low-income customers in different cities of Pakistan. The secondary data was collected from websites to take government mechanisms for implementing the 5 million housing program. Secondary data is also including the brochures related to the 5 million housing program which were published by the Government of Pakistan at different websites. Detailed calculations were carried out to estimate how much land and cost is required for this program. Policies are recommended for the successful implementation of the 5 million housing program.

IV. BEST PRACTICES OF AFFORDABLE/LOW INCOME HOUSING IN PAKISTAN

In Pakistan, we can see few good programs of low-income housing schemes such as the OPP, KKB, and Safiya Homes which were successfully implemented by using the concept of incremental development approach. These projects have engaged the community for the successful implementation for affordable housing in the country.

ORANGI PILOT PROJECT

Orangi town is the biggest katchi abadi consisting of a narrow streets system. This was suffering from unhygienic conditions due to open and dirty katcha drains. This drain system running in the middle of the streets caused dangerous diseases. The OPP was initially announced as a lane sewerage project in Orangi. After that, it becomes the biggest NGO in Pakistan which is working for the improvement of living conditions of the low-income people in the country. This project aims to improve the slums and katchi abadis on a self-help basis (Hasan, 2003). The salient features of OPP are listed below:

- This project was initiated as a lane sewerage system for the improvement of aatchi abadis and eradication of poverty.
- This project highlighted public awareness, community organization, and empowerment of low-income people.
- NGO took part into several other welfare programs like Micro Credit Scheme, Women Training and Research Training Institute.
- This project engaged number of volunteers from Daood Engineering College for surveys and community organization.
- This project involved foreign donor organizations to support OPP.

KHUDA KI BASTI PROJECT

This project was initiated by the Hyderabad Development Authority, Pakistan. It was a low-income site and services scheme announced in Gulshan-e-Shahbaz, Hyderabad. It was observed, the current site and services projects have proven unsuccessful to provide house to poor needy/homeless people. Thus, poor people were forced to spend their life in katchi abedies and slums. This project changed the existing system of provision of low-income housing. This project aimed to provide planned plots to the selected poor people rather than constructed housing units in planned and serviced housing schemes. The utility services, roads, and superstructure of the housing units were developed by the allottees of the plots on a self-help basis. Also, they presented the concept of incremental development of infrastructure services and the construction of housing units on a self-help basis when allottees can afford it easily. The KKB

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program proved to be fruitful for the low-income community in the provision of planned and affordable housing. This program has been simulated at eight places to date one of them is comprising of Kala Shah Kaku near Lahore (Siddique, 2013). In 2013, 2800 low-income families (18000 people) obtained shelter through self-help and incremental development. The low-income families organized themselves to develop infrastructure incrementally without obtaining loans from conventional financial organizations. The salient features of KKB are given below:

- This project used the concept of incremental development approach of affordable housing for poor people.
- This project implemented innovative allotment criteria for plot allotment for poor people rather than balloting.
- The development of infrastructure services and construction of housing units carried out on a self-help basis by the allottees.
- This project involved the technical staff of the Hyderabad Development Authority for the development of a low-income housing scheme.
- This project highlighted the community organization and empowerment of low-income people.

SAFIYA HOMES

Safia Homes is a project of Ansaar Management Company (AMC), it is a social enterprise taking on the challenge of developing low-income housing in Pakistan. This enterprise started in 2008 with a dream of bringing real change to the housing sector by providing affordable, quality housing that is accessible to low-income people in the country. It is providing low-income incremental housing in different cities of Pakistan such as Faisalabad, Peshawar, Lahore, Kala Shah Kaku, Multan, and Muzaffargarh. They are working to providing more than 1500 housing units (mostly housing units provided) and flats in the abovementioned cities. It is also worth mentioning that they introduce a lowcost modern village concept post-2010-floods in Punjab that is primarily driven by community support (https://www.safiyahomes.pk). The salient features of Safiya Homes are described below:

- This project used the concept of incremental development approach of affordable housing for poor people.
- This project engaged the community.
- This project involved international social investors, like Acumen and Places for People.
- Civil infrastructure includes the Roads, water supply, underground sewerage, electricity, parks, and graveyard.
- Social Infrastructure includes the education complex, health centers, centers of worship, community center(s), block development committee rooms, solid waste management system.

V. WHY 5 MILLION LOW-COST HOUSING UNITS IN PAKISTAN?

Although the Prime Minster of Pakistan has pledged to construct five million houses for his shelter fewer compatriots during his government's stipulated five-year tenure, the challenge is certainly a daunting one as the country has a housing backlog of almost 10 million units with demand growing at a rate of 0.7 million new units per year. In its November 27, 2017 report, "Lamudi," a Berlin-based online real estate marketplace with operations in 34 countries, had viewed: "By 2016, Pakistan's housing shortage had reached around 10 million units and is expected to grow every year by 0.7 million units. This is an alarming situation and needs to be dealt with immediately. Most of this shortage is due to lack of housing available for the lower-income strata and an underdeveloped mortgage finance market" (Arnott, 2008).

The planning, designing, and construction of 5 million housing units in the coming 5 years is a big task for the Government of Pakistan. This needs innovations in land identification, development, planning, designing, and construction. This is a sole opportunity to introduce up to date procedures like digital planning, benchmarking, spatial data infrastructure for land pooling, readjustment and land management, infill parcel development, mixed-use and compactness, compact development, accessible and efficient public transport system, one window approval process, smart and intelligent services system, e-property transactions and e-services, capacity buildings of institutions, coordination mechanism, buildings bylaws and regulations, transparent land acquisition system, and control on rents.

NAYA PAKISTAN HOUSING PROGRAM

The Prime Minister of Pakistan has announced the "Nava Pakistan Housing Program" on 10 October 2018 in Islamabad. Under this program, the Government of Pakistan will construct 5 million affordable and low-cost housing units within 5 years for poor people in urban and rural areas of Pakistan through one window operation. These houses will be provided to the poor people with 15 to 20 years payment plan. This program not only highlighted the housing issues but also the creation of multiple jobs and encourage economic growth in the country. More than 40 construction industries will be engaged in this program. A new young entrepreneur class will emerge, and the government will provide essential skills and training under the umbrella of this program. Also, training institutions will be established for the training of unemployed youth. The government will provide land, facilitate, and eliminate bottlenecks. These housing units will be constructed through a public-private partnership, which facilitates with all basic amenities. The Prime Minister said that "We want to build houses for those who ordinarily do not even dream of owning a house, as they fall in low-income group and barely manage to find a shelter". The data of estate lands will be gathered and registered by land banks, the government will provide land for housing units to be undertaken by private sectors/developers and will monitor by a housing task force consists of seventeen members. Under this program, data of slums (katchi abadis) will also be collected.

World Bank estimated that in 2009 Pakistan was facing a housing shortage of 7.57 million units and 6 million (79 %) of them were concentrated in the lower-middle-income and the lower-income group. Pakistan had 30 million housing units with a shortage of 10 million. From the annual demand of 700,000 housing units, the country constructs only 250,000 annually, with a backlog of 450,000 housing. If 5 million housing units program will be implemented to combat the shortage of housing in the country and this would able to solve half of the hosing problem in country (Nenova, 2010).

TENTATIVE BREAKUP OF FIVE MILLION HOUSING UNITS

The proposed breakup of five million housing units shows that 2740 houses will have to be constructed in a day (8 hours/day). This diagram shows that this is a very difficult task to construct five million houses under the current working mechanism of Government in a period of 5 years. Figure 1 shows that the construction of 5 million housing units is a dream, but effective planning and implementation can give positive indication towards the reality.



Tentative breakup of five million housing units



ADOPTIVE INDICATORS BY GOVERNMENT OF PAKISTAN

The Government has developed a registration form for the collection of data of people. Based on the data collected from the registration form, housing specifications containing site, design, and the price will be decided for the applicant. Several indicators were selected by the government such as profession, current residence, family gross income, preferred monthly payment plan, number of residents expected to live in a house, and the desired location of the house. Detail of indicators is presented in Table 4.

TABLE 4

Indicators of low-income housing adopted by Government

Indicators	Sub-Indicator	Explanation
Profession	Government Employee, Private Sector Employee, Self Employed, Farmer, Labor	Percentage of houses to be allocated to whom professional
Current residence	Joint Family Home, Rental Home, Katchi Abadi	Percentage of people living in which type of houses
Family gross income	<20,000 , 20,001- 40,000, 40.001 - 60,000, 60,001 - 80,000 , > 100,000	Which income class want to get low cost houses, and this referred towards the design
Preferred monthly payment plan	5,000 - 10,000, 10,001 - 15,000, 15,001 - 20,000	Percentage of people who want to choose what kind of monthly payment plan
Number of residents expected to live in a house	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, more than 10	Size of the household in corresponding to the house area
The desired location of the house	Faisalabad, Gilgit, Quetta, Muzaffarabad, Swat, Islamabad, Sukkur	What percentage of people required which location of the house in a city

Source: Punjab Housing and Town Planning Agency, 2018

The indicators identified for the evaluation and selection of people for the five million housing program are described in table 4. These indicators are generic in nature. The government will select the suitable people for this program by adopting the above-mentioned indicators. According to these indicators, the minimum monthly installment is 5,000, which is not affordable for low-income people whose monthly income less than 20,000. The indicators must be specific in nature for the selection of people. The ownership status of the current residence must be included as an indicator. To identify the actual beneficiaries of the low-income housing project, there is a need to conduct a detailed research study. The opinion of housing experts and practicing town planners should be incorporated to make this project implementable and successful. Also, it is recommended that government should follow the indicators suggested by the World Bank and other countries for evaluation of eligible people and make the program affordable and viable for homeless people.

PROPOSED LAND USE BREAKUP OF 5 MILLION HOUSING UNITS

Pakistan is the world's 5th largest populated country and it has a shortage of housing and more specifically, the trend of low-cost housing. Real estate holds immense potential because of population density. The people of Pakistan are experiencing penury and therefore the housing is not very elaborate or accurately planned and cannot last very long build by them. Many people are homeless due to overpopulation. Social Housing is an immediate need for people of low income or with particular needs, provided by the Government or not-for-profit organizations. Therefore, for the purpose of demand of land for housing an estimate developed to guide the practitioners. The proposed land use breakup of the 5 million housing units which is same for all proposed sites in the country under NPHP is provided in Table 5.

			U		
Housing Unit	Area of	Demonstrate	No. of	Housing	A
Size	Plot (sq ft)	Percentage	Story*	Units	Area (Acres)
3 Marla	675	33	2	1,650,000	15468.75
5 Marla	1125	18	2	900,000	14062.50
7 Marla	1575	12	2	600,000	13125.00
10 Marla	2250	7	2	350,000	10937.50
Apartments 3					
Marla (2 bed	675	20	7	1,000,000	2678.57
rooms)					
Apartments 4					
Marla (3 bed	900	10	7	500,000	1785.71
rooms)					
Total (45% of		100		5 000 000	59059 02
total land area)		100		3,000,000	38038.03
Roads, OS, PB, C	Commercial &	Graveyard (55	% of total	land area)	70959.82
Grand Total (Are	a in Acres)				129017.85

TABLE 5

Proposed land-use breakup and estimated area for 5 million low-income housing units

* One floor will use for one household.

Table 5 is presenting the housing breakup according to different acceptable sizes for NPHP. It is estimated that 45% of the total land area

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is reserved for residential use and 55% of the land will be used for commercial, public buildings, parks, institutions, graveyard, and roads. Vertical development is the need of the time otherwise land shortage and lack of agricultural land will be the main problems after a few decades. But Pakistani people don't accept such high-rise flats due to local culture and climate. Therefore, authors have proposed a maximum number of plots for housing units which are the best choice for people in Pakistan. Most of the population in Pakistan is low income, so this research proposed 81% for low-income people, and the remaining 19% are for middle-income groups to cut off the cost for low-income people. However, 30% apartments (ground + 6) are also proposed to offer a variety of dwellings for the applicants. And following the policy of the World Bank has a learning lesson for the developers as well as Government organizations.

"The evolution of the World Bank's housing policy through two decades can be divided into three stages. The first decade of Bank housing policy focused mainly on "sites and services" and slumupgrading projects; the second gradually shifted the emphasis to housing finance development, and recently there has been a gradual shift to "housing policy development loans" (Arnott, 2008).

To accommodate the low-income people, maximum percentages are given to 3 Marla (675 sq. ft as one Marla is equal to the 225 sq. ft in Lahore and 272.25 sq.ft in many cities of Pakistan) plot which will be ground +1 story. One story will be used for one household. To make this five million housing initiative economically viable the concept of crosssubsidy is used. The plot size of more than 5 Marla is used to accommodate the middle-income class. The revenue collected from these plots will be used to provide subsidies to low-income people. To achieve the target of five million housing units, more than 129 thousand acres of land is required including 58058.03 acres land for residential units and remaining land for other amenities.

COST ANALYSIS

If average construction cost Rs. $2500/\text{ft}^2$ (value obtained from survey) which is being charged in Lahore, Islamabad, Multan, Karachi and Faisalabad then there will be a requirement of 10524 billion Pakistani

rupees to construct only 5 million housing units. The breakup of cost is presented in table 6. As per surveys conducted with the developers of the housing schemes, the cost of development per Kanal (4500 sq. ft) is ranging from 1.5 -2.0 million in the big cities of the Pakistan. The calculated cost of development is presented in Table 7, if we are taking the average development cost to be 1.75 million per Kanal and it comes out to be 14.0 million for one acre.

