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Willingness to Pay by the Farmers for Safer Use of Pesticides

Tasnim Khan[1], Rana Ejaz Ali Khan[2] and Sassee Bibi[3]

Abstract

This study attempted to investigate the determinants of indirect health cost of pesticide use by farmers. For the purpose willingness to pay for safer pesticides is taken as indirect health cost of pesticide use. The ordered probit model has been employed on primary data collected from Tehsil Bahawalpur in Pakistan. The results revealed that health impairment index, farmer's literacy status, number of dosage of pesticides, farmer's age, use of safety measures, farmer's perception about symptom and working hours have positive impact while number of doses of insecticides, farm size and use of pesticide according to recommended dose have a negative impact on willingness to pay for safer pesticides. Highest ratio of the farmers (38 percent) is willing to pay over and above 20% premium for safer use of pesticides to avoid health cost of pesticides. It means that farmers are bearing a high health cost by use of pesticides.

Keywords: Health cost; Farmers' health; Willingness to pay; Pesticide use; Cotton growers; Insecticides use

GEL Classification: N5

1. Introduction

Synthetic pesticides have played a significant role in restricting massive damage to crops. The safety of crops would not have been possible

[1]The Islamia University of Bahawalpur, Bahawalpur, Pakistan, email: tasneem_iub@hotmail.com

[2]The Islamia University of Bahawalpur, Bahawalpur, Pakistan, email: ranaejazalikhan@yahoo.com

[3]The Islamia University of Bahawalpur, Bahawalpur, Pakistan, email: sasseebibi5@gmail.com

without pesticides (Damalas & Eleftherohorinos, 2011). On the other hand, environmental damages and health impairments are also caused by the massive use of pesticides (Maroni et al., 2006). In the last forty years, there is enormous increase in the use of pesticides in Pakistan. Furthermore, the farmers particularly the cotton-growers use pesticides indiscriminately (Khan, 2003). It is also documented that the use of pesticides in Pakistan has caused many fold increment in pest population by the development of pest's resistance against pesticides. This massive and indiscriminate use of pesticides results in enormous health cost to the farmers.

The economic valuation of health costs by use of pesticides is complex due to the market and non-market health-cost. Market components of health cost include illness cost, loss in yield productivity and loss of working days, etc. and non-market components include cost of illness, etc. It is not easy in a model to combine both market and non-market components of pesticide related health cost, therefore, majority of the studies focused on market components of pesticide related health cost. Ajayi (2000) analyzed the cost of treatment and cost of working days lost for Cote d Ivoire. Rola et al., (1993) used simply the production losses for Philippines. For Nicaragua Garming et al. (2006) assessed the cost of chronic sickness. Although some studies have attempted to estimate the health cost by including market and non-market components (Khan & Damalas, 2015). However, a comprehensive analysis is needed by combined market and non-market health cost of pesticides use and ultimately agricultural policy formation. For the assessment of non-market cost contingent valuation approach is prevalent in the literature (Khan & Damalas, 2015). In this approach, respondents are offered a hypothetical market, in which they are invited to show their willingness to pay for existing or potential environmental conditions not reflected in any real market. The monetary values obtained in this way are thought to be contingent upon the nature of the constructed market, and the commodity described in the survey scenario. The answers offered a direct way to trace the demand curve for an environmental good that could not otherwise be seen from the market data (Garming, 2006).

Individuals' preferences provide the appropriate foundations to make decisions about changes in well-being or loss of health effects. Using individual preferences, willingness to pay is a suitable measure for estimating the pesticide health effects. According to Carson (2000), the cost benefits analysis or to find out farmers' willingness to pay economically for a proposed change in a commodity, contingent valuation approach is most appropriate

technique. To keep the individual constant at its initial level of utility the changes in utility are measured in monetary terms. The similar law is used in case of non-market commodities and services "that is the highest quantity of income that a consumer/individual is willing to forgo to gain or loss the access to the relevant commodity or service" (Lipton, 1995).

The analysis of current study is based on contingent valuation approach to measure the health cost of pesticide use by farmers. By estimating the willingness to pay the policy may be framed to eliminate the health effect of pesticides through financing from the farmers. The core objective of the study is to assess the determinants of farmers' willingness to pay to remain safe from the use of pesticides.

The rest of the article is structured as follows. Section 2 presents methodology and empirical model. Section 3 presents empirical results. Section 4 concludes the study.

2. Methodology

In health economics one of the most commonly used approach for the assessment of non-market commodities and services are contingent valuation approach. Individuals' health is primarily private commodity that is estimated by household theory. To measure the change in the supply of non-market commodity in contingent valuation approach the individual's constant utility is taken a base by applying the compensated demand function of Hicks. For the assessment of pesticide associated health outcomes suitable measure is compensating variation which show the utility level without change. The utility of a farmer (U_0) can be expressed as the sum of health (H_0) and sum of income (I_0).

$$Uo=Io+Ho \qquad (1)$$

Where U_0 = initial utility level of farmer, I_0 = initial income of the farmer and H_0 = initial health status of the farmer. Suppose health supply increase to H_1 by taking income constant at I_0 i.e. by using a new or developed pest control technique (I_0=I_1). Farmer goes up to the higher level of utility U_1.

$$U1=Io=I1=H1 \qquad (2)$$

Improvement in health is represented by given up amount of income by the farmer that he is willing to pay to remain at its initial utility level with improved health status.

$$Uo=Io-F(WTP)+H1 \qquad (3)$$

The willingness to pay is a function of attributes, characteristics of the consumer (farmer) and other factors consider affecting the choice. In this study we analyze the factors affecting farmer's willingness to pay for safer pesticides. They are household socioeconomic characteristics, health related variables, pesticides and risk related variables, farm characteristics and farmer's perception.

The functional form of the model is as follows:

WTP = f (HIINDEX, INCOME, LIT, EDU, AGE, FSIZE, DOSEP, DOSEI, PERCEPT, DOSER, SAFETY, WHOUR)……(4)

Table 1: Operational definitions of variables for willingness to pay model

Variables	Definitions
Dependent Variable	
Willingness to pay (WTP)	Willingness to pay is a categorical variable, 1= not willing to pay, 2=willing to pay up to 5%, 3=willing to pay 6 to 10%, 4=willing to pay 11 to 20%, 5=willing to pay more than20% premium for safer pesticides.
Independent variables	
Health impairment index (HIINDEX)	Health impairment index ranged zero to fourteen is a continuous variable.[4]
Farmer'sincome (INCOME)	Farmer's income is a continuous variable, taken as a farmer's six months income earned in rupees.
Farmer's literacy status (LIT)	Literacy status is a dummy variable, 1=literate, 0=illiterate.
Farmer's education (EDU)	The number of completed years of education as a continuous variable[4].