Total Housing Unit			5,000,000)	
Housing Unit Size	Area of Plot (ft ²)	Percentage	Housing Units	Total area (ft ²)	Cost (Billion)
3 Marla (675 sq ft)	675	33	1,650,000	1,113,750,000	2784.38
5 Marla (1125 sq ft)	1125	18	900,000	1,012,500,000	2025
7 Marla (1575 sq ft)	1575	12	600,000	945,000,000	1890
10 Marla (2250 sq ft)	2250	7	350,000	787,500,000	1575
Apartments (2 bed)	675	20	1,000,000	675,000,000	1350
Apartments (3 bed)	900	10	500,000	450,000,000	900
Total (45% of total land area)		100	5,000,000	4,983,750,000	10524.38

TABLE 6

Cost analysis for 5 million housing units

Table 6 describes the cost analysis for this program which is based on a standard rate of $2500/\text{ft}^2$ in the current scenario prevailing in big cities of Pakistan. The total development cost of this program will be 1806 billion rupees (refer Table 7).

TABLE 7

Estimated total cost including development cost for 5 million housing units

Cost	Area (Acres)	Cost (Billion)
Cost of Development	129017.85	1806.25
Total Cost (5 Million Houses Units + Development)		12330.63

According to Government payment schedule for NPHP, the minimum down payment is 350,000 PKR (2188 USD) for the ground

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floor and 330,000 (1875 USD) for the 1st floor of 3 Marla (20% of the total cost of plot) which is too much for a poor person to afford. It seems that this program designed for the poor or for the middle class who have already well-furnished homes their own. Now, we take an overview of about payment period of 18 Months for 3 Marla House. Cost of ground floor is 1,750,000 and 1,650,000 for 1st floor. Is it possible for lowincome people to pay the remaining amount (excluded down payment) within 18 months which comes out to be PKR 77.778 /month if they do not want to take a loan on an interest rate of 09%? From the above discussion, it can safely be concluded that it will remain a dream for low income/middle income person to build or own a 3 Marla house of his own in the NAYA PAKISTAN HOUSING SCHEME, because it is very expensive and challenging for a middle or low-income person as minimum wage in Pakistan is 15,000 - 20,000 (\$94-125) assuming the dollar rate of PKR 160. Keeping in view low income who can think of paying the afore-mentioned down payment and subsequent monthly income installments. It is estimated that total cost of the project is PKR 12330 billion (77 billion USD) if assumed that Government will use the state-owned land.

EXPERT OPINION FROM PROFESSIONAL TOWN PLANNERS

A total of 85 registered and practicing town planners are consulted through interviews, related to the applicability and evaluation of the five million housing program. The majority (72.94%) of the interviewed experts belongs to the government sector which are working (77% of total) in Lahore and remaining are from other major cities of Pakistan. Almost 53% respondents have professional experience of more than 15 years. The major findings of the interview with experts are elaborated as under:

Reduction in down payment

It is concluded from the opinion of the professional the down payment (20% of the total) for NPHP is not affordable to real low income people, but middle-low can afford the down payment fixed by the government for house. Almost 84% of the experts suggested that the down payment

should be reduced as per the low-income category people. It should be 5% - 7% of the total cost of the house.

Reduction in installment of total payment

It is very difficult to pay remaining amount to the low income within the period of two years for constructed house. 88.23% of the experts respond that the monthly installment should be a little higher than the monthly rental amount and it may be prolonged to 20-25 years. In the case of Government employees, the constructed house should be provided by deducting the housing allowance from their salaries.

Total cost of house should be accessible for poor

This research inferred that the majority of the expert (92.94% of the total) responded the cost of 3 Marla and 5 Marla fixed by the government is not affordable for low-income people in the country. They suggested that the government should provide housing units at about or even less than one million rupees in the case of Lahore. In small-towns, it should be about half a million and in rural areas of Pakistan, it should be around 0.25 - 0.3 million which should be in the access of low-income people. This could not be possible without subsidy then government must provide subsidy to the poor segment of population.

Introduction the concept of Social Housing

According to the professional, the concept of social housing must be introduced in the country, and in any case, it should not be converted into a routine housing business, i.e. sale on stamp paper or illegal occupation, utility services connection fees etc. may be reduced and provided on a priority basis. We need to change the social norms of house ownership in the country. People with large houses get prestige and respect in our society and if some hard worker and highly educated is living in a small house or low-income category scheme, normally de-privileged. Almost 92% participants suggested that needs to be changed as it has happened in Europe, such as in the Netherlands, about 60% of people were living in social housing without any ownership rights. The idea of social housing is missing in Pakistan and this should be adopted.

Best Model for Housing Project

Different models of affordable housing are in existence in the world such as site and services, incremental development etc. More than 87% of the experts recommended that the site and services model for the low-income housing which was implemented in Pakistan such as KKB. Experts further suggested that the afore-mentioned model is the best model to somehow achieve the target of 5 million housing units in the country.

Strict legislation/regulations Mechanism

Majority of the expert suggested that strict legislation mechanism is needed, and if someone fails to construct a house in a given time period, it must be taken over by the concerned authority and only 50% of the current market price be given back. By planning instruments, site and services scheme should be allowed only for high middle and high-income class with heavy taxation on sale of allotted plot. Otherwise, community housing/low-income housing should be promoted. The experts object to the name 'Low Income Housing' as low income gives a negative or degrading impact. It should be better to called 'Community Housing'.

Incentives/Bonus for Housing Developers

More than 89% experts suggested that private developers must be engaged with incentives or bonus by the government. With the general agreement for financing, the project for low-income groups can be launched. Through the change in legislation, in the blights zone of innercity, regeneration projects / high rise may be initiated to avoid the horizontal spread of cities especially the big cities to promote the sustainable/compact development in the county. Islamic banking system should be promoted for providing the finance for low income housing units.

VI. CONCLUSION

Housing is one of the basic necessities of human beings. Access to lowincome and affordable housing has become a major concern for low and middle-income households around the globe. Housing has become less affordable for low income and middle-income people due to lack of housing policies. In Pakistan, owing to the increase in the urban population resulting in slums and informal housing. The Government of Pakistan has launched a NPHP for construction of 5 million housing units for providing affordable housing to low and middle-income people by the year 2023 in the country. This study sketched land use breakup including 45% for residential housing units and 55% for other amenities such as roads, public buildings, open spaces, commercial and graveyard. This research study estimated that more than 129 thousand Acres of land is required to achieve the target of 5 million housing units in the county. It is proposed 81% of residential units for low-income people, and the remaining 19% are reserved for middle-income groups to cut off the cost for low-income people. This research study also estimated the total cost of whole project, this project is required a total cost of 12330 billion PKR (77 billion USD) if assumed that Government will use the state-owned land. It is safely be concluded that it will remain a dream for low income/middle income person to build a 3 Marla or 5 Marla house under the umbrella of NPHP, because it is very expensive and challenging for a low and middle-income person as minimum wage in Pakistan is 15,000 -20,000 PKR/month. It is finally inferred by seeing the cost and land requirement for 5 million housing units, this is a dream rather than reality.

Many countries such as USA, California, San Francisco, Scotland, England, South Australia, India, and Vienna are providing the affordable housing for low income people. These countries are using various approaches and models to provide affordable housing including cross subsidy, Dutch model, inclusionary zoning, density bones, public private partnership, and social housing. In Pakistan, few projects were also initiated to provide the affordable housing in the country such as OPP, KKB, and Safiya Homes by using the concept of sites and services, and incremental housing development. The above-mentioned practices are successfully practicable at their own level for providing the low income/affordable housing for the poor. In this research study, 85 experts were targeted to get the opinion for successful implication of 5 million housing units under the NPHP. Based on the expert's opinion, this study concluded that down payment, installment plan and total cost of even 3 Marla is not affordable for poor people in the country. It was also suggested by experts that the different concept of affordable housing such as social housing, site and service, and incremental development to make the real execution of 5 million housing units by 2023. Density bonus and other incentives should be given to the housing developers for successful completion of this projects. This study suggested that strict legislation/regulation should be formulated for better implementation of this project.

VII. RECOMMENDATIONS

This research presented the following recommendations are as below:

- The institutions should boost the participation of the community (like OPP, KKB, and Safiya Home) and private sectors (like Vienna and India) for the successful implementation of 5 million housing units in the country.
- The role of private developers in the provision of affordable housing should be highlighted and the government should give the incentives for providing affordable housing under the umbrella of 5 million housing units like India and the United State of America. Density bones should be awarded to the developers for promoting the high-rise development in the country. Islamic mortgage financing system should be encouraged in the country for successful execution of 5 million housing units.
- Mostly, government servants are homeless in Pakistan. The Government should provide houses against their housing allowance in the country. This can be a part of the 5 million housing program. In this way, housing backlog will be reduced in Pakistan.
- The project cost of 5 million housing units is so high and huge land shall be required for successful implementation of this program. Therefore, the government should encourage the crosssubsidized model of affordable housing to achieve the target by 2023. This research suggested social and rental housing, site and services model should be promoted.

• According to the private housing rule in Pakistan, 20% of plots shall be reserved for low-income people. The government should impose a strong enforcement mechanism for this. Also, these 20% plots in newly approved housing schemes should be the part of NPHP. Strict legation/regulations should be formulate to execute the 5 million housing units program.

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FUZZY REGRESSION APPROACH FOR MEASURING POVERTY IN PAKISTAN

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Abstract. Poverty is perceived to be vague in terms of (i) making judgement about who is to be considered as poor, (ii) selecting the relevant dimensions and indictors. Any benchmark selection to identify poor remains somewhat arbitrary and the vagueness exists irrespective of whether the conventional or non-conventional poverty measure is used. To address the issue of vagueness, this study employs fuzzy regression as a natural alternative to the conventional approach. The fuzzy logic assigns degree of membership to a set of poor people on a scale from 0 to 1 instead of the rigid dichotomization. To cater the second issue, we measure the welfare level of individuals using Engel curve method as it gives a lot of information regarding the consumption behavior of consumers at different levels of total expenditures and for various family compositions. Pakistan Social and Living Standards Measurement (PSLM) survey 2015-16 is used to estimate poverty. Findings reveal that poverty estimates vary significantly across the provinces and regions. Overall, highest incidence of poverty is observed in Balochistan followed by Sindh, KPK is the least poor province. Poverty is not only a rural but a provincial phenomenon as well in Pakistan.

Keywords: Engel Curves; Dichotomization; Identification; Unidimensional Poverty

JEL Classification: C02, C18, I32

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I. INTRODUCTION

The first sustainable development goal of the World is to end extreme poverty in its all forms by 2030 (United Nations, 2015). Since 1990s, sustained decline in global poverty is observed till 2017, but the deceleration in the poverty reduction rate is reported in 2018 making it hard to reach 2030 target of 3 percent global poverty. Almost 10 percent of the world is still living in extreme poverty (World Bank, 2020). As per the national poverty line, 24.3 percent of the population in Pakistan lives in poverty (ADB, 2020). Poverty eradication strategies rely on the estimation of poverty trends at national and sub-national levels. Therefore, several methods are devised to measure poverty. On balance, categorize the poverty measurement methods into we mav unidimensional and multidimensional approaches. Unidimensional or conventional approach to the measurement of poverty stresses only on one variable, usually the income while multidimensional approach utilizes several indicators to obtain more exhaustive and useful measure (Costa, 2003). Both the conventional and multidimensional poverty measures evolved from distribution insensitive (unidimensional: head count index, poverty gap, income gap; multidimensional: Alkaire & Foster MPI) to sensitive measures (unidimensional: square poverty gap, Watt index, average exit time; multidimensional: Datt's MDPI). The distribution sensitivity implies that the poverty measure is convex in deprivations, i.e., the value of the measure increases if transfer is made from relatively more to a less poor person (Najam, 2020). Not only the evolution of these measures but the debate regarding poverty threshold and selecting the welfare dimensions and indicators is also same.

For unidimensional or conventional poverty measures, the debate is on setting the benchmark value, i.e., poverty line. In the same way, for multidimensional poverty measures debate is on setting the poverty cut offs at dimensional and indicator levels [see, e.g., Naveed & Islam (2012), Salahuddin, & Zaman (2012), and Bourguignon & Chakravarty (2019)]. Therefore, the analysis of poverty requires to dichotomize the population into poor and non-poor based on a benchmark value (Betti et. al, 2006). This use of a stringent cut-off not only results in loss of information but also removes the fuzziness that exists between the two extremes of welfare. Poverty is perceived to be vague in terms of (i) making judgement about who is to be considered as poor, (ii) selecting the relevant dimensions and indictors (Neff, 2013). Any benchmark selection in this regard remains somewhat arbitrary and the vagueness exists irrespective of whether the conventional or non-conventional poverty measure is used. Conventional regression models require crisp data and relationship between the dependent and independent variables. However, in case of poverty which is a vague phenomenon in terms of identification of poor and evaluating parameters (indicators), fuzzified regression seems to be a more natural alternative to the conventional approach (Chukhrova & Johannssen, 2019).