Farmer's age (AGE)	Age is a continuous variable, taken as number of completed years.
Farm size (FSIZE)	Farm size is a continuous variable, taken as number of acres of land.
Number of doses of pesticides used (DOSEP)	Number of doses of pesticides used per acre as a continuous variable (It includes herbicides, fungicides and others excluding insecticides)
Number of doses of insecticides used (DOSEI)	Number of doses of insecticides used per acre as a continuous variable
Farmer's perception about symptom (PERCEPT)	Farmer's perception about the symptom as ordered variable: 0=not sure, 1=sure, 2=very sure, 3=completely sure.
Use of pesticides according to the recommended dose (DOSER)	Use of pesticide according to recommended dose is a dummy variable: 1=yes, 0=no
Use of safety measures during pesticides use (SAFETY)	Use of safety measure is a dummy variable: 1=yes, 0=no
Working hours spentby a farmer on pesticide use (WHOUR)	Number of daily hours a person works on a farm and remained exposed to pesticides ascontinuous variable.

2.1 Empirical Model

Willingness to pay (WTP) is a multiple response variable that has inherent order or rank so the ordered probit model is appropriate which can be expressed as:

where WTP* is the latent or unobserved willingness to pay, X is a vector of variables considered to effect willingness to pay, β is a vector of parameters showing the association between willingness to pay and variables in X and is an independently and identically distributed error term with

[4]We have calculated health impairment index through additive method by taking fourteen symptoms of diseases (eye irritation, fever, headache, convulsion, dizziness, shortness of breath, vomiting, skin irritation, nervous diseases, blood pressure, tiredness, urinary diseases, digestive diseases, and other diseases) caused by the use of pesticides. All these health impairments are taken as 1=yes, 0=no. The high value of index shows high health impairment and the low value shows low health impairment

mean zero and variance one. The probability of WTP being in one of J finite categories can be shown as:

where Φ (.) is a cumulative density function (CDF), which estimates the probability of WTP. The ordered probit model allows for calculation of predicted probabilities for each WTP category and marginal effects. When calculated at the means of the data, predicted probabilities indicate the chance of the average farmer being willing to pay a premium falling in each of the categorical premium levels. For the analysis of WTP we have used the following function:

$$WTP^* = \beta_0 + \beta_1 HIINDEX + \beta_2 INCOME + \beta_4 EDU + \beta_5 AGE + \beta_6 FIZE + \beta_7 DOSEP + \beta_8 DOSEI + \beta_9 PERCEPT + \beta_{10} DOSER + \beta_{11} SAFETY + \beta_{12} WHOUR + \varepsilon \quad (6)$$

In the equation (6) WTP* is the latent or unobserved willingness to pay. WTP is the estimated score of ordered probit model and is linear function of all independent variables.

2.2 Sampling and data collection

Data have been collected through a well-designed and comprehensive questionnaire in 2014, by face to face interviews from farmers in Tehsil Bahawalpur. The cotton belt of Pakistan that is the area which produces major part of the cotton production in the country passes through Tehsil Bahawalpur. So the area may be a good case study. Similarly major part of the pesticides used in agriculture absorbs cotton production. It signifies the geographic area of research for the topic. The non-probability sampling technique is used and a sample size of 203 observations was collected from farmers who were directly exposed to pesticides. Only those farmers were included in the sample who were owners of the farm and also work on farm. The survey was conducted during the period when pesticides were applied on cotton.

3. Result and Discussion

The percentage of willingness to pay in different categories has been shown in table 2.

Table 2: Distribution of Willingness to Pay Responses (%)

Willingness to pay for safer pesticide category	%
Not willing to pay	25.12
Willing to pay 1-5% premium	15.76
Willing to pay 6-10% premium	7.88
Willing to pay 11-20% premium	12.81
Willing to pay over and above 20% premium	38.42
Total	100

The results show that highest percentage of the farmers (38.42 percent) is willing to pay more than 20% premium. It indicates that farmers perceive a high cost of health due to pesticide use. The results of ordered probit model are given in Table 3 and the marginal effects and predicted probabilities for willingness to pay in different categories are shown in table 4. The upper panel of table 4 shows the predicted probabilities and the lower panel shows the marginal effects. The predicted probabilities show the average likelihood of farmer's willingness to pay for safer pesticide use.

Table 3: Estimated Coefficients of Ordered Probit Model for Willingness to Pay

Variables	Estimated coefficients	P>|z|
HIINDEX	.135624	0.014**
INCOME	7.09e-08	0.834
LIT	.9591117	0.000*
EDU	-.0617347	0.157
AGE	.0202769	0.008*
FSIZE	-.0499286	0.055**
DOSEP	.4008564	0.000*
DOSEI	-.3937413	0.000*
PERCEPT	.5350727	0.000*
DOSER	-1.530242	0.090***

SAFETY	.4082784	0.030**
WHOUR	.0529096	0.083***
Number of obs =203 Pseudo R^2= 0.3179	LR $chi^2(12)$ = 189.62 Log likelihood = -203.44794	Prob> chi^2 = 0.0000*

*, ** and *** indicates 1, 5 and 10 percent level of significance, respectively.

Table 4: Predicted Probabilities and Marginal Effects for Willingness to Pay

Predicted probabilities					
	WTP (No willingness)	WTP (up to 5%)	WTP (6-10%)	WTP (11-20%)	WTP (more than 20 %)
Constant	.083537	.2255663	.17786743	.24203355	.27099571
Marginal Effects					
HIINDEX	-.0208311 (0.021)**	-.0269557 (0.021)**	-.0062905 (0.118)	.0091513 (0.071)***	.044926 (0.015)**
INCOME	-1.09e-08 (0.834)	-1.41e-08 (0.834)	-3.29e-094 (0.836)	.78e-09 (0.834)	2.35e-08 (0.834)
LIT	-.1516822 (0.000)*	-.1763947 (0.000)*	-.0401707 (0.000)*	.0576469 (0.018)**	.3106007 (0.000)*
EDU	.0090919 (0.168)	.0124791 (0.167)	.0030397 (0.241)	-.0042543 (0.214)	-.0203564 (0.159)
AGE	-.0031144 (0.014)**	-.0040301 (0.015)**	-.0009405 (0.108)***	.0013682 (0.055)**	.0067168 (0.010)**
FSIZE	.0076687 (0.066)**	.0099235 (0.065)***	.0023158 (0.171)	-.0033689 (0.117)	-.016539 (0.058)**

DOSEP	-.0615693	-.0796716	-.0185924	.0270479	.1327854
	(0.001)*	(0.002)*	(0.075)***	(0.030)**	(0.000)*
DOSEI	.0604764	.0782574	.0182624	-.0265678	-.1304285
	(0.001)*	(0.002)*	(0.079)***	(0.034)**	(0.000)*
PERCEPT	-.0821841	-.1063475	-.0248176	.0361042	.1772451
	(0.000)*	(0.000)*	(0.046)**	(0.025)**	(0.000)*
DOSER	.0839921	.2084152	.1397446	.1191864	-.5513383
	(0.000)*	(0.000)*	(0.044)**	(0.363)	(0.021)**
SAFETY	-.0645787	-.0797163	-.0174409	.0284768	.1332592
	(0.042)**	(0.038)**	(0.125)	(0.104)***	(0.026)**
WHOUR	-.0081266	-.010516	-.002454	.0035701	.0175265
	(0.098)***	(0.097)***	(0.172)	(0.152)	(0.085)***

*, ** and *** indicates 1, 5 and 10 percent level of significance, respectively.