Poverty is not an attribute that is simply present or absent for individuals or households instead it should be considered as a matter of degree. Cerioli & Zani (1990) introduce this concept for measuring poverty based on their inspiration from the theory of Fuzzy Sets. Many researchers utilize this concept for the measurement of poverty [see, e.g., Chakravarty (2006), Oyekale (2009), Montrone (2011) and Betti (2017)] as it allows to tackle the direct criticism on the conventional measures of poverty in terms of dichotomization into poor and non-poor (for details see, Chukhrova & Johannssen, 2019). The fuzzy logic assigns degree of membership to a set of poor people on a scale from 0 to 1, where 1 means full membership and 0 means full non-membership to the set of poor. For example, the official poverty line for Pakistan based on HIES 2013-14 is PKR 3030 per adult equivalent per month. As per official poverty line, a person who earns more than PKR 3030 is non-poor but fuzzy logic assigns him a slightly lower degree of membership to the set of the poor people. The advantage of the fuzzy logic is that it allows us to tackle the problem of identification and vagueness as it does not require a single precise poverty line (e.g., PKR 3030). This fuzzy membership function has the ability to accommodate non-distinctive cases as described above and does not require the stringent cut-off line dividing the poor and nonpoor (Neff, 2013).

For measuring poverty, another pertinent issue is the choice of the indicator for the identification of poor. Conventional methods of poverty measurement based on income or expenditure and its distribution are indirect way of studying poverty because the economic access to the private goods like food is determined not only by the individual's income but also determined by the government and non-government organizations. Therefore, the personal income is not the main determinant of poverty (Kumar et. al., 2008). To measure the welfare level of individuals, we use Engel curve method as it gives a lot of information regarding the consumption behavior of consumers at different levels of total expenditures and for various family compositions. Food shares are good indicators of welfare across different household sizes as budget share for food falls if expenditure increases and there is a positive relationship between food share and household size. Engel curves have widespread empirical applications. Many demand systems like linear expenditure system, almost ideal demand system (Deaton and Muellbauer, 1980) and quadratic almost ideal demand system (Banks, Blundell, & Lewbel 1997, Chen & Chen; 2016) are based on Engel curve. Rao (1981) utilizes the conventional property of the Engle Curve of a necessity to explore that the proportion of food expenditure increases, reaches a maximum point and then declines. Rao suggests that one and half time of the maximum point should be taken as poverty line and the maxima as a threshold for acute poverty.

A handful of studies on Pakistan explore the consumption patterns by computing the Engel curves (see, e.g., Burney, & Khan, 1992; Shamim & Ahmad, 2007; Ahmad & Arshad, 2007 and Kiani, 2013) however, the use of Engle curves and Fuzzy logic in measuring poverty is relatively a nascent idea in local literature. This study contributes to the scarce literature by utilizing Engle curve approach for estimating poverty in Pakistan through Fuzzy Regression.

II. METHODOLOGY AND DATA

Health, education, sanitation, and drinking water are the public goods provided by the government whereas there are some private goods like food provided by non-government agents through market mechanism (Kumar et. al., 2008). Therefore, the economic access to these public and private goods depends on an individual's and government and nongovernment organization's resources. Hence, personal income is not the main driver of poverty. To measure the welfare level of individuals, we use Engel curve method as it gives a lot of information regarding the consumption behavior of consumers at different levels of total expenditures and for various family compositions. We prefer Engel method to other approaches due to its simplicity, low data requirements and clear theoretical foundations. There is one assertion and two regularities regarding this method. The assertion is that food shares are good indicators of welfare across different household sizes. The regularities are (i) the budget share for food falls if expenditure or income rises, (ii) holding total expenditure constant, household size and food share has positive relationship between them. The identifying assumption in this approach is that there should be a stable structural relationship between real income and food shares.

Regarding the estimation of Engle curve, we consider the Working (1943) and Lesser (1963) model (eq. 1) as its mathematical form is consistent with consumer behavior and fulfills the requirements of consumer demand theory and adding-up restriction. The following empirical model is the restricted form of Almost Ideal Demand System (Deaton and Muellbauer, 1980)

$$m_{ip} = \alpha + \beta lny_{ip} + X_{ip}\phi + \sum_{p=1}^{3} D_{ip} + \varepsilon_{ip} \dots (1)$$

where ${}^{m_{ip}}$ is the budget share for food (table 1) for the ith household in province p, y_{ip} is the per capita total expenditure, X_{ip} is a vector of household-specific control variables (age, gender & education of the household head, household size, region, and occupation), ${}^{D}{}_{ip}$ is a province-level dummy variable for province p and ${}^{\varepsilon_{ip}}$ is the error term. The provincial dummy variable, ${}^{D}{}_{ip}$, takes the value one for the province 'i' and zero otherwise. Dummy variable, ${}^{D}{}_{ip}$, is used to control for the latent affects including price differentials across the provinces. Budget share for food is used due to its several advantages over the other indicators. Firstly, budget share for food is more sensitive to changes in income, second, it is a nondurable good hence there is no lag between its expenditure and consumption unlike the durable goods. Lastly, unlike the GDP and CPI, food expenditure is not politically sensitive indicator (Hamilton, 2001). Per capita consumption expenditure, y_{ip} , is used instead of income due to (i) it is less volatile than income, (ii) strong relationship between individual's wellbeing and consumption (Lewis, 2014), and (iii) people declare consumption expenditure more truly than income and it is more accurately measured at the lower quintile of income distribution.

To tackle the criticism on dichotomization of population into poor and non-poor, we utilize the concept introduced by Cerioli & Zani (1990) based on the theory of Fuzzy Sets initiated by Zadeh (1965).

For any given set X of elements $x \in X$, any fuzzy subset F of X is defined as follows: $F = \{x, \mu_F(x)\}$, where $\mu_F(x): X \to [0,1]$ is called the membership function (mf) in the fuzzy subset F. The $\mu_F(x)$ indicates the degree of membership of x in F. Hence, $\mu_F(x) = 0$ means x does not belong to F, $\mu_F(x) = 1$ means x belongs to F completely. Whereas, $0 < \mu_F(x) < 1$ means x partially belongs to F. Its degree of membership to F increases as $\mu_F(x) \to 1$.

In the conventional headcount ratio H, the mf may be perceived as $\mu(y_i) = 1 if y_i < z$ $\mu(y_i) = 0 \ if \ y_i > z$ and as $\mu(y_i) = \frac{(z_1 - y_i)}{(z_1 - z_2)} \text{ if } z_2 < y_i < z_1$ where y_i is the consumption expenditure of household i and z is the expenditure poverty line. In order to avoid the poor and non-poor dichotomy, Cerioli & Zani (1990) introduce a transition zone $(z_1 - z_2)$ between the two extremes. the mf in this zone declines from 1 to 0 linearly. Cheli and Lemmi (1995) defines the mf as the distributional function of income linearly transformed such that the value equal to 1 represent poorest and 0 the richest person in the population. Membership function provides the possibility distribution therefore; the estimation approaches are referred to as "possibilistic regression analysis" and the data distribution as "possibilistic distribution".

This study considers the fuzzy regression approach proposed by Lee & Tanaka (1999) based on quadratic programing. This method constructs upper and lower approximation models which allow us to compute the membership function, $\mu(y_i)$. We consider this non-linear programing model as it tackles the criticism on linear regression models in terms of non-interactive possibilistic parameters. When the possibilistic

distribution is defined on minimum parameters, they often become crisp due to zero spread of fuzzy regression parameters (for details see, Chukhrova & Johannssen, 2019).

The data used to estimate eq. 1 come from Pakistan Social and Living Standards Measurement (PSLM) survey 2015-16. It covers all rural and urban areas of the four provinces namely Sindh, Punjab, Balochistan and Khyber Pakhtunkhwa excluding forces restricted military areas of these provinces. Table 1 provides the summary statistics for the important variables.

Variables	n	Mean	SD	Min	Max
Food expenditure per capita	24,181	690.28	340.37	91.77	5407.92
Total expenditure per capita	24,181	9105.81	8031.43	1415.21	182517.1
Budget share for food per capita (%)	24,181	9.79	5.76	0.3239	49.02
Literacy	24,181	0.645		0	1
Household Size	24,181	4.33	1.94	1	40

TABLE 1

Descriptive Statistics

This research used a detailed sample consisting of 8072 households from rural areas, 16109 households from urban area and a total of 24181 households that are covered by PSLM 2015-16. The control variables include the age, gender & education of the household head, household size, region (rural/urban), and occupation. It is pertinent to mention that we use OECD equivalence scale to construct the household size. The average household size is 4.33 with a standard deviation of 1.94. Total monthly expenditure per capita is PKR 9106 with standard deviation of PKR 8031 indicating enormous variation of expenditure within and across the regions. Per capital budget share of food (9.8 percent) with standard deviation of 5.8 percent further reiterate the fact that income distribution of the people in Pakistan varies according to region and groups. These findings motivate us to measure poverty at national and provincial level.

III. RESULTS AND DISCUSSION

One of the main goal of SDGs is to attain the level of 'no poverty' in its all dimensions by 2030. In line with this goal, the vision 2025 of Pakistan is also aiming to reduce poverty. To achieve the goal, first step is the measurement of poverty using a robust and reliable method. The rigid dichotomization of the population into poor and non-poor based on the poverty line results in loss of fuzziness that exist between poor and nonpoor. As already discussed, poverty is perceived to be vague in terms of choosing the indicator(s) to evaluate and make judgement about who is to be considered as poor (Neff, 2013). Any benchmark selection in this regard remain somewhat arbitrary and the vagueness exists irrespective of whether the conventional or non-conventional poverty measure is used. Thus, fuzzified regression seems to be a more natural alternative to the conventional approach (Chukhrova & Johannssen, 2019). This study employs the fuzzy regression technique that treats poverty as a matter of degree rather than an attribute that is simply present or absent in individuals. Conventional methods of poverty measurement based on income or expenditure and its distribution are indirect way of studying poverty (Kumar et. al., 2008). Therefore, to measure the welfare level of individuals, we use Engel curve method as it gives a lot of information regarding the consumption behavior of consumers at different levels of total expenditures and for various family compositions.

Poverty estimates help in targeting the people who lacks in resources and essentials required to maintain a minimum standard of wellbeing. Social safety net programs like Benazir Income Support Program (BISP) are initiated in this regard. However, the coverage of these programs is limited due to financial constraints. Thus, a selected proportion of the vulnerable population can be targeted which requires the poverty estimation at different benchmarks. This study provides poverty estimates at different values of membership function (μ) and results are summarized in table 2. Suppose, government choses to target people with degree of membership to the set of poor equal to 0.88 (top 12 percent). At the chosen cut off, 30.34 percent people at national level are living in poverty with 48.59 percent of the households in rural whereas 21.20 percent in urban areas of Pakistan are poor. Poverty is a rural phenomenon in Pakistan (table 2 & 3) due to interregional differences in consumption patterns of households as the income increases (Siddiqui, 1982 and Burney & Khan, 1991). Pearson Chi-square test is utilized to test the hypothesis of no association between poverty and provinces. We are unable to accept the hypothesis (p-value=0.0000) indicating that the poverty is not only a rural but a provincial phenomenon as well in Pakistan.

Pakistan is the sixth most populated country (World Population Prospects, 2019) and aiming to reduce poverty levels in all dimensions to half by 2025. With instable economy, Pakistan is struggling to make progress in human development, food security, health, education, and unemployment (Padda & Hameed, 2018). Figure 1 is clearly indicating the need of education and creating employment opportunities to reduce poverty in Pakistan. Pakistan has launched different social safety net programs to reduce poverty in different regimes such as Cash Transfer, Benazir Income Support Program, Worker's Welfare Fund, Ehsas etc., however in all programs, education aspect is not given the due consideration. Figure. 2 clearly demonstrates the lack of educational opportunities to low income group as they are mostly located in rural areas. Access to education and health facilities in rural areas of Pakistan should be the priority of the government. Employment opportunities are limited due to instable economic and political conditions in the country. Besides, more than 50 percent of literate persons are under employed in Pakistan (Labor Force Survey, 2017-18) and they are looking for alternate work.



Figure 1 Poverty Vs Literacy and Unemployment

TABLE 2

Poverty Estimates at National Level

μ	National	Rural	Urban
0.85	46.92%	67.54%	36.58%
0.86	41.81%	62.17%	31.62%
0.87	36.24%	55.33%	26.67%
0.88	30.34%	48.59%	21.20%
0.89	24.40%	40.80%	16.18%
0.90	18.44%	32.45%	11.42%

Figure 2

Income Distribution Vs Education and Region



Highest incidence of poverty is in Balochistan province where 41.54 percent of the population is living below the poverty threshold with degree of membership equal to 0.88. More than half of the rural Balochistan (57.19%) is living in poverty whereas 36.65 percent of urban population is also poor. Our results corroborate with the findings in Saleem, Shabbir & Khan (2019). Despite its richness in natural resources, the province is considered as "lagging region" where social indicators and living standards are lowest in the country. Balochistan has witnessed the slowest growth over the decades due to weak fiscal base and worst infrastructure. Due to shortage of water and inappropriate arid conditions, only 6% of the land is capable of being farmed productively. Furthermore, typical feudal system hinders the growth and induces

poverty in the region as they can easily exploit more than 49 percent of the population belonging to low income group (Figure. 3).

Second highest incidence of poverty is observed in Sindh where approximately 28.0 percent population is suffering from poverty with 45.81 rural and 19.72 percent urban population is deprived. Our findings corroborate with the results in Khan *et. al.*, (2014) and Padda & Hameed, (2018). The rural population of Sindh is dependent on agriculture, animal rearing and fishing for their livelihood. Crop yield is low due to soil erosion, water shortage/mismanagement, water logging, over irrigation and high cost of input materials. Employment opportunities are scarce for rural residents and mechanized farming has closed the door for new entrants from the local workforce. Although, unemployment is relatively less in Sindh however, more than 57 percent of the population in Sindh belong to low income group and only 9.85 percent are rich (Figure. 3).

TABLE 2

Poverty Estimates at Provincial Level

Province	Overall	Rural	Urban	
КРК	24.26%	32.29%	19.69%	
Punjab	27.98%	45.81%	19.72%	
Sindh	35.07%	63.95%	18.00%	
Balochistan	41.54%	57.19%	36.65%	





Punjab and KPK provinces are at the third and fourth place with overall poverty rates of 27.98% & 24.26% respectively. Both provinces share almost the same rate of poverty (20.0%) for urban region however the poverty rate for Punjab's rural population is much higher (45.81%) than KPK (32.29%). The contributing factors to high rate of poverty in rural Punjab includes low productivity in farms, bigger size of households, lower prices of output, absence of infrastructure, high dependency ratio and illiteracy. Poverty in KPK province has declined over the last decade due to increase in remittances (Jamal, 2016) and improved law and order situation after the successful operation against the anti-state agents in KPK which allowed the local business and tourism industry to flourish.

IV. CONCLUSION

Although in the previous decade a lot of progress has been made in eliminating poverty, still this is an alarming problem and needs to be resolved. The key purpose of this research is to analyze consumption patterns of households through which we can calculate poverty in Pakistan. This study estimates Engle curves by utilizing the budget share of food through the fuzzy regression.

On balance, 30.34 percent people at national level are living in poverty with 48.59 percent of the households in rural whereas 21.20 percent in urban areas of Pakistan are poor. Highest incidence of poverty at provincial level is recorded in Balochistan where 41.54 percent of the population is poor. Majority of the poor are living in rural areas (57.19%) and the urban poverty in Balochistan is also high (36.65%) relative to other provinces. Rural Sindh is the most deprived area in Pakistan with highest incidence of poverty (63.95%) and the urban areas of Sindh are least deprived in the country with 18.0 percent of population living in poverty. Almost 20 percent of the urban population of both Punjab and KPK is below poverty however, the rural population in Punjab is more deprived (48.81%) as compared to the rural population of KPK (32.29%).

Illiteracy and lack of employment opportunities in Pakistan are the main drivers of poverty. Political unrest and crumbling economy are the hindrances in foreign investment resulting in scarce employment opportunities. Access to education and health facilities in rural areas of

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Pakistan should be the priority of the government. Instead of cash transfer programs, vocational training programs should be launched on large scale by the government of Pakistan.

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EFFECTS OF PERCEIVED ORGANIZATIONAL SUPPORT ON EMPLOYEES' SAFETY COMPLIANCE AND SAFETY MOTIVATION: MEDIATION BY COWORKER SUPPORT

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Abstract. This research endeavor aims to investigate effects of perceived organizational support for safety (POSS) on safety motivation and compliance through mediation of coworker support. Data collected through questionnaire from 279 respondents proved the fact that presence of support from organization increases employees' safety motivation and compliance of policies. It is further evident that coworker support partially mediates the aforementioned association. It is also evident that POS is good predictor of safety motivation and compliance, while coworker support is strong predictor of safety compliance than safety motivation. Future directions for researchers and implications of the study are also highlighted.

Keywords: Perceived organizational support; coworker support; safety motivation; safety compliance; mediation

JEL Classification: J28, D23

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I. INTRODUCTION

Occupational Health and Safety (OHS) is one of the most agonizing disquiet for organizations of toady, because organizations face huge costs if such issues raise (Puah, Ong, chong, 2016; Rodrigues et al., 2021). International Labor Organization (ILO) reported that 2 million workers die due to work related accidents and diseases in a single calendar year. Besides this, almost 270 million accidents and 160 million work related diseases are also reported ("Facts on safety at work", 2005). Thus demanding attention, from top level management and decision makers of the organizations (Credo, et al., 2010; Liu, Mou, & Liu, 2021); and employees (Puah et al., 2016). This study aims at investigating the role of these two internal stakeholders in improving safety performance at work, defined in terms of safety motivation and compliance by employees.

While looking at the OHS issues at workplace, it is the management that has to play distinctive role in developing safety culture and reducing costs associated with safety (Hofmann & Morgeson, 1999; Kim, 2021; Puah et al., 2016). Past studies are also evident of the fact that organizational support related to safety (POSS) increased the possibility of compliance of safety standards (Ring, 2010; Zaharatos, Barling, Iverson, 2005), thus improving overall safety outcomes. Organizations can utilize two approaches namely: control-oriented and commitmentoriented approaches to have a rheostat mechanism for safety issues. Control-oriented mechanism is based on the premise that organization should work through rules and regulation and should ensure its compliance (Barling & Hutchinson, 2000; Shi & Zainal, 2021; Walton, 1985). But there has been growing consideration on the utilization of commitment-oriented mechanism along with control strategy (Lawler, 1996: Walton, 1985). It is further commented that commitment based mechanism could be a better explanatory mechanism of safety performance, than control-oriented (Vashishta, 2021; Whitener, 2001).

Valuing commitment-oriented strategy as the explanatory mechanism, this research endeavor values the role of POSS as the organizational mechanism. POSS is defined as employees' belief that organization values takes care for employees' well-being and values their contribution towards safety (Baran, Shanock & Miller, 2012; Tucker et al., 2008; Rhoades & Eisenberger, 2002). Such belief is considered as

important antecedent of employee safety outcomes (Mearns & Reader, 2008). Turner et al., (2010) found that when organizations provide resources (support), the outcomes related to hazardous work events are reduced, and employees raise voice for safety. But literature linking support with safety motivation and safety compliance is scarce (Baran et al., 2012; Puah et al., 2016).

Additionally, how POSS can predict safety motivation and compliance is also an unattended area. This study considers coworkers support as the explanatory mechanism. This could be based on the assumption that when organization provides support, a culture of support is nourished which is often shared by the peers (Baran et al., 2012). Thus POSS may lead to coworker support which may in turn make their peers adhere safety practices (safety compliance) and their willingness to work safely (safety motivation).

II. REVIEW OF LITERATURE

Inflation always has been ranked among the key variables of an economy. Its measurement allows us to examine the real health of an economy by evaluating the growth prospects relative to cost of living. Inflation within the threshold level is not a source of problem but beyond certain limit offers a serious cause of concern for economists and policy makers. The persistent focus of many economists and researchers on topic of inflation and its determinants is owed to the severity of this problem faced by many economies around the world. High levels of inflation are considered as a curse because it erodes the productive capacity of an economy. Various theories about inflation and its determinants have been presented by renowned economists and different school of thoughts historically. About relational aspect, Classical doctrine favors the notion of "Quantity Theory of Money" (QTM), which suggests a proportional relationship between quantity of money and price level. QTM proposes that for a stable value of output and a constant value of velocity of money, a twofold increase in supply of money leads to a corresponding two-fold increase in price level. Monetarists consider money supply as an active determinant of change in price level. According to monetarists changes in price level in an economy are primarily caused by changes in stock of money. However, they do not

believe in an over rigidly defined proposition of one to one correspondence like classical in all time periods. In this relevance the famous dictum posited by Friedman is worth noticing; that is "Inflation is always and everywhere a monetary phenomenon not in the short run but in the long run". Friedman further posits: "Common to all disturbances, is that the price movements reflect changes in the quantity of money".

Organizational Support Theory (henceforth, OST of Eisenberger et al., 1986) deals with the global belief that organization values the contribution of their employees and takes care for their well-being (Rhoades & Eisenberger, 2002). OST became the underlying mechanism for the concept of POS, and explains how organization and its agents (e.g. supervisor) create a reciprocation relation through positive organizational image (Ahmed, Ismail & Amin, 2014). The reciprocation starts with the support and care perceptions of employees, which makes them return the favors positively (Islam, Rehman, Ahmad, Ali & Ahmed, 2014). Similarly, when employees perceive that organization values employees contribution towards safety, provides an environment of safety and takes care for employee safety (POSS), employees reciprocate with safety outcomes (Hofmann & Morgeson, 1999; Michael et al., 2005; Griffin & Neal, 2000; Neal, Griffin & Hart, 2000).

Past studies on safety outcomes have found that provision of support predicts it positively. For instance, Clarke (1998) found that employees raise safety voice when they believe that management provides support for voice and takes actions over it. Voice has been a function of psychological safety felt by the employees, which is often linked with the management consideration for employees (O'Donovan, De Brun & McAuliffe, 2021). Mullen (2005) also asserted that voice behavior is largely dependent upon support provision from organization. Puah et al., (2016) found that POSS increase employees' safety compliance as they reciprocate organizational support positively and work for achievement of organizational safety goals. On the other hand, we proposed here that POSS not only paves the way for safety compliance but also increases their motivation and willingness towards safety goals (Zacharatos et al., 2005).

Both these relations could be explained with reciprocation norm generated due to POSS (basic premise of OST), which assumes that employees' reciprocate the favors (POSS) by doing those activities which can pay organization favorably (Gillet et al., 2010). It is also worth sharing that organizational support makes employees put self-directed efforts (Pohl et al., 2012); thus making them display willingness and persistence to do tasks or high level of motivation (Darolia et al., 2010; Gillet et al., 2013). Recently, Sherf, Parke and Isaakyan (2021) also observed that safety voice required psychological support from various levels, and organization is the major source of all. It is therefore assumed that POSS will also predict employees' safety motivation.

Considering the discussion made on the relationship of POSS with safety compliance and motivation, following assumption is made:

H1: POSS will positively influence safety compliance (1a) and safety motivation (1b)

Past studies have valued the role of organizational or horizontal level of support, but how peers can influence employees' safety outcomes is an area that has largely been unattended. This study values this gap and assumes that coworker support can influence employees' safety behavior. Laurence (2005) noticed that support from coworker influences peers responses towards job, environment and organization. Similarly, Westaby and Lowe (2005) noticed that coworkers may influence risk taking behavior of employees.

Co-worker support and safety outcomes relation could also be explained by social exchange theory (SET, Blau, 1964). Unequivocally, when employees share information with peers and show safety concern, it is expected that peers will reciprocate it positively with favorable safety behavior (e.g. voice; Tucker et al., 2008). It is thus assumed that coworker support will influence employee safety response, in terms of both compliance and motivation. Past studies have noticed such relation, For instance Andriessen (1978) found that peers workplace responses directly influence employees safety initiatives. Zhou and George (2001) found coworker support as a way to improve safety compliance, as such examples are set by peers and its believed that a culture of compliance exists; similarly, rules and policies as they will have sense to improve work place safety practices (i.e. safety motivation).

The said association could also be explained by Social Impact Theory (SIT; Latane, 1981), which presumes that change in one's behavior is largely dependent upon the real, implied or imagined actions of other individuals. Such change is based on importance, proximity and number of parties involved in the relation. Here it is assumed that persons with authority (e.g. supervisors, peers with expert/referent power) can influence followers based on their importance at workplace. Similarly, peers or supervisors can influence other fellows on the grounds that they are at proximity with the working environment in real. Moreover, as peers are more in number the possibility of influence is also greater (Carroll, 1998). It is therefore assumed that coworkers are in better position to influence employees' safety outcomes, even when management or supervisors are unable to support their employees (Westaby & Lowe, 2005). Based on the theoretical premise and past studies following hypothesis is formulated:

H2: Coworker support will positively influence employees' safety compliance (2a) and safety motivation (2b)

Considering the premise of OST, it is assumed that support from organization makes employees reciprocate to organization. It could also be true for employees response towards working environment, as they my reciprocate employees by considering them part of organization (Ahmed et al., 2014; Islam et al., 2014). Furthermore, it is evident that coworker support also influences employees safety related behavior. It could thus be assumed that POSS will lead to coworker supportive behavior which in turn will foster safety related behavior at work. SIT again could be used to explain this association, which presumes that management and supervisors, being symbol of strength, involve employees to work with their peers thus influencing through coworker support (Tucker et al., 2008). Similarly, being away from frontline employees (proximity), coworkers are the better source to influence employees. Thus management utilizes coworkers to create inspirational appeal and improve safety behavior of employees (Clarke & Ward, 2006; Hofmann, Morgeson and Gerras, 2003). Recent studies have found the role of coworker support in safety responses of peers. For instance, Lambert et al., (2021) signified its outcomes by highlighting the trust that creates when employees support each other. In this ways employees response to safety increases. Haas & Yorio (2021) further highlighted that safety

compliance of employees is influenced by the environment provided at work, which is determined by the collective efforts of management and employee and thus working peers along with an employee determine the safety environment. Thus coworker support increases when the organizational support is high and thus partially mediates the relation of support and safety response, and is hypothesized below:

H3: Coworker support will partially mediate the relationship of POSS and safety compliance (H3a) and safety motivation (H3b).