Health Impairment index

Theoretically it is assumed that health effects of pesticide use results into increased willingness to pay for avoiding these effects. The ordered probit results have shown positive impact of health impairment index on willingness to pay. The results of the marginal effects show that health impairments negatively influence first three categories of willingness to pay (1= not willing to pay, 2= willing to pay 1-5 percent, 3= willing to pay 6-10 percent premium) and positively influence the fourth and fifth category (4= willing to pay 11-20 percent, 5= willing to pay more than 20 percent). An incremental increase in health impairment leads to pay higher premium for safer use of pesticide. The results are analogous to theoretical expectations and are supported by a number of studies (Ajayi, 2000 for Cote d'Ivoire; Khan, 2009 for Pakistan; Garming and Waibel, 2009 for Nicaragua).

Education of the farmers

Education of the farmer was captured in the analysis by two variables, i.e. literacy status of the farmer as binary variable and the years of education of the farmer as continuous variable. The results of regression analysis have shown that literacy status of the farmer has positive impact on the likelihood of willingness to pay. According to marginal effects education has negative

marginal effect for first three categories of willingness to pay and positive effects for fourth and fifth category of willingness to pay. It explained that literate farmers have more knowledge and information about pesticides risk and symptom. They are more conscious about their health as compared to illiterate farmers and are more likely to pay higher premium for safer pesticide use. The results are supported by Khan (2009, for Pakistan) and Muhammad et al.(2015, for UAE). The years of schooling has no significant impact on willingness to pay in regression analysis as well as marginal effects. The explanation may be that there is lesser variation in years of education of the farmers as majority of the farmers in the economy are comparatively having lesser years of completed education.

Farmer's age

Farmer's age has shown positive impact on willingness to pay in the regression. According to marginal effects age has negative marginal effect for first three categories of willingness to pay and positive marginal effect for fourth and fifth category of willingness to pay. Farmer's age was taken as proxy for farmer's experience and awareness. Experienced farmers have long history of pesticide use and exposure to hazards of pesticide use. They are more willing to pay for safer pesticide use(Khan, 2009 for Pakistan; Garming and Waibel, 2009 for Nicragua; Ajayi, 2000 Cote d'Ivoire; Cranfield and Magnusson, 2003 For Canada; Muhammad et al., 2015 for UAE).

Farm Size

Contrary to theoretical expectations the regression analysis has shown that farm size has negative impact on willingness to pay. According to marginal effects the farm size has positive effect for first three categories of willingness to pay and negative effects for last two categories of willingness to pay. Such type of relationship may be explained as large land holders use appropriate quantity of pesticides with adequate safety measures (Khan, 2003). They experience less negative effects of pesticide use that is why they are less likely to have willingness to pay the premium. The results are supported by Garming and Waibel (2009) for Nicaragua however Khan (2009), for Pakistan has concluded that large family size holders are more likely to pay the premium.

Number of doses of pesticide

The variable of number of pesticides used includes herbicides and fungicides, etc. According to the theoretical expectations number of doses of pesticides usedshould increases the willingness to pay. The regression results have shown positive impact of number of doses of pesticides used on willingness to pay. According to marginal effects number of doses of pesticides used has negative effect for first three categories and positive effects for last two categories of willingness to pay. As the number of doses of pesticides used increases the pesticides exposure and risk increases which leads to more likely for the farmers for willing to pay higher premium for safer pesticides use. The results are supported by Ajayi (2000, for Cote d'Ivoire) and Rola and Pingali(1993, for Philippine).

Number of doses of insecticide

The use of insecticides has been separated from pesticides on the basis that insecticides are particularly used for cotton crop. Contrary to theoretical expectations number of doses of insecticide has negative impact on willingness to pay. According to marginal effects number of doses of insecticide has positive marginal effects for first three categories of willingness to pay and negative marginal effects for fourth and fifth category of willingness to pay. This relationship may be explained by the phenomenon that farmers are spending huge expenditures to purchase insecticides to secure their crops from pests and there is no alternative or safer pesticides use available to protect their crops. They are not willing to further increase the cost by paying for safer pesticides use. The results are supported by Ajayi (2000, for Cote d'Ivoire) and Rola and Pingali(1993, for Philippine).

Farmer's perception about symptom

The ordered probit model has shown that farmer's perception about symptoms positively impacts the willingness to pay. According to marginal effects farmer's perception about symptom occurrence has negative effect for first three categories and positive marginal effects for fourth and fifth category of willingness to pay. The results are according to the expectations as farmers have perception about negative health effects of pesticide use, they are more likely to pay higher premium for safer pesticides use (see alsoAjayi,

2000 Cote d'Ivoire; Khan, 2009 for Pakistan; Garming and Waibel, 2009 for Nicaragua).

Use of pesticide according to recommended dose

Under the theoretical expectations use of pesticide according to recommended dose should have negative impact on willingness to pay. Ordered probit results have shown negative effect of use of pesticides according to recommended dose on willingness to pay. According to the marginal effects use of pesticide according to recommended dose has positive marginal effects for first four categories of willingness to pay and negative effect for fifth category. The use of pesticides according to recommended dose represents the awareness of the farmer regarding pesticide practices. It may be assumed that they are also familiar with the negative health effects of pesticides. Therefore, they are likely to pay higher premium for safe use of pesticides.

Use of safety measures

The ordered probit regression has shown positive impact of use of safety measures on willingness to pay. According to the marginal effects utilization of safety measures during pesticides use has negative marginal effects for first two categories of willingness to pay and positive marginal effects for last two categories of willing to pay. The explanation may be that these farmers are much conscious about the negative impacts of pesticides on health and are willing to pay higher cost for safer pesticides use.

Working hours

The results have shown that daily working hours of farmers on the farm have positive impact on willingness to pay. According to the marginal effects working hours spent by the farmers on use of pesticides has negative marginal effects for first two categories of willingness to pay and positive marginal effects for last categories of willingness to pay. As farmer spends more time on farm and remains exposed to pesticides and ultimately is willing to pay higher premium for safer pesticides use (Ajayi, 2000 for Cote d'Ivoire).

4. Conclusion and Policy Recommendations

This study evaluated the indirect heath costs of pesticides use in the form of farmer's willingness to pay for safer pesticides. The results express that

majority of the farmers are willing to pay higher premium for safer use of pesticides to avoid health cost caused by pesticide use. It explains that farmers are bearing high health cost by use of pesticides. The results expressed that health impairment index, the age of the farmer, farmer's education, number of doses of pesticide used, farmer perception about symptoms, the use of pesticide according to recommended dose and working hours enhance the farmer's willingness to pay for safer pesticides. All these results express that farmers are bearing an indirect health cost of pesticides use. It may be diminished by use of appropriate measures. It is proposed that scientists should focus on research for alternative pest control methods which are less harmful to the human health. Seminars and workshops should be conducted to provide the sufficient information to farmers to increase their knowledge about how the negative effects of pesticides can be avoided by adopting safety measures

REFERENCES

Ajayi, O. O. (2000). *Pesticide Use Practices, Productivity and Farmers' Health* (No. 3). Special Issue Publication Series.

Carson, R. T. (2000). Contingent valuation: a user's guide. *Environmental Science & Technology*, 34 (8), 1413–1418

Cranfield, J. A., & Magnusson, E. (2003). Canadian consumers' willingness to pay for pesticide-free food products: An ordered probit analysis. *International Food and Agribusiness Management Review*, *6*(4), 13-30.

Damalas, C. A., & Eleftherohorinos, I. G. (2011). Pesticide exposure, safety issues, and risk assessment indicators. *International journal of environmental research and public health*, *8*(5), 1402-1419.

Garming, H., & Waibel, H. (2006). Willingness to pay to avoid health risks from pesticides: a case study from Nicaragua. In *German Association of Agricultural Economists 46th annual conference. Giessen, Germany: German Association of Agricultural Economists.* (239-248).

Gaming, H. and H. Waibel. 2009. Pesticides and farmer health in Nicaragua: a willingness-to-pay approach of evaluation. *The European Journal of Health Economics*, 10(2), 125-133.

Khan, M. 2009. Economic evaluation of health cost of pesticide use: willingness to pay method. *The Pakistan Development Review,* 48(4), 459-470.

Khan, M., & Damalas, C. A. (2015). Farmers' willingness to pay for less health risks by pesticide use: A case study from the cotton belt of Punjab, Pakistan. *Science of the Total Environment*, *530*, 297-303.

Plan, S. (2010). Pulse Health Initiative.

Lipton D.W., K. Wellman,I. C. Sheifer andR. F. Weiher.1995. Economic valuation of natural resources: a handbook for coastal resource policymakers. NOAA Coastal Ocean Program Decision Analysis Series No. 5.US Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), Silver Spring, MD.USA.

Maroni, M., Fanetti, A. C., & Metruccio, F. (2006). Risk assessment and management of occupational exposure to pesticides in agriculture. *La Medicina del lavoro*, *97*(2), 430-437.

Muhammad, S., Fathelrahman, E., & Ullah, R. U. (2015). Factors affecting consumers' willingness to pay for certified organic food products in United Arab Emirates. *Journal of Food Distribution Research*, *46*(1), 37-45.

Rola, A. C. and P. L.Pingali. 1993. Pesticides, rice productivity, and farmers'health: An economic assessment. International Rice Research Institute,Manila and World Resource Institute, Washington.

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Impact of Foreign Direct Investment and Foreign Remittances on Unemployment in Pakistan: A Time Series Analysis

Maria Mazher[1], Tahir Mukhtar[2] and Sidra Sohail[3]

Abstract

The present study aims at measuring the impact of FDI and foreign remittances on unemployment in Pakistan. The analysis is carried out by using annual time series data over the period 1972 to 2014. The study has employed the ARDL model. The results reveal that in the long run both FDI and foreign remittances play an important role in reducing the unemployment in Pakistan. However, in the short run their impact is statistically insignificant. The results suggest that appropriate measures ought to be taken by the government to increase the flow of foreign capital in the form of FDI and remittances to reduce unemployment rate in Pakistan.

JEL Classification: C22; F41; O53

Keywords: Foreign Direct Investment; Foreign Remittances; Unemployment; ARDL

I. Introduction

In a modern world, globalization has led the basis of mutual interdependence among various countries of the world and none of the country is self-sufficient in producing all goods and services. Therefore, countries are interlinked with one another through free trade for achieving their requirements (Vijayasri, 2013). In this way, globalization and the availability of foreign capital have created many advantages and opportunities for development of the developing countries. In this regard, the primary and considerable advantage to developing

[1]M.Phil. Scholar, Department of Economics, FJWU., Rawalpindi, email: mariamazhar28@yahoo.com

[2]Associate Professor, Department of Economics, Fatima Jinnah Women University, Rawalpindi,
email: tahir.mukhtar@fjwu.edu.pk

[3]PhD Scholar, PIDE, Islamabad, email:sidrasohail_14@PIDE.edu.pk

countries is the inflow of capital in the form of foreign direct investment (FDI) which helps in modernizing different sectors in these developing countries through better management and improvement in technology leading to raise the employment level (Whyman & Baimbridge, 2006). Furthermore, through the transfer of modern and sophisticated technology from developed to developing countries, FDI tends to enhance the productivity of factors of production, products quality and increases the exports of the host country and finally it stimulates the economic growth (Bacic, *et al*., 2004).

On the other hand, foreign remittances are also considered an important mechanism for relocating the international assets and resources from developed to developing countries (Russell, 1992). In theory, the impact of remittances is controversial. However, they have very strong positive impacts on economic development of a nation (Connell & Conway, 2000). On the whole, the inflow of foreign remittances increases the economic development and reduces the poverty by increasing the national income of the recipient country, lessening the credit constraints, increasing the investment and employment opportunities and augmenting the human capital by developing the education and health facilities (Stark & Lucas, 1988; Taylor, 1992). In general, for developing nations their significance cannot be denied in light of the fact that they have turned into the second biggest wellspring of foreign financing after FDI in these economies (Ratha, 2003).

Like all other developing nations, attracting the FDI inflows has always remained at the top priority of Pakistan. However, Pakistan failed to magnetizer considerable volume of FDI inflows due to incompatible policies, disappointing judiciary system, lack of political steadiness and macroeconomic discrepancy (Khan, 1997). Increasing international economic prerequisites has encouraged the importance of FDI as a development motivating element of foreign capital flows. Despite its hard efforts Pakistan could not become a safe haven for foreign investors. Consequently, we see a fluctuating trend of FDI inflows to Pakistan over the sample period of the study (see figure 1 in appendix).

On the other hand, the inflow of remittances has been registering a steady increase for the last three decades, nonetheless, remittance income as percent of GDP has depicted a fluctuating behavior for the last four decades (see Figure 2 in the appendix). Currently, Pakistan is facing several problems and unemployment is one of them. Many Pakistani graduates are talented,

intelligent, and skilled, yet do not get an opportunity to work. During the 1970s and 1980s the unemployment issue was not so much serious but since the 1990s this problem has become alarming despite adopting liberal and open policies (see Figure 3 in the appendix).

The aim of this study is to empirically investigate the effect of FDI and foreign remittances on unemployment in Pakistan by utilizing the autoregressive distributed lag (ARDL) model. In addition, the study examin the relative significance of FDI and foreign remittances in influencing the unemployment in the country. The significance of the present study is evident from two facts. Firstly, the study is pioneer in examining the role of foreign remittances in determining unemployment in Pakistan. This is worth mentioning that previous studies only focus either on exploring relationship between economic growth and foreign remittances or the poverty and remittances nexus in Pakistan. No attempt has been made in the past to gauge the impact of foreign remittances on unemployment in Pakistan. Secondly, the study also incorporates the exports in the analysis which has not been used in the existing literature on Pakistan with regard to the determinants of unemployment.

The rest of the study is structured as follows. Section 2 throws light on the existing relevant literature. The details of the methodology used is given in section 3. The empirical results are given in section 4. Section 5 concludes the study.