III. RESEARCH METHODOLOGY

Participants of the study included employees working in engineering firm in Lahore and nearby. Respondents were approached at two points of time (at first instance, respondent for POSS and safety compliance); while at second instance, coworker support and safety motivation). At phase one 296 responses were received, while at phase two only 279 employees responded. Responses for both the samples were matched through t-test and it no significant difference was found, thus responses were unbiased. Average age of respondents was 32.58 years (SD=6.67), while majority of them were male (53.33%). Measures used in data collection were adopted from well-established scales. POSS and coworker support was operationalized with three items (each) scale of Tucker et al., (2008). Safety compliance and motivation were measured with seven items and four items (respectively) scales of Neal et al., (2000). Five points likert scale (1=strongly disagree, and 5=strongly agree) were used to elicit responses. Data analysis was done through structural equation modelling (SEM), following guidelines of Hair et al., (2006). Furthermore, Podsakoff et al., (2003) procedures to overcome biases were used, where at first instance all variables are put in one model called one factor model. At second instance, all the variables are put in independent models to see the model fitness. Both these models showed parsimonious fit, thus helping us conclude that biases were not severe.

IV FINDINGS AND DISCUSSION

DESCRIPTIVE STATISTICS

Descriptive analysis along with correlation and reliability statistics are given in Table 1. It is evident that all the measures have acceptable reliability values (∞ >0.70). Correlation analysis affirms that both POSS and coworker support are positively related to safety compliance and safety orientation (r=.261 to .421; p<0.05 to p<0.001), thus helping us mover further with path analysis.

TABLE 1

N=279	Mean	∞				
	(SD)		1	2	3	4
(1) POSS	4.09 (0.75)	.904				
(2) PCSS	3.98 (0.86)	.888	.389**			
(3) Safety compliance	3.96 (0.67)	.798	.409*	.377**		
(4) Safety motivation	4.00 (0.75)	.835	.421*	.261*	.105**	
$p < 0.001^*, < 0.05^{**}$	•	•		•		

Descriptive Statistics

PRELIMINARY ANALYSIS

Preliminary analysis included investigation of measures of exogenous and indigenous variables for validity. Confirmatory factor analysis was used for this purpose, which was also useful to check the loading of each item on the construct. Each item loaded on construct with acceptable value (0.53-0.93, p<.001). Moreover the model fitness indices were also acceptable (x2/df=3.94, CFI=0.91, TLI=0.89, IFI=0.870, RMSEA=0.05). All the measures were also found good at discriminant (AVE> square correlation coefficient) and convergent validity (as, AVE>0.50) (Fornell & Larcker, 1981).

PATH ANALYSIS AND HYPOTHESES TESTING

RMSEA

SEM was applied to test hypotheses, it's widely used technique due to its ability to use factor analysis and multiple regression simultaneously (Hair et al., 2006). Fitness indices presented in Table 2 highlights that model had acceptable fitness indices.

Structural Equation Model			
	Direct effect/Standard value		
x^2/df	3.54/≤ 3.00		
Δx^2	-		
GFI	0.901/≥0.90		
AGFI	0.814/≥0.80		
CFI	0.890/≥0.90		
NFI	0.876/≥0.90		
NNFI	0.887/≥0.90		

TABLE 2

Figure 1

 $0.07 \le 0.08$

Path Analysis



Figure 1 and Table 3 represent the results of path analysis, it is evident that model is making significant contribution in predicting safety compliance and safety motivation (r2=0.504, p<0.05).

Table 3 reveals that POSS is a strong predictor of safety compliance (β =0.393, p<0.05) and safety motivation (β =0.420, p<0.001). Thus results support both H1a and H1b, which assumes that organizational support predicts employees' safety compliance and motivation. These results are consistent with findings of Pauh *et al.*, (2016) who found that

organizational support for safety increases employees compliance behavior. Lambert et al., (2021) also noticed that safety compliance is an outcome of support initiatives at work. Zacharatos et al., (2005) also asserted that organizational support predicts employees' response towards safety. These results also support the assumptions made on the basis of OST and SIT.

It is also evident that coworker support also predict both compliance and motivation (H2a & H2b). These findings are also consistent with assumptions of SIT (Latane, 1981), where it is inferred that actions of one person are largely dependent upon the actions of other individuals and strength of influence is the source of inspiration and influence. Findings of current study prove that coworkers (being person with expert power) have direct influence on followers through power to influence and proximity to the field, and due to proximity they can exert more influence than the organizational influence. Table 3 shows the results, where it is noticeable that coworker support predicts safety compliance (B=0.341, p<0.001) and motivation ($\beta=0.149$, p<0.005). Results of the study also show that coworker support is better predictor of compliance than motivation. This could be explained by SIT, where proximity could be a source to learn true implications of safety by peers. Motivation on the other hand is considered one's internal state which is most often intrinsic and needs organizational level favor and responses. Past studies also found consistent results, for instance, Zhou and George (2001) found that coworkers support increased employees' willingness to improve safety conditions. Recent studies have witnessed that coworkers help in creating an environment of safety where compliance and motivation for such practices are nurtured, thus safety environment is outcome of safety support from coworkers (Haas & Yorio, 2021). Sherf et al., (2021) and O'Donovan et al., (2021) also found that safety responses of employees are nurtured when they feel psychological safety at work; which is function of safety movement and support at work (Vashishta, 2021). Shi & Zainal (2021) further observed that safety motivation and compliance of employee requires attention from management as provision of support at work predicts one's responses towards safety. Based on such presumptions, Kim (2021) further commented that there should an organizational level system of support that may ensure best implementation of safety practices. The changing dynamism (e.g.
pandemic) has increased the need of employees' responses towards safety, while further created need for study of factors that contribute in improving employees' safety outcomes (Rodrigues et al., 2021).

TABLE 3

Hypotheses	Effects	Standardized Regression weights	C.R.	Р	Result
H1a	POSS—SC	0.393	3.128	**	Supported
H1b	POSS—SM	0.420	4.219	*	Supported
H2a	CS—SC	0.341	3.247	*	Supported
H2b	CS—SM	0.149	2.516	**	Supported
** <i>p</i> <0.05, * <i>p</i> <0.001					

Results of Hypotheses Testing

Table 4 contains results of mediation analysis, where both direct and indirect effects are presented. Findings of the study reveal that both POSS and CS predict outcomes variables (compliance and motivation), thus helped us infer that CS partially mediates the relationship of POSS and outcomes variables, thus H3 (H3a & H3b) are supported.

TABLE 4

Mediation Analysis

	Safety compliance		Safety motivation	
	Direct	Indirect	Direct	Indirect
POSS	0.393	0.134	0.420	0.063
CS	0.341		0.149	

V. IMPLICATIONS OF THE STUDY

Safety is one of areas of most concern for today's organizations, and employees' involvement in safety is most important consideration. Findings of current study revealed that fact that safety behavior of employees is dependent upon the organization and peers. This study offers valuable theoretically contributions, the foremost is the consideration of organizational factors (both organizational support and coworker support) in predicting one's safety behavior. It is therefore worth sharing, from findings of the study, that employees' can show better safety behavior when organization and coworkers support them. Furthermore if motivation is needed to be increased than role of organizational support have stronger influence than the coworker support. Compliance on the other hand needs both organizational and coworker attention.

VI. LIMITATIONS AND FUTURE DIRECTIONS

Though this study adds value in existing literature, it is still prone to some limitation. The foremost is small sample of the study, which could be better overcome by changing the study design (e.g. experimental design). Furthermore, group dynamics (Tucker et al., 2008) and individual factors (e.g. personality; Kelloway,2006) could also be part of investigation for future studies, as along with organizational factors these factors are also considered important in determining one's safety behavior. Furthermore, other organizational factor, (e.g. leadership, job characteristics) could be used as antecedents of individual behavior (Barling et al., 2002; Pohl et al., 2012). Future researchers could work on other aspects of safety (e.g. voice, behavior) or leadership that may influence the safety environment (Shi & Zainal, 2021). Future studies, could also consider the perceptions of support in the presence of safe conscious leadership (Lambert et al., 2021; Shi & Zainal, 2021). Yet another consideration could be perceptions of justice in wake of safety considerations, as a virtuous organization is supposed to reward employees for their safety considerations. Thus it is expected that the justice would be an outcome of such environmental focus efforts (Haas & Yorio, 2021).

VII. CONCLUSION

This study unveils the ways of predicting safety behavior (safety compliance and motivation) through organizational support and intervention of coworker support. Findings of the study unveils that organizational support for safety is an important predictor of outcome variables, while coworker support bridges this link. Findings also reveal that organizational factors offer more outcomes than peers support, thus organization should focus on employees to get best behavioral outcomes.

Additionally, coworkers support increases propensity to comply with standards because of example provided on the shop floor.

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ANALYZING INTEREST RATE GAP AND OUTPUT GAP AS INDICATORS OF INFLATION: A TEST OF KEYNESIAN AND WICKSELLIAN PROPOSITION FOR PAKISTAN

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Abstract. This study tries to empirically investigate two theoretical propositions for Pakistan's economy. The first one is the Keynesian output gap and its deterministic impact on the inflation and the second one is the impact of real interest rate gap on inflation proposed by Wicksell. ARDL approach has been utilized to identify the association among the specified series during selected sample period 1974 Q1 to 2017 Q4. The natural rate of interest and potential output are extracted using Uni-variate Unobserved Component Model. The results are suggestive of weak association between inflation and interest rate gap in the short run while strong association has been found in case of output gap. Further, a long run co-integration is found existent among the inflation, interest rate gap and output gap.

Keywords: Output gap; inflation; real interest rate gap; ARDL; unobserved component model

JEL Classification: E430, E310, E320

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I. INTRODUCTION

With the demise of Classical ideology after the Great Depression, economic literature witnessed a paradigm shift in terms of economic ideas prevailing before. The footstep of Keynes in this process of ideological evolution marked the beginning of a thought-provoking chain that had unfolded many new dimensions for upcoming intellectuals and researchers. Keynes (1936) removed the skepticism of Classical school on manifold concepts, especially regarding the proper treatment of economy's potential output and gravitational aspect of output around this benchmark. Keynes introduced the concepts of output gap based on these gravitational aspects and linked them with the inflationary and deflationary gaps observed in the economy. Whenever actual output exceeds the potential output it puts a restraint on the economic resources. As a result, the demand pressures generated are translated into inflationary pressures. Propositionally, Keynes treated "Output gap" as an indicator of inflation in the economy. This proposition can safely be regarded as such critical contribution which has laid the foundation for bulk of literature on inflation and its attributes today.

The Keynesian supremacy however does not imply that everything from the Classical stream should go unnoticed and unrecognized. More than a century ago, the concept of "Natural rate of interest" was introduced by a renowned Classical Economist Nut Wicksell (1898, 1906)¹. This concept has currently become a Hall mark in economic literature, especially in literature relevant to monetary policy design, its relevance and capturing its stance. Any negative or positive deviation of actual interest rate around the natural rate is summarized into inflationary and deflationary pressures. For example, whenever actual interest rate remains below natural level, it presents a stimulus for real variables including investment and consumption. Besides, it positively affects financial/monetary variables like bank lending ratio and money supply and via these potentially transmutes into inflationary pressures.

Having discussed a formal backdrop, this study intends to analyze the validity of these important propositions for Pakistan's economy.

¹ "Natural rate of interest" is termed as that level of interest rate which keeps the output at its "Potential" and inflation at its "Stable".

Objectively our study aims at exploring "Output gap" and "Real interest rate gap" as indicators of inflation for Pakistan. Although considerable amount of literature is available focusing on measuring output gap in Pakistan, but it scantly addresses the measurement of interest rate gap. Our study viably contributes to the existing literature by offering a measurement of interest rate gap besides output gap. This contribution is meaningful because real interest rate gap is considered as an indicator of monetary policy stance in literature. A positive interest rate gap suggests tightening of monetary policy while its negative sign indicates loose monetary policy stance. Therefore, this study on the hindsight also reveals aspects of monetary policy stance through calculation of this gap which is not commonly done for Pakistan's economy. Additionally, our study uniquely places these variables (output gap and interest rate gap) in deterministic framework of inflation, which is marginally addressed before. The theoretically consistent and justifiable relation between output gap and inflation is positive while it is perceived as negative between interest rate gap and inflation; however, the exceptions always exist depending upon economy specific credentials. Our study therefore attempts to capture the nature of this relationship for Pakistan's economy utilizing ARDL bound testing approach.

Interest rate and output are among those economic variables which responsibly gauge the economy as per belief of conventional economists² Understanding regarding their behavioral dynamics and linkage becomes even more important when they are placed at the deterministic framework of a variable and are supposed to offer a policy guideline in a traditional monetary framework. Policy relevance of the said gaps (output gap and interest rate gap) is well evident from the central bank's objective functions and loss functions specified by economists in monetary literature. These objective functions are often designated to track optimal level of inflation by assigning respective weights to these gaps in due course of optimization. Even the nominal interest rate rules (Taylor, 1993) proposed as a policy guideline suggest these gaps as feedback variables for central banks to set nominal interest rate at an appropriate level.