2. Review of Literature

The dramatic expansion of high level of unemployment is a big annoyance for developing countries. There is a huge stock of literature on analyzing FDI and employment association but there is a dearth of literature examining the impact of foreign remittances on unemployment. Leon-Ledesma and Piracha (2001) by taking the annual time series data for eleven Central and East European countries have scrutinized the effect of remittances on employment over the period 1990 to 1999.Thestudy finds the strong evidence of positive relationship between remittances and employment. On the other hand, Shaari, et al. (2012) aim at estimating the impact of FDI on unemployment and economic growth in Malaysia over the time period 1980 to 2007 and the OLS technique has been applied. The study reports a negative and statistically significant relationship between FDI and unemployment and a positive and significant relationship between FDI and GDP. The study concludes that the

establishment of foreign companies in particular country can provide more jobs and thus total number of unemployed persons falls. Other studies such as Bayar (2014) and Stamatiou and Dritsakis (2014) document a positive relationship between FDI and unemployment for Turkey and Greece respectively.

Drinkwater et al. (2003) employ the panel data of a sample of twenty countries in order to study the role of remittances in labor market dynamics covering the period 1970 to 2000. The findings reveal that remittance income is an insignificant determinant of unemployment but it is positively associated with investment. In contrast, a study by Kim (2007) concludes that remittances are positively related with unemployment because families with remittance earnings have high reservation wage and reduce their labor supply. The studies such as Rizvi and Nishat (2009) by taking the data for Pakistan, India and China over the period 1985 to 2008, and Mehra (2013) by using the Indian data for the period 1970 to 2007 report that FDI inflows have no impact on unemployment. However, Balcerzak and Zurek (2011) find that FDI tends to reduce unemployment in Poland.

In case of Pakistan, Habib and Sarwar (2013) investigate the impact of FDI and other macroeconomic variables (i.e. exchange rate and GDP per capita) on employment. They employ the Johenson cointegration technique using data for the period 1970 to 2011. The findings reveal that FDI and GDP per capita have positive influence on employment whereas exchange rate is negatively related with employment. Maqbool et al.(2013) analyze the relationship between unemployment, FDI, GDP, population, inflation and external debt by using the annual time series data for the period 1976 to 2012 in case of Pakistan. The study finds a negative association between inflation, GDP, FDI, external debt and unemployment but a positive relationship between population growth and unemployment. Using annual data for the period 1983 to 2010, Aqil *et al.* (2014) explore the determinants of unemployment in Pakistan. The findings of the study indicate that FDI and population growth have negative impact on unemployment. Kamran, *et al.* (2014) inspect the sources of unemployment in Pakistan over the period 1981 to 2010. Using the OLS technique the study documents a positive relationship between FDI and unemployment. Similarly, the relationship between FDI, corruption, population size, inflation and unemployment has been investigated by Zeb *et al.* (2014). Their study covers the time period 1995 to 2011 while their employed estimation technique is the OLS. The results indicate that FDI negatively affects unemployment. Furthermore, inflation has significant

negative relation with unemployment, whereas, corruption and population growth are positively linked with unemployment.

The survey of the literature clearly demonstrates that there is acute shortage of researches germane to explore the relative importance of FDI and remittances in affecting unemployment in the context of Pakistan. Hence, this study is the first attempt in this direction. The other contribution of the study is the inclusion of exports in analysis which has never been incorporated in previous literature concerning the issue of unemployment in Pakistan.

3. Analytical Framework

Concerning the theoretical view point on FDI it is widely believed that Greenfield investment has the potential to generate maximum employment opportunities in an economy (Hisarciklilar, et al*.,* 2014). Stark (1991) is of the view that that no general theory of remittances exists in the existing literature. However, the theory of new economics of labor migration draws some intention towards the impact of remittances on the economy. According to this theory remittances have positive impact on macroeconomic development of the home country (Taylor, 1999). Moreover, following the search matching model of the labor market developed by Drinkwater *et al.* (2006) foreign remittances can have two opposite effects on the unemployment rate. Firstly, given risk averse workers, they increase search utility and the impact on the unemployment rate can be both positive and negative. Secondly, they relax the credit constraint facing firms, raising the capital stock towards its optimal level and reducing the unemployment rate. When remittance income is sufficiently high, the optimal capital stock is reached and any further increase has only the search effect.

Following Maqbool, *et al.* (2013) and Arslan and Zaman (2014), we estimate the following mdoel,

$$UEMP_t = \hat{a}_0 + \hat{a}_1 FDI_t + \hat{a}_2 REM_t + \hat{a}_3 INF_t + \hat{a}_4 GDPGR_t + \hat{a}_5 LOP_t + \hat{a}_6 X_t + u_t$$

The description of variables used in equation (1) along with their data sources are presented in Table 1.

Table 1: Variable Description

Variable	Description
UEMP	Unemployment (% of labor force)
FDI	FDI, net inflows (% of GDP)
REM	Foreign Remittances (% of GDP)
INF	Growth Rate of Consumer Price Index (CPI)
GDPGR	GDP growth (annual %)
LOP	Natural Log of Oil Prices (rupees per barrel)
X	Exports of goods and services (% of GDP)

We have already discussed the likely impact of FDI and remittances on unemployment. With regard to the relationship between inflation and unemployment the Phillips curve suggests a tradeoff between inflation and unemployment: the higher the inflation, the lower will be rate of unemployment and vice versa. High GDP growth is theoretically expected to bring a reduction in unemployment. The theoretical relationship between GDP growth and unemployment is strongly supported by the notion of Okun's law (1962). Higher oil priceis expected to cast a negative impact on employment because it results in higher input cost which in turns squeezes the wages and lowers production leading to increase unemployment in the economy (Brown and Yucel, 2002). The last important explanatory variable is exports which has an expected negative impact on the unemployment rate as exports are important source of foreign exchange earnings that can be used for enhancing productive capacity of the economy. Therefore, the rise in exports tends to increase the economic growth and employment in various sectors of the economy (i.e. mining, industry, agriculture etc) and consequently unemployment rate falls.

The study has accomplished its empirical task using time series data for the period 1972 to 2014 for Pakistan. The required data are obtained from

Pakistan Economic Survey (various issues), World Development Indicators, the World Bank, and US Energy Information Administration.