² Of course, within an "Islamic Economic setup", output plays a key role but interest rate being prohibitive has no role to offer either in theory or in practice.

What needs to be emphasized is that an issue must be considered in a broad perspective with all its determinants in check. As this should be a generally adopted and accepted principle regarding every economic phenomenon, case is not very much different regarding inflation. The comprehensive review of all determinants of inflation is not the actual subject matter of this paper rather focus is accorded on examining theoretically proposed determinants including output-gap, and real interest rate gap. Rather than replicating an exercise of determining the conventional and traditional determinants of inflation in Pakistan, this paper aims to fill up the literature gap by analyzing these indicators as potential determinants of inflation. Appreciable literature is available on the discussed theme at international level, but studies lack focus on this topic in case of Pakistan.

The remaining sections are organized in following manner: A synoptic review of literature is presented in section II. Section III is specified to introduce the data and discussing variables used in the study. Section IV concretely discusses the used methodology. Section V focuses on estimation and results and the last section (section VI) is specified for presenting a conclusive outlook and policy recommendations.

II. REVIEW OF LITERATURE

A BACKDROP ON RELATIONAL ASPECT

Inflation always has been ranked among the key variables of an economy. Its measurement allows us to examine the real health of an economy by evaluating the growth prospects relative to cost of living. Inflation within the threshold level is not a source of problem but beyond certain limit offers a serious cause of concern for economists and policy makers. The persistent focus of many economists and researchers on topic of inflation and its determinants is owed to the severity of this problem faced by many economies around the world. High levels of inflation are considered as a curse because it erodes the productive capacity of an economy. Various theories about inflation and its determinants have been presented by renowned economists and different school of thoughts historically. About relational aspect, Classical doctrine favors the notion of "Quantity Theory of Money" (QTM), which suggests a proportional relationship between quantity of money and price level.

QTM proposes that for a stable value of output and a constant value of velocity of money, a twofold increase in supply of money leads to a corresponding two-fold increase in price level. Monetarists consider money supply as an active determinant of change in price level. According to monetarists changes in price level in an economy are primarily caused by changes in stock of money. However, they do not believe in an over rigidly defined proposition of one-to-one correspondence like classical in all time periods. In this relevance the famous dictum posited by Friedman is worth noticing; that is "Inflation is always and everywhere a monetary phenomenon not in the short run but in the long run". Friedman further posits: "Common to all disturbances, is that the price movements reflect changes in the quantity of money".

With the transition of macroeconomic literature towards a more structural design in economic modeling, the importance assigned to the concept of "Natural rate of interest" introduced by Wicksell (1898, 1907) has reemerged. The simple monetary transmission mechanism sketched by monetarist is assigned a Neo-Wicksellian interpretation by the economists today, who associate the monetary expansions or contractions with the deviations of actual interest rate around its natural level. According to this interpretation, whenever real interest rate falls short (or remains below) of its "natural level", it stimulates investment, to complement this increased investment demand, credit expansion and money creation is observed on the part of banks, which in turn increases liquidity in the hands of individuals and via that price pressures are built on account of high aggregate demand (Amato, 2005). This indicates that the explicit mechanism through which money operates in monetarist system is visualized and presented as an implicit mechanism in Neo-Wicksellian framework (Woodford, 1997; Humphrey, 1997). The negative association between real interest rate and inflation is also advocated by the well-known fisher equation.

Keynesian economists hold a different view regarding relationship between "Money supply and Price level". They claim that changes in prices are not driven by changes in money stock³. Unlike Classical who

³ This controversial view point stems from the skepticism of whether to deal money supply as exogenous or endogenous

always assume the economy at the full employment level, Keynes points out the deviations of the economy in either direction⁴. Moreover, Classical and monetarist have little intent to accept the role of interest rate in determining the price signals while Keynesians consider interest rate among the strong determinants of inflation. As per natural rate concept we may not find Keynesians in ideological compliance with Wicksellian theory⁵, however, we can find a profound recognition of concept of natural rates and real interest rate gaps in New Keynesian framework, (Laubach and Williams, 2003; Bjornland, 2011; Neiss and Nelson, 2003).

EMPIRICAL REVIEW

Inflation in Relation with Output and Output Gap

Though relationship between "Inflation" and "GDP" is a cause of concern for both developed and developing nations but the direction of relation may well be tracked opposite in the two categories. The economies which undergo the phases of increasing economic development (growth) inevitably must face rising inflation in the initial stages of their growth. But only those economies have sustained in terms of growth which keep inflation under check. This belief provokes bulk of literature on what should be the appropriate level of inflation that might prove to be consistent with the features of economic growth or that is deemed acceptable as an accompanying factor of growth. In this relevance a study conducted by Khan et al. (2001) scrutinizes the "threshold level" of inflation for the developed and developing economies and suggests it in between the range of 4 to 5% for the developed countries while between 7 to 11% for the less developed countries. In the same context a study performed by Mubarik (2005) using a causality test reports this threshold level as 9% for Pakistan. Their finding supports the report presented by World Economic Outlook (2006), which proclaims that the experienced high growth rate of GDP in

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⁴ Above full employment level causing inflationary gap and below full employment level causing deflationary gap.

⁵ For detailed discussion see "Treaties of Money", Keynes (1936)

Pakistan for the year 2004-2005 in between the range of 7 to 8% was correlated with high rate of inflation with 8 to 9 %.

Thirwall *et al.* (1971) conducted a cross-country study including (industrialized) developed and developing countries to figure out the direction of relationship between "GDP" and "Inflation". The study reports a positive relationship among industrialized developed countries and negative relationship among developing countries. In another study conducted by Ghosh *et al.* (1998) covering IMF member countries and using the data from 1960 to 1996, finds that at inflation rates around 2 to 3%, inflation and output-growth are positively correlated, however the case is converse for inflation exceeding beyond this level. Ayyoub *et al.* (2011) re-examines the traditional quest of association between inflation and growth for Pakistan. They report a negative relationship between the said variables and suggest a threshold of 7% for sustainability of growth.

Direction of Causality between inflation and output has also remained the subject matter of manifold studies. A study by Mallik *et al.* (2001) performs co-integration analysis of inflation with economic growth for South Asian countries⁶ and reports two plausible results. Firstly, it reveals inflation and output-growth as positively linked. Secondly, it affirms that inflation is more sensitive to the increments in GDP growth rather than GDP to the increments in inflation, thus rendering GDP growth as a significant determinant of Inflation for the developing countries. Likewise, a study by Hussain and Malik (2011) identifies a threshold level of inflation for Pakistan performing cointegration analysis and reports it as 9%. Besides evaluating the threshold, the study also examines the causality aspect between the two variables and finds one way causality from inflation to output growth.

After 1990's, focus of the world switches towards inflation targeting regimes and economists in this era realize the fact that it is not the absolute movements of output growth which defines variations in inflation rather its relative deviations from its potential value. Various studies are found in literature which primarily focuses on analyzing "Output gap" as a key factor determining inflation. Gali *et al.* (2000) specifies a hybrid Phillip curve in which output gap is portrayed as a

⁶ The included countries were Pakistan, Bangladesh, India, and Sri Lanka

crucial factor determining inflation. Claus *et al.* (2000) studies the efficacy of output gap for inflation in New Zealand and contends a strong association between the two variables. Mehra (2004) analyzes output gap as an indicator of inflation for Richmond and finds weak support to track it as critical. Farley *et al.* (2010) examines output gap as driver of inflation for US and Canada and find it significant in case of US but insignificant for Canadian economy. A study by Lann *et al.* (2012) evaluates determinants of inflation for US economy including output gap and reveals weak association between inflation and its covariate (output gap). A relatively recent study by Nabila, *et al.* (2013), tracks a significantly positive relationship between output gap and inflation for Pakistan, however contrasting result has been found in a study by Asjed *et al.* (2014). The most recent study by Sharif and Qayyum (2018) on Pakistan, reports output gap as a significant attribute of inflation in short run but insignificant factor in the long run.

Inflation in Relation with Interest Rate/Interest Rate Gap

The most widely examined proposition in the literature has been the fisher equation, which states a definitional relationship between realinterest rate and inflation. King *et al.* (1997) conducts a study to examine the long run neutrality assumption of fisher equation and find insignificant evidence of neutrality of fisher equation in long run and conclude that the continuous inflationary trends are caused by continuously lower real rate of interest. Kugler (1982), studies the link between the interest rate (short-term) and inflation for five countries (Switzerland, USA, UK, Germany, and France). Using an autoregressive model, the study deducts that variations in the real interest rate cause variability in inflation. Bullock *et al.* (1991) conducts a cross country study of industrialized nations to examine the relationship between real interest rate (short term) and inflation over the three decades of 1960's, 70's and 80's. They find the two variables as negatively related in the decades of 60's while positively related in 80's.

Berzezina (2002) tests the empirical relevance of the linkage between real rate gap and inflation for UK covering the period of 1980 to 2000 using a co-integration technique. The author reports interest rate gap as significant in terms of its deterministic power. Similarly, Neiss *et al.* (2003) performs a study for testing the validity of real interest rate gap as an important attribute of inflation using DSGE modeling. Their result falls true to their postulated hypothesis as real rate gap proves significant in its role as an indicator of inflation.

III. METHODOLOGY

DEVELOPMENT OF MODEL

We develop our model based on a simple economic proposition as:

$$(\pi_t - \pi^e) = \beta(y_t - y_t^*) \text{ where } \beta > 0 \tag{1}$$

Equation (1) states that any spread of output (y_t) around its potential level (y_t^*) causes inflation (π_t) to deviate from its expected level (π^e) . One can give a backward-looking dimension to the equation (1) in terms of expectation about inflation by assuming that the people hold adaptive expectation as:

$$\pi^e = \pi_{t-1} \tag{2}$$

By including this backward-looking expectation structure into equation (1), we can obtain an equation similar to a traditionally looking Phillip curve.

$$\pi_{t} = \alpha \pi_{t-1} + \beta (y_{t} - y_{t}^{*})$$
(3)

Equation (3) states that inflation depends upon its own lag, and the deviation of output from its potential level. Equation (3) has been designed to test the validity of Keynesian proposition, which states that inflation takes signal from variations in output gap.

One more economic relation can be brought into the picture for meaningful analysis that is

$$\pi_t = \alpha \pi_{t-1} + \gamma (r_t - r_t^*) \tag{4}$$

Where r_t and r_t^* are respectively representing the "real rate of interest" and "natural rate of interest" at a time "t".

The relationship expressed in (4) has been utilized by economists in studies before. Laubauch *et al.* (2003) utilizes this relationship in the

establishment of their structural model. Berzezina (2002) estimated the mentioned relationship using SVAR. Svensson (2003), Ness *et al.* (2001) also proposes real rate gap as a prominent indicator of inflation in their study.

By combining (3) and (4) we can write

$$\pi_t = \alpha \pi_{t-1} + \beta \tilde{y}_t + \gamma \hat{r}_t + \xi_\pi \tag{5}$$

where \tilde{y} denotes the output gap and \hat{r} represents formulated interest rate gap.

The Auto regressive distributed lag (ARDL) specification of equation (5) is expressed as followed:

$$d\pi_{t} = \alpha \pi_{t-1} + \beta \tilde{y}_{t-1} + \gamma \hat{r}_{t-1} + \phi_{t} d\hat{r}_{t} + \phi_{t} d\tilde{y}_{t} + \sum_{i=0}^{n} \delta_{t-i} d\hat{r}_{t-i} + \sum_{i=0}^{n} \delta_{t-i} d\tilde{y}_{t-i} + \sum_{i=0}^{n} d\pi_{t-i} + \xi_{\pi}$$
(6)

To find out relationship of inflation with relevant variables, different models have been employed in the past, including SVAR, VAR, and Cointegration. However, we proceed by utilizing the ARDL bound testing approach developed by Pesaran $(2001)^7$. ARDL is a widely accepted and used approach in the existing literature, its main advantage is its flexibility of dealing with a mix of stationary and integrated of order 1 I(1) variables. This advantage is complemented by the ability of this approach to tackle the endogenous nature of the regressors. Furthermore, there is no restriction imposed upon using the same numbers of lags for each regressor as was imposed by some former estimation techniques.

IV DATA AND STRUCTURE OF VARIABLES

For estimation purpose, data on all variables are taken from International Financial Statistics (IFS, 2018) except for real GDP which has been taken from Hanif, *et al.* (2013)⁸ Quarterly data has been used over the period of

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⁷ Researchers like Whyte (2011), Qurbanalieva (2013) and use Dabušinskas (2005) also use ARDL technique in their studies.

⁸ As the weights of GDP has remained constant in quarterly terms as per findings of Hanif *et al* (2013), the average weight per quarter over the selected time period has been used to project the quarterly GDP beyond 2013, in our selected sample.

1974 Q1 to 2017 Q4. We use "Call money rate" (CMR) as a proxy for the nominal interest rate. The ex-post real interest is calculated by adjusting the nominal call money rate with CPI.