The study has employed the ARDL co integration technique developed by Pesaran *et al*. (2001). This technique is considered quite useful in obtaining consistent parameter estimates even if the order of integration of variables is mixed i.e. I (0), and I (1). Moreover, it is capable enough to yield efficient and consistent empirical results for the small data size. We can express the model (1) within the ARDL specification as follows:

$$\Delta UEMP_t = \alpha_0 + \sum_{i=1}^{\rho} \alpha_1 \Delta UEMP_{t-i} + \sum_{i=0}^{\rho} \alpha_2 \Delta FDI_{t-i} + \sum_{i=0}^{\rho} \alpha_3 \Delta REM_{t-i} + \sum_{i=1}^{\rho} \alpha_4 \Delta INF_{t-i} + \sum_{i=2}^{\rho} \alpha_5 \Delta GDPGR_{t-i}$$
$$+ \sum_{i=3}^{\rho} \alpha_6 \Delta LNOP_{t-i} + \sum_{i=0}^{\rho} \alpha_7 \Delta X_{t-i} + \beta_1 UEMP_{t-1} + \beta_2 FDI_{t-1} + \beta_3 REM_{t-1} + \beta_4 INF_{t-1} + \beta_5 GDPGR_{t-1} + \beta_6 LNOP_{t-1}$$
$$+ \beta_7 X_{t-1} + v_t \qquad (2)$$

In equation (2), the coefficients attached with difference operators measure short-run dynamics, whereas, the terms with first lagged captures the long run relationship. Here the null hypothesis of no long-run relationship

$(\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0)$ is tested against the alternative hypothesis of the presence of long run relationship $(\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0)$. The short run dynamics and the stability of the model is explored through the error correction model (ECM) which can be expressed as follows.

$$\Delta UEMP_t = \delta_0 + \sum_{i=1}^{\rho} \delta_1 \Delta UEMP_{t-i} + \sum_{i=0}^{\rho} \delta_2 \Delta FDI_{t-i} + \sum_{i=0}^{\rho} \delta_3 \Delta REM_{t-i} + \sum_{i=1}^{\rho} \delta_4 \Delta INF_{t-i} + \sum_{i=2}^{\rho} \delta_5 \Delta GDPGR_{t-i}$$
$$+ \sum_{i=3}^{\rho} \delta_6 \Delta LNOP_{t-i} + \sum_{i=0}^{\rho} \delta_7 \Delta X_{t-i} + \eta ECT_{t-1} + e_t \qquad (3)$$

where, ECT_{t-1} is the error correction term and η indicates the speed of adjustment which is linked to cointegration equation. This term actually represents the feedback of the system in stabilizing its disequilibrium.

4. Results and Discussion

We begin our estimation task by checking the stationary properties of the variables. Table 2 reports the result of the Augmented Dickey-Fuller (ADF) unit root test applied to determine the order of integration of the time series used in the study. The results clearly indicate that the variables FDI and GDPGR are stationary at level, whereas, other variables are non-stationary at level but they become stationary after taking the first difference. It shows that the variables are a purely combination of I(0) and I(1) and none of them is

integrated of order (2), which makes a suitable case for employing the ARDL model. Thus, we proceed further with our empirical analysis by applying the ARDL technique.

Table 2: Results of ADF Test

			Mackinnon Critical Values for Rejecting the Unit Root Hypothesis	
Variable	**Level**	**First Difference**	**5%**	**Order of Integration**
UEMP	-2.048	-6.179	-3.523	*I* (1)
FDI	-4.884		-3.540	*I* (0)
REM	-1.684	-4.907	-3.523	*I* (1)
INF	-3.415	-7.678	-3.523	*I* (1)
GDPGR	-5.663		-3.540	*I* (0)
LOP	-2.563	-5.786	-3.523	*I* (1)
X	-1.630	-6.225	-3.523	*I* (1)

As a first step, we apply bound test in order to check the long run relationship between dependent and independent variables. On the basis of F-statistic, the decision regarding cointegration is taken. Results of bound test are presented in Table 3.

Table 3: Results of Bound Test

Significance Level	Critical Values		F- Statistic
	Lower Bound	**Upper Bound**	
10 %	2.12	3.23	
5 %	2.45	3.61	5.054
2.5 %	2.75	3.99	
1 %	3.15	4.43	

The results reveal that the value of calculated F-statistic is 5.054, which is

greater than the upper bound critical values at 10%, 5 %, 2.5 %, and 1% levels of significance. Based on the finding the null hypothesis of no long run relationship is rejected. Thus, we conclude that a cointegrating vector exists when unemployment is taken as dependent variable. In the second step we obtain the long run parameter estimates of repressors. To this end, we use the SBC for the optimal lag length selection of all the variables of the model. The optimal lag length for each variable is shown as ARDL (1, 0, 0, 1, 2, 3, 0). The long run estimates of ARDL model are presented in Table 4.

Table 4: Estimated Long Run Coefficients

Dependent Variable: UEMP

Variable	Coefficient	t-value
FDI	-0.115***	-6.105
REM	-0.066**	-2.505
INF	- 0.211***	-4.950
GDPGR	- 0.570***	-2.742
LOP	0.319*	1.732
X	- 0.369***	-2.965
C	1.472**	2.616

Note: ***, ** and * indicate significant at 1 percent, 5 percent, and 10 percent levels respectively.

The results reveal that FDI, foreign remittances, inflation rate, GDP growth, and exports have a negative long run impact on unemployment while oil price has a positive impact on unemployment. It is obvious from Table 4 that one percent increase in FDI leads to 0.115 percent decrease in unemployment rate in Pakistan. The relationship is logical because high FDI inflows, especially establishment of foreign companies in an economy provide more jobs opportunities. Moreover, FDI facilitates in expanding the business size by providing the technical know-how to the domestic investors, augments human capital, and improves the managerial skills. All this results in enhancing business activities and hence paves the way

for more jobs in an economy. This finding is consistent with the empirical evidence provided by Habib and Sarwar (2013) Maqbool *et al.* (2013), Aqil *et al.* (2014), Arslan and Zaman (2014) and Zeb *et al.* (2014) for Pakistan as all these studies have documented the unemployment reducing role of FDI. Nonetheless, our result contradicts the positive association between FDI and unemployment as provided by Kamran *et al.* (2013) for Pakistan. The coefficient of foreign remittances variables carries a negative sign which suggests that one percent increase in foreign remittances is associated with a 0.066 percent reduction in unemployment in Pakistan. Remittances reduce unemployment by lessening the credit constraints and motivate the business enterprises to expand their business and make jobs available. This result is in line with the empirical findings of Loen-Ledesma and Piracha (2001) and Drinkwater *et al.* (2003) for various developing countries including Pakistan, whereas, it is in sharp contrast with what has been reported by Kim (2007) for Jamaica. Inflation rate is appearing to be statistically significant at 5 percent level of significance. The result reveals that one percent rise in inflation rate leads to 0.211 percent decline in unemployment. This result supports the findings of Zeb *et al.* (2014) who argue that unanticipated increase in price level decreases the real wage which will make the situation more favorable for producer; hence, they increase labor demand which ultimately leads to lower unemployment in an economy in the long run. Moreover, this outcome is also in line with the notion of the Phillips curve.