To obtain the "Output gap" and "Real interest rate gap", we have used the "Unobserved Component Model" (UC) introduced by Clarke (1987). This model works by splitting the actual series into trend component and its cycle counterpart. The extracted trend component for current analysis is used as our proxy for "Potential output" and "Natural interest rate", while cycle is used as proxy for "Output gap" and "Real interest rate gap". The UC model is specified by a measurement equation and state equations. The measurement equation is given as follow:

$$x_t = x_t^{-} + \widetilde{x}_t \tag{A}$$

The state equations are

$$x_t^* = \alpha + x_{t-1}^* + \varepsilon_t$$

$$\widetilde{x}_t = \beta_1 \widetilde{x}_{t-1} + \beta_2 \widetilde{x}_{t-2} + \eta_t$$
(B)

The measurement equation specifies the split of actual series x_t (which symbolically reflects log of real GDP/real interest rate) into stochastic trend x_t^* and cycle \tilde{x}_t . The set of state equations reveals the dynamics of the two unknowns: Trend component is assumed to follow a random walk with drift while cycle assumes an AR (2) process in line with the propositions of Clarke. The error terms ε_t and η_t are framed as standard white noise and are assumed as mutually uncorrelated. The above system of equations is estimated by employing Kalman filter.

V. ESTIMATION RESULTS AND DISCUSSION

In the first step of estimation, we employed Unobserved Component model to measure the two gaps (output gap and real interest rate gap)⁹. The extracted series of these gaps are presented in Figures 1 and 2.

⁹ The results of likelihood estimate of UC model are reported in table A.1 and A.2 of Appendix A.



Figure 1 presents the first extracted series (real interest rate gap). The extracted series is observed to be highly volatile across the zero-level benchmark. The amplitude of movements mostly remains between -4% and 4%, except for few quarters. It is visible that the fluctuations are relatively more frequent as compared to what has been observed after 2000. A marginal drift in terms of peak and trough is found in years after 2000.







Figure 2 reports the patterns of extracted output gap series for the selected time-period in our study. The series appears to be less volatile as compared to real interest rate gap. If we investigate the movement of this series around the zero-level benchmark, there is a prominent drift in both directions i.e., positive output gap and negative output gap. This suggests that the deviations around 0 % output gap persist for considerable amount of time.

In the second step, we tested order of integration of all three variables used in our designated model. The results of unit root for the three-series involved in our estimation are presented in following Table 1:

TABLE 1

Variable	ADF (Level)	Prob.	Order of Integration
Inflation	-1.572	0.1087	I(1)
Real rate Gap	-4.276	0.0000	I(0)
Output Gap	-2.278	0.4432	I(1)

Results of Unit Root Test

The unit root testing suggests that both output gap and inflation are integrated of order 1 while real rate gap is stationary at level (integrated of order 0).

After identifying the order of integration, ARDL model specified in equation (6) has been estimated and results are provided in Table 2 and 3.

ARDL (4,4,3)

Variables	Coefficient	Std. Error	t-Statistic	Prob.		
С	0.341197	0.199358	1.711483	0.0890		
$\pi_{_{t-1}}$	-0.186585	0.087612	-2.129672	0.0347		
\hat{r}_{t-1}	-0.160379	0.054993	-2.916339	0.0041		
\widetilde{y}_{t-1}	0.120628	0.051813	2.328157	0.0212		
$d\pi_{_{t-1}}$	-0.410565	0.096307	-4.263075	0.0000		
$d\pi_{t-2}$	-0.369049	0.087294	-4.227664	0.0000		
$d\pi_{t-3}$	-0.351593	0.075534	-4.654740	0.0000		
dr̂	-0.472311	0.044538	-10.60469	0.0000		
$d\hat{r}_{t-1}$	-0.107299	0.065941	-1.627192	0.1057		
$d\hat{r}_{t-2}$	-0.097516	0.061143	-1.594880	0.1127		
$d\hat{r}_{t-3}$	-0.124557	0.055423	-2.247385	0.0260		
$d\tilde{y}$	-0.041681	0.124954	-0.333568	0.7391		
$d\widetilde{y}_{t-1}$	-0.014995	0.126754	-0.118302	0.9060		
$d\tilde{y}_{t-2}$	-0.353002	0.126054	-2.800404	0.0057		
R-square: 0.59		Likelihood: -245.5	5 DW Statistics: 1.90			
F-Stat: 17.73		Prob: 0.0000	SWC	SWC:3.27		

The lag structure of our ARDL model is specified using "Schwartz information criterion (SWC)". Using results given in Table 2, first we test for the presence of long run relationship between inflation, output gap and real rate gap using Bound test. Estimated results are summarized in Table 3.

				Pesaran et al.	(2001)
Test Statistic	Value	Probability	Significance level	Lower bound	Upper bound
F-statistic	5.019	0.000	5%	3.10	3.87

Bound Test of Co-integration

Results of the Bound test provides us with an evidence on long run relationship between inflation, real rate gap and output gap based on the value of F-Statistics in Table 3. As the computed F-statistics (5.019) is greater than the value specified by the upper bound (3.87), therefore, we contend that the three variables are co-integrated. The long run relationship among included variables is represented by the following equation:

$$-0.186\pi_t - 0.160\hat{r}_t + 0.120\tilde{y}_t = \xi_t \tag{7}$$

Equation (7) can be written by normalizing the coefficients:

$$\pi_t = -0.8595 \,\hat{r}_t + 0.6465 \,\tilde{y}_t - 5.361 \xi_t \tag{8}$$

The results are in line with the theoretically proposed link between the specified variables. Output gap is found positively related with inflation, while negative relationship is observed between real rate gap and inflation. The results suggest that a 1% increase in real interest rate gap results in a 0.86% decrease in inflation, while a 1% increase in output gap leads inflation to increase by $0.65\%^{10}$

Further, the differenced terms in Table 2 captures the short run impacts of independent variables upon inflation. Rather than discussing the individual short run coefficients we apply joint coefficient restriction test to examine whether real rate gap and output gap cause inflation in short run or not. Extractions of the Wald test are given in following Table 4.

¹⁰ We also estimated an "Error correction model" and found the "Error Correction" term significantly equal to -0.1865. The coefficient of this term suggests that if disequilibrium emerges, a correction of 18% is required in each short-run period to acquire long-run equilibrium.

Variable	Test Statistic	Value	df	Probability
Interest Rate Gan	F-statistic	1.518557	(4, 158)	0.1993
interest Kate Gap	Chi-square	6.073787	4	0.1937
Output Gan	F-statistic	3.219592	(3, 158)	0.0244
Output Gap	Chi-square	9.618778	4	0.0217

Bound Test of Co-integration Wald Test (Joint test upon the short-term coefficients)

The results indicate that we can reject the "null hypothesis" of no Granger Causality between output gap and inflation in short run but cannot reject this null hypothesis for association between real rate gap and inflation. Therefore, we can conclude that output gap Granger causes inflation in the short run but same is not true for short run causality between inflation and real interest rate gap. Our results are coherent with the economic theory and empirics which identify long and variable lags in transmission of monetary policy¹¹. As real interest rate gap has been used to capture the effect of monetary policy (stance) upon inflation in our model; its long run significance and short run insignificance is making it evident that the impact of monetary policy operationalizes on inflation with some lag of time in Pakistan. From cost perspective, real interest rate often serves as real cost of borrowing to finance many investment and production processes. As the proceeds of these processes often come in the market with a delay and lag of time, therefore, it is logical to visualize the impact of variations in real interest rate in medium or long run rather than short run. Theoretically, the demand-pull pressures are transmitted to inflation rather quickly, the significance of output gap indicator in short run in our model is in line with the theoretical proposition.

VI. CONCLUSION

This study aspires to unfold association between inflation and two critical indicators: one from real side (output gap) and other from monetary side (interest rate gap) of the economy. These two gaps are considered as the

¹¹ See for reference: Friedman (1961); Teker, et al. (2012)

key determinants of inflation in empirics and theory, and therefore are advocated to be analyzed in the literal world by the economists. As per our knowledge these two indicators have not been examined in terms of their explanatory power for inflation in Pakistan. Thus, this study contributes significantly in terms of filling up this research gap. Our intended idea is pursued firstly by approximating the two unknowns: "Potential output" and "Natural rate of interest" using unobserved component model and secondly employing the generated series of output gap and real rate gap as predictors of inflation in Pakistan. ARDL model has been applied to capture the long run and short run relationships. The results provide evidence for the presence of long run relationship between inflation, output gap and real rate gap. However, the short run relationship was well evident between inflation and output gap while there was no significant existence of this short run relationship in case of real interest rate gap.

Our study theme clearly provokes the need of having a profound knowledge about the concept and appropriate appraisal of the suggested indicators of inflation. Especially, the results regarding the efficacy of real rate gap in terms of inflation provides us a margin to quote a policy recommendation; Policy makers can use the concept of "Natural rate of interest" as a yard stick to guide and stabilize inflation. State bank of Pakistan can target inflation by targeting this gap which does indeed require frequent calculation of this natural rate as a benchmark for setting up the interest rate. The absolute increase or decrease in interest rate does not allow you to judge whether the adopted policy is pro-cyclical or countercyclical. The relative comparison or differential from the benchmark value (information on real rate gap) can be helpful to track counter-cyclicality and pro-cyclicality in proper manner.

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APPENDIX

TABLE A-1

Kalman Filter Estimates, Output Gap State space: Unobserved Component Model Method: Maximum likelihood (Marquardt)

	Final State	Root MSE	Z-Statistic	Prob.
Trend (Potential Output)	1458.714	0.823290	1771.811	0.0000
Cycle (Output gap)	3.672752	0.923850	3.975486	0.0001
Log likelihood	-283.1816	Akaike info criterion		3.229337
Parameters	1	Schwarz criterion		3.247351
Diffuse priors	3	Hannan-Quinn criter		3.236643

TABLE A-2

Kalman Filter Estimates, Interest Rate Gap State space: Unobserved Component Model Method: Maximum likelihood (Marquardt)

	Final State	Root MSE	Z-Statistic	Prob.
Trend (Natural Rate of Interest)	6.464180	0.584495	11.05492	0.0000
Cycle (Real interest rate gap)	-0.377065	1.953890	-0.192982	0.8470
Log likelihood	-434.4796	Akaike info criterion		4.937268
Parameters	0	Schwarz criterion		4.937728
Diffuse priors	3	Hannan-Quinn criter. 4.9		4.937628

ECONOMY, MEDIA AND VOTING BEHAVIOUR: COMMUNICATION CHANNELS' IMPACT ON DIFFERENT INCOME GROUPS IN PUNJAB, PAKISTAN

MUHAMMAD SHABBIR SARWAR, KHURAM SHAHZAD AND JAVAIRIA SHAFIQ*

Abstract. This study observes the relationship between economic status of voters, media and their voting behaviour. The objectives of this quantitative research are to explore the subject in two directions: a) to observe the association of income and voting behaviour, b) to investigate the impact of communication channels on voters belonging to different income groups. The research method employed was survey (n=1704) using the multi-stage cluster sample technique for data collection from 18 districts with the representation of all 10 divisions of Punjab province. Data was analysed through the factor analysis and logistic regression analysis. The study results revealed that voters with higher income were more inclined to vote with a percentile of 97.7 which declined to 68.1% in the case of low income voters. However, study observed that impact of interpersonal communication was more likely in case of dependent, unemployed and low income voters i.e. Rs 5000-15000 per month. Voters with income bracket of 16-20 thousand per month positively influenced by electronic media while those earning Rs 20-50 thousand per month were not influenced by any communication channel significantly.

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JEL Classification: D10, D7, D72

I. INTRODUCTION AND BACKGROUND

Voting behaviour and economic conditions of voters have a strong relationship and media also plays important information mediating role between elections and voters. Right to vote is a basic right and responsibility of voters in every democratic nation. Political studies experts have concluded that vote choices in elections are highly associated with income (Schlozman *et al.*, 1999).

High income people are more likely to vote rather than low income people. In general, correlation between rich people and higher voter turnout is well established and poor class is less inclined towards any political engagement. This political imbalance can be understood with the thorough analysis of income wise voting behaviour and vote turnover. This will give a vision that in a democratic setup, how political participation can be increased? Voter turnout are unequally shared among different socio economic sectors with lesser voting among low income class. We get an insight that a cash transfer program has a positive impact on low income people to cast voter in any democratic system. Economic parameters of voter are highly associated with the voting patterns of any country. Democracy is directly dependent on open electoral process and single voter contribution (Akee, 2019).

Monetary factors of the people play important role in every walk of life. However, in voting behaviour financial condition of voters counts a lot. Preferences of 'haves' and 'have nots' make the difference clear to cast vote or not (Azhar, 2011).

Media and democracy is essential for a country. A free and fair elections are not possible without the political debates, knowledge of how to vote, adequate information about parties, regulations and electoral process, which are well provided by the media on the screens of people. Media has substantial effect on the general public's thinking and discourses especially in some specific periods like electoral junctures (Electoral Knowledge Network, 2020). Media plays an important role in voting behaviour of 'haves' and 'have nots'. Nowadays media is becoming popular in various financial groups of voters. Citizens acquire information regarding political system and the ruling party initially from electronic media and print media. These media houses can manipulate the voting decision of individuals through not only the tilt/angle of a specific report but also by with the selection of specific stories to cover in election days (Gerber, Kerlan & Bergan, 2006).