There exists a negative relationship between growth rate of GDP and unemployment in such a way that one percent rise in GDP growth tend to reduce unemployment in the economy by 0.57 percent. The inverse relationship between GDP and unemployment has already been postulated by the Okun's law and by the empirical studies such as Rizvi and Nishat (2009) and Kabaklarli *et al.* (2011), among others. Since Pakistan is the net importer of oil so the changes in oil price play a crucial role in affecting the macroeconomic variables. The oil price has very devastating effect on macroeconomic variables such as unemployment, inflation and GDP growth (Shaari *et al.*, 2012).The empirical result presented in table 4 indicates that the coefficient of the variable oil prices is statistically significant at 10 percent level and it is positive which means that 1 percent rise in world oil price will cause 0.319 percent increase in unemployment rate Pakistan in the long run. This outcome supports the findings of Rabalo and Salvado (2008), and Ahmad (2013) that upward pressure in oil prices upshots the higher production cost leading to make it quite difficult for production and business activities to sustain themselves. The situation may deteriorate further with the net outcome rise in the number of jobless individuals in the economy. Finally, the study finds strong support in favor of a significant and negative relationship

between exports and unemployment such that a 0.369 percent decrease in unemployment is associated with 1 percent increase in exports. The finding is supported by Dizaji and Badri (2014) who argue that higher exports lead to higher competition among different industries and the production units, increase the labor productivity, improve the quality and diversification of the products which result in production process development and more employment opportunities.

Table 5: Results of Error Correction Model

Variable	Dependent Variable: UEMP Coefficient	t-value
Δ FDI	-0.018	-0.105
Δ REM	0.053	0.583
Δ INF	-0.023*	-1.753
Δ GDPGR	-0.007	-0.112
Δ GDPGR (-1)	0.133**	2.356
Δ LOG(OP)	0.580	1.299
Δ LOG(OP(-1))	0.611	1.099
Δ LOG(OP(-2))	0.835	1.411
Δ X	-0.186**	-2.544
ECT_{-1}	-0.504***	-3.389
R^2	0.613	
Adjusted R^2	0.420	
F-statistic	3.176	
Prob(F-statistic)	0.005	

Note: ***, ** and * indicate that coefficients are significant at 1 percent, 5 percent, and 10 percent level of significance respectively.

The next step after estimating the long-run coefficient is to estimate the ECM. Table 5 reports the results for the ECM. The coefficient of ECT is statistically significant at 5 percent level of significance and it carries a negative sign which is desirable. Therefore, the result indicates that the long run equilibrium relationship between unemployment and the explanatory variables is stable. The coefficient of ECT or the speed of adjustment is -0.504 suggesting that in case of any disturbance in the long run equilibrium position, the forces of the model will restore the equilibrium at the speed of 50 percent each year. Moreover, it is found that in the short run FDI, inflation rate, GDP growth and exports influence the unemployment inversely, whereas, foreign remittances and world oil price impact unemployment positively. However, the impact of all the variables is insignificant except INF and X. Hence, FDI and remittance income play their role in reducing unemployment in Pakistan only in the long run while they fail to bring any change in the unemployment rate in the country. This outcome can be justified on the ground that both FDI and remittances require time to expand the productive capacity of an economy and establishing a business encouraging environment in the economy for raising employment rate.

Figure 1: Result of CUSUM Test

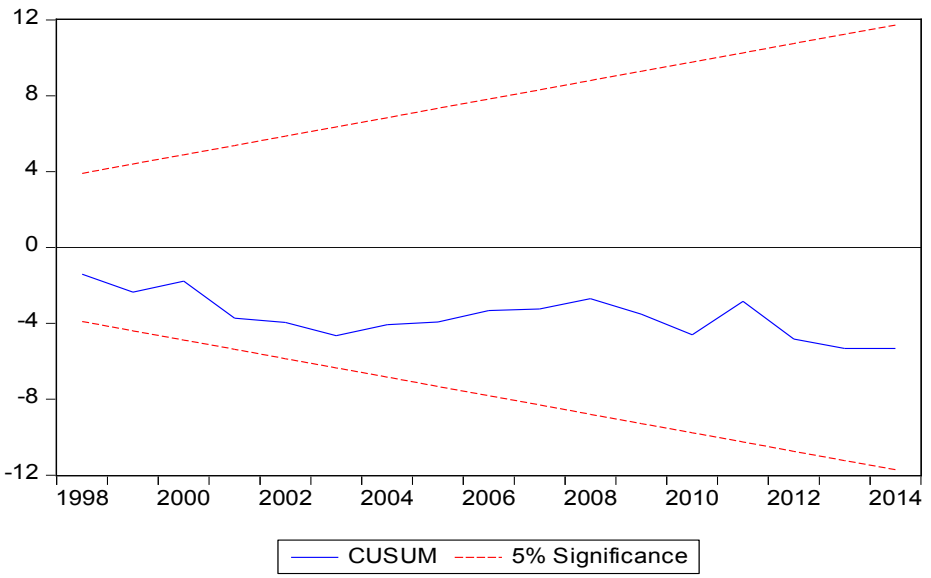
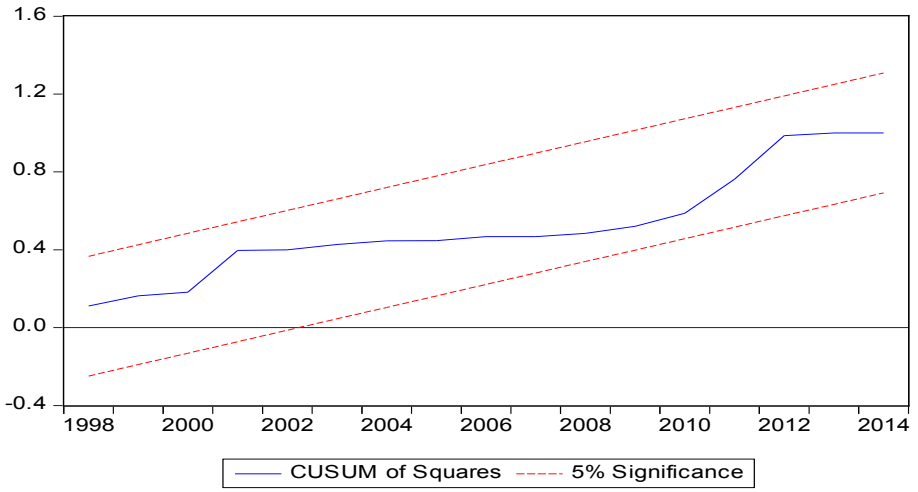


Figure 2: Result of CUSUM of Squares Test



Finally, Cumulative Sum (CUSUM) and CUSUM of Squares test are applied in order to check the stability of the estimated parameters of the model. Figure 1 displays the results of CUSUM test whereas figure2 shows the results of CUSUM of Squares test. Results of CUSUM and CUSUM of Squares test reveal that the estimated lines are within the critical limits at 5 percent level of significance. Therefore, it is confirmed that parameters of the model remained stable during sample period of the study.

5. Conclusion

Unemployment is a serious concern for policymakers as it creates financial, moral and social hazards in an economy that may hamper the pace of economic growth and development. Like other developing countries reducing unemployment has been the core of macroeconomic policies in Pakistan. The role of FDI and remittances has become crucial in the management of Pakistan's economy. Therefore, the present study has focused on gauging the impact of FDI and foreign remittances on unemployment in the country. For this purpose the study has selected the time period from 1972 to 2014 and the empirical task has been carried out by means of the ARDL technique.