Normally, financially high class is more likely to engage in political participation than the poor class. However, media's role in civic political participation with reference to economic conditions is the main topic of discussion of this paper/article.

In Pakistan, six national PTV channels, 89 private networks, 26 overseas TV stations, 138 commercial radio channels, 64 Pakistan Radio stations, 34 Pakistan Radio FM channels were operating in 2013 (Sarwar, 2018). Pakistani print media is comprised of over 500 daily newspapers and over 800 periodicals (PEMRA & APNS, 2016).

According to the Asian Development Bank, in 2017, around 210 million people were living in Pakistan out of which 12.4% were below poverty (as cited by Shafique, Ali & Usman, 2019). Pakistan having wealth distribution with the upper 10% of the population earning 27.6% and lower 10% are having 4.1% of the total income (Nations Encyclopaedia, 2017).

Socio-economic status of Pakistan depicts that around 15 million people are elite class, 25 million people are standing on middle class (upper), 65 million people belongs to middle class (lower), 65 million people are on the border line of desperately poor class (Dawn, 2010).

The relationship between economy, media and voting behaviour very important to study for the democratic strengthening of the country. The available literature does not sufficiently focus on the relationship of economy, media and vote patterns. This reflects existing gap in this important research area, especially in a country where democracy is struggling and voting behaviour matters a lot for strengthen this process. The objectives of this study are:

- To explore the relationship between low income people and high income people on the voting behaviour.
- To measure the difference of media impact on political participation of rich voter and poor voter.
- To investigate whether media influence the voter, with sound and poor economic condition, positively or negatively.
- To gauge the relationship of income and voting behavior of people.

RESEARCH QUESTIONS

RQ1: What was the impact of media and communication channels on voters belonging to different income groups of Punjab province in General Elections 2013?

RQ2: Do the economic conditions of voters affect the voting participation of people?

RQ3: Whether communication channels influenced the dependent and unemployed voters in GE 2013 differently?

II. METHOD

The quantitative survey research method is applied for this study through a questionnaire of purposive survey, comprised of 42 items to gather data from 18 districts of Punjab, Pakistan. According to the National Census (2017) the population of Punjab is over 110 million (110,012,442) including 55,958,974 males, 54,046,759 females. The total number of the registered voters was 4,99,27,112 (57 per cent of the Pakistan voters) in General Election 2013 which comprised 28,064,284 (56.21%) male and 21,862,830 (43.78%) female voters (ECP, 2013). For this study the multistage cluster sampling technique was applied to collect data from respondents (n= 1704), the registered voters belonging to 18 districts of the province. The sample comprised respondents from diverse income groups i.e. from dependents to the voters having more than Rs 50,000 monthly earnings. The data was collected from 18 districts comprising rural and urban clusters of registered voters besides ensuring almost

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participation of male 54 % and female 46 % voters in this study i.e. 54 and 46 percent respectively.



The data was compressed through the factor analysis and analysed by using the analysis technique of logistic regression.

III. DISCUSSION AND ANALYSIS

Since the registered voters of Punjab province belonging to various income groups were the focus of the study, the data was collected from the following income groups:

In Pakistan's Punjab province most of the students and housewives are usually considered as dependent registered voters. Sometimes there is only one member, the family head, who supports five to 10 other members of the family including his parents and children (Economic Survey of Pakistan, 2010). The sample comprised respondents from diverse income groups i.e. from dependents to the voters having more than Rs 50,000 monthly earnings.

Respondents Income (Pak Rupee)

	Frequency	Percent
Dependent	577	33.9
Unemployed	145	8.5
Up to 5000	94	5.5
6000-10000	160	9.4
11000-15000	192	11.3
16000-20000	155	9.1
21000-30000	140	8.2
31000-40000	79	4.6
41000-50000	46	2.7
50000 or above	67	3.9
Total	1655	97.1
Missing System	49	2.9
Total	1704	100.0

TABLE 2

Income and Voting - Cross-tabulation count % within income

Incomo	Voti	ng	Total	
meome	No	Yes		
Donondont	165	353	518	
Dependent	31.9%	68.1%	100.0%	
Unemployed	28	86	114	
Unemployed	24.6%	75.4%	100.0%	
UP TO 5000	21	59	80	
	26.3%	73.8%	100.0%	
<pre><000 10000</pre>	21	122	143	
0000-10000	14.7%	85.3%	100.0%	
11000-15000	22	152	174	
	12.6%	87.4%	100.0%	
16000 20000	28	117	145	
10000-20000	19.3%	80.7%	100.0%	
Incomo	Voti	Total		
-----------------	-------	-------	--------	--
meome	No	Yes		
21000 30000	14	107	121	
21000-30000	11.6%	88.4%	100.0%	
31000-40000	11	62	73	
	15.1%	84.9%	100.0%	
41000-50000	1	43	44	
	2.3%	97.7%	100.0%	
More than 50000	6	53	59	
	10.2%	89.8%	100.0%	
Total	317	1154	1471	
1 Otai	21.5%	78.5%	100.0%	

TABLE 3

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	69.898ª	9	.000
Likelihood Ratio	75.096	9	.000
Linear-by-Linear Association	56.598	1	.000
N of Valid Cases	1471		
cells (0.0%) have expected count less than 5.			

TABLE 4

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.218	.000
	Cramer's V	.218	.000
	Contingency Coefficient	.213	.000
N of Valid Cases		1471	

The Table 3 depicts the relationship voting and income is significant with $\chi^2(9) = 69.898$, p < .0005. Same is case with, the association

strength, V=218 reflecting that the association is significant. The findings revealed that the voters who earn Rs 41 to 50 thousands per month were the most likely voters showing 97.7% turn out in the election. However, the voters with over Rs 50 thousand monthly income showed 89.8% voting turn over. This also reflects that voting trend among middle class is more as compared to the elite class. Mostly there was an increase in voting among various income groups having more income i.e. dependents 68.1%, Rs upto 5000 income 73%, Rs 6000-10000 income 85% and Rs 11-15 thousands income 87%.

TABLE 5

Media and IPC Impact on voting of different income group voters

Income		В	S.E.	Wald	df	Sig.	Exp(B)	
Dependent		EM_Mean_	-1.031	.214	23.278	1	.000	.357
		IPC_Mean_	.549	.129	17.970	1	.000	1.731
	Step 1 ^a	OM_Mean_	.000	.121	.000	1	.997	1.000
		PM_Mean_	404	.140	8.304	1	.004	.667
		Constant	3.431	.772	19.733	1	.000	30.903
		EM_Mean_	.240	.384	.391	1	.532	1.271
		IPC_Mean_	.535	.264	4.113	1	.043	1.707
Unemployed	Step 1 ^a	OM_Mean_	.241	.248	.946	1	.331	1.273
		PM_Mean_	.290	.258	1.256	1	.262	1.336
		Constant	-2.580	1.384	3.476	1	.062	.076
		EM_Mean_	.157	.460	.117	1	.733	1.170
D . 5	Step 1 ^a	IPC_Mean_	.150	.324	.214	1	.644	1.161
KS 5 Thousand		OM_Mean_	.039	.313	.015	1	.902	1.040
Thousand		PM_Mean_	020	.388	.003	1	.958	.980
		Constant	523	1.847	.080	1	.777	.593
	Step 1 ^a	EM_Mean_	1.026	.526	3.804	1	.051	2.791
(10		IPC_Mean_	1.519	.404	14.116	1	.000	4.569
6-10 Thousand		OM_Mean_	493	.290	2.878	1	.090	.611
Thousand		PM_Mean_	052	.484	.012	1	.914	.949
		Constant	-3.594	2.284	2.476	1	.116	.027
11-15 Thousand	Step 1 ^a	EM_Mean_	.865	.486	3.169	1	.075	2.374
		IPC_Mean_	.456	.290	2.481	1	.115	1.578
		OM_Mean_	130	.263	.246	1	.620	.878
		PM_Mean_	956	.331	8.325	1	.004	.385
		Constant	.933	1.738	.288	1	.591	2.543

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Income		В	S.E.	Wald	df	Sig.	Exp(B)	
16-20 St Thousand 1	~	EM_Mean_	1.661	.555	8.961	1	.003	5.263
		IPC_Mean_	2.363	.411	33.109	1	.000	10.625
	Step	OM_Mean_	137	.251	.299	1	.584	.872
	Ia	PM_Mean_	-1.061	.353	9.026	1	.003	.346
		Constant	-6.805	1.859	13.399	1	.000	.001
		EM_Mean_	-1.239	.481	6.643	1	.010	.290
21.20	<u>.</u>	IPC_Mean_	.336	.362	.858	1	.354	1.399
21-30 Thousand	Step	OM_Mean_	.204	.261	.615	1	.433	1.227
Thousand	14	PM_Mean_	.480	.360	1.777	1	.182	1.616
		Constant	2.630	1.702	2.388	1	.122	13.871
		EM_Mean_	-2.445	1.106	4.884	1	.027	.087
21.40	C.	IPC_Mean_	.106	.592	.032	1	.858	1.111
31-40 Thousand	Step 1a	OM_Mean_	.136	.437	.098	1	.755	1.146
Thousand		PM_Mean_	.009	.638	.000	1	.988	1.010
		Constant	7.819	3.504	4.981	1	.026	2488.437
		EM_Mean_	545	.832	.430	1	.512	.580
11 50	G .	IPC_Mean_	.179	.595	.091	1	.763	1.197
41-50 Thousand	Step 1a	OM_Mean_	.014	.561	.001	1	.980	1.014
Thousand		PM_Mean_	-1.150	.750	2.352	1	.125	.317
		Constant	5.885	3.264	3.250	1	.071	359.477
	Step 1a	EM_Mean_	174	.711	.060	1	.807	.840
More than 50 Thousand		IPC_Mean_	.673	.996	.456	1	.500	1.959
		OM_Mean_	155	.652	.056	1	.813	.857
		PM_Mean_	031	.532	.003	1	.953	.969
		Constant	1.319	2.726	.234	1	.628	3.740
a. Variable(s) entered on step 1: EM (electronic media)_Mean_, IPC (interpersonal								
communication)_Mean_, OM (outdoor media)_Mean_, PM (print media)_Mean								

This table reveals IPC put a positive significant impact on economically dependent voters as B=.549, p<.0005 reflecting an odd ratio of 1.731. Also, IPC significantly positively impacted the voters who were jobless as B=.535, p<.05 with an odd ratio 1.79. Voters with Rs 6000-10000 also had positive significant impact of interpersonal communication on their vote decision as B=1.52, p<.0005 with an odd ratio of 4.57.

On the other hand, the electronic media (EM) and the print media (PM) had significant but negative impact as B=-1.03, p<.0005 with an odd ratio .357 and (B=-.404, p< .005) and odd ratio .667 respectively.

However, the print media had negative significant impact on the voters whose monthly earnings range was between Rs 11-15 thousand as B=.96, p<.005 showing an odd ratio of 0.385.

Further, the EM (electronic media) positively influenced the voters of income range of Rs 16-20 thousand as B=1.661, p<.005 with an odd ratio of 5.26 and while IPC also positively influenced this income group. However, print media had significant but negative influence on this income group (Rs 16-20 thousands) as B= -1.06, p<.005 with an odd ratio of 0.346.

The electronic media negatively significantly impacted the voters belonging to the income group of Rs 21-30 thousand as B=-1.24, p<.05 with an odd ratio of .290. Likewise, the EM significantly negatively impacted the voters belonging to the income range of Rs 31-4000 in in GE 2013 as B=-2.445, p<.05 and showing an odd ratio of .087.

Interestingly, no media or communication channel could significantly influence voters of the three income groups including Rs 5,000 and Rs 41000-50,000 and more than Rs 50,000 in GE 2013.

IV. CONCLUSION

The relationship between voter turnout and income of people was seen significantly positive. People from income group Rs 41,000 to 50,000 were the most likely voters (97.7%) while the registered voters with over 50,000 income showed 89.8% participation in General Election 2013 in Punjab. However, dependent and unemployed people voted less (68.1%).

The second part of the article focused on the impact of communication channels on voters belonging to different economic status or income groups. The study revealed that dependent and unemployed voters were positively influenced by IPC.

Voters of the income bracket ranging 6000-10000 rupees were positively influenced by the interpersonal communication channels. The

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electronic media positively impacted the voters of income group Rs 16000-20000 while print media's overall impact was negative on the voters of this economic status. The voters who earn Rs 21000-30000 and Rs 31000-40000 per month has significant but negative impact of electronic media.

Interestingly, no media or communication channel could significantly influence voters of the three income groups including Rs 5,000 and Rs 41000-50,000 and more than Rs 50,000 in GE 2013.

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This data collection and its analysis is solely based on the efforts from the authors who did not receive any funding from any institution. The research instrument (questionnaire) was formerly approved by the departmental doctoral programme committee and pre testing was done on data collected from National Assembly constituency NA-128. It was make sure that the identity of the respondents remained anonymous to avoid any potential harm.

Authors Credit Statement

Muhammad Shabbir Sarwar conceptualized the idea and conducted this study as part of his PhD dissertation. He operationalized the key terms and devised methodology. Mr. Khurram Shahzad helped in data collection, while and Ms Javairia Shafiq worked on literature review of this paper.

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