The findings indicates that FDI, foreign remittances, inflation, GDP growth and exports has significant negative impact on unemployment in the long run. On the other hand, in the short run FDI, inflation rate, GDP growth and exports have negative impact on unemployment, however, only the impact of

inflation and exports is significant. Moreover, foreign remittances and world oil price have positive but insignificant effects on unemployment. FDI has a greater impact on unemployment relative to foreign remittances in the long run which implies that foreign remittances are mainly used for consumption purposes in Pakistan. Unfortunately, the policy makers in Pakistan have failed to chalk out a convincing plan to divert the remittance income towards productive use. The findings of the study lead to the following policy recommendations. Firstly, as FDI is negatively related with unemployment, hence, government should take appropriate measures to attract FDI and foreign capital in Pakistan. In this regard, it is imperative to create a business friendly and peaceful environment in the country. For this purpose, improving infrastructure facilities, providing better law and order state, overcoming energy crisis and existence of political stability are crucial to craft investment conducive climate to enhance the volume of FDI in Pakistan. Secondly, for enhancing their unemployment reducing role, remittances can be redirected from current consumption towards productive investment by offering higher interest rate on deposits or subsidies for productive investment. In addition, government should facilitate investment by Pakistani diaspora in real estate and industrial enterprises through the provision of tax holidays and without any requirement for a national tax number. Finally, for bringing a significant decline in unemployment rate, exports ought to be increased. For this purpose, there is a need to increase the production of goods and services in all sectors in general but in exportable sector in particular. Moreover, export diversification should be given top priority for which we need to diversify the production base in favour of goods and services with comparative advantage, global demand and growth potential.

REFERENCES

Ahmad, A., Ali, S., and Ahmad, N. (2014). Crime and economic growth in developing countries: Evidence from Pakistan. *Journal of Basic and Applied Scientific Research, 4*(4), 31-41.

Ahmad, F. (2013). The effect of oil prices on unemployment: Evidence from Pakistan. *Business and Economics Research Journal*, *4*(1), 43-57.

Aqil, M., Qureshi, M. A., Ahmed, R. R., and Qadeer, S. (2014). Determinants of unemployment in Pakistan. *International Journal of Physical and Social Sciences*, *4*(4), 676-82.

Arslan, M., and Zaman, R. (2014). Unemployment and Its Determinants: A study of Pakistan Economy (1999-2010), *Journal of Economics and Sustainable Development, 5*(13), 20-24.

Bačić, K., Račić, D., & Ahec-Šonje, A. (2004). The effects of FDI on recipient countries in Central and Eastern Europe. *Privredna kretanja i Ekonomska Politika*, *14*(100), 58-96.

Bayar, Y. (2014). Effects of economic growth, export and foreign direct investment inflows on unemployment in Turkey. *Investment Management and Financial Innovations*, *11*(2), 20-27.

Brown, S. P., & Yücel, M. K. (2002). Energy prices and aggregate economic activity: an interpretative survey. *The Quarterly Review of Economics and Finance*, *42*(2), 193-208.

Connell, J., & Conway, D. (2000). Migration and remittances in island microstates: a comparative perspective on the South Pacific and the Caribbean. *International Journal of Urban and Regional Research*, *24*(1), 52-78.

Dimitrios, A. (2006), Applied Econometrics: *A modern approach using E-Views and Microfit*,Palgrave Macmillan: (New York).

Dizaji, M., & Badri, A. K. (2014). The effect of exports on employment in Iran's economy. *Merit Research Journal of Arts Social Sciences and Human*ities, *2*(6), 081-088.

Drinkwater, S., Levine, P., & Lotti, E. (2003). *The labor market effects of remittances*. Hamburgisches Welt-Wirtschafts-Archiv, (2003), 1-47.

Habib, M. D., & Sarwar, S. (2013). Impact of foreign direct investment on employment level in Pakistan: A time series analysis. *JL Pol'y & Globalization*, *10*(1): 46-55.

Hisarciklilar, M., Gultekin-Karakas, D., & Asici, A. A. (2014). Can FDI be a panacea for unemployment?: The Turkish case. In *Labor and employment relations in a globalized world*, 43-70. Springer, Cham, 2014.

Abdus, S., & Zafar, I. (2005). The Contribution of workers' remittances to economic growth in Pakistan. *PIDE-Working* Paper No. 187.

Jamali, M. B., Shah, A., Soomro, H. J., Shafiq, K., & Shaikh, F. M. (2011). Oil price shocks: A comparative study on the impacts in purchasing power in Pakistan. *Modern Applied Science*, *5*(2), 192-203.

Kabaklarli, E., Hazel, P., & Buluş, A. (2011, August). Economic determinants of Turkish youth unemployment problem: Co-Integration analysis. *International Conference on Applied Economics–ICOAE*, 267(2011), 272.

Kamran, A., Shujaat, S., Syed, N. A., and Ali, S. N. (2014). *A study on determinants of unemployment in Pakistan*. In proceedings of the seventh international conference on Management Science and Engineering Management. 1337-1348.

Kim, N. (2007).The impact of remittances on labor supply: The case of Jamaica. *World Bank Policy Research Working Paper No*.4120.

León-Ledesma, M., & Piracha, M. (2004). International migration and the role of remittances in Eastern Europe. *International Migration*, *42*(4), 65-83.

Maqbool, M. S., Sattar, T. M. A., and Bhalli, M. N. (2013). Determinants of unemployment: Empirical evidences from Pakistan. *Pakistan Economic and Social Review*, *51*(2), 191-207.

Mehra, N. (2013). Impact of foreign direct investment on employment and gross domestic product in India. *International Journal of Economics and Research*, *4*(4), 29-38.

Ratha, D. (2005). Workers' remittances: an important and stable source of external development finance. *Remittances: development impact and future prospects*, (2005), 19-51.

Rizvi, S. Z. A., & Nishat, M. (2009). The impact of foreign direct investment on employment opportunities: panel data analysis: empirical evidence from Pakistan, India and China. *The Pakistan Development Review*, *48*(4), 841-53.

Robalo, P. B., and Salvado, J. C. (2008). *Oil price shocks and the Portuguese economy since the 1970s*, FEUNLWorking Paper No. 529, Universidade Nova de Lisboa, Faculdade de Economia, Portugal.

Russell, S. S. (1992). Migrant remittances and development. *International Migration/Migrations Internationales/Migraciones Internacionales*, *30*(3-4), 267-87.

Stamatiou, P., & Dritsakis, N. (2014). The impact of foreign direct investment on the unemployment rate and economic growth in Greece: A time series analysis. In *International Work-Conference on Time Series Analysis (ITISE)* (Vol. 1, 97-108).

Stark, O. (1991). *The migration of labor*, Cambridge, Mass: Basil Blackwell.

Stark, O., & Lucas, R. E. (1988). Migration, remittances, and the family. *Economic development and Cultural Change*, *36*(3), 465-481.

Tahir, M., Khan, I., & Shah, A. M. (2015). Foreign remittances, foreign direct investment, foreign imports and economic growth in Pakistan: A time series analysis. *Arab Economic and Business Journal*, *10*(2), 82-89.

Taylor, E. J. (1999). The new economics of labor migration and the role of remittances in the migration process. *International Migration*, *37*(1), 63-88.

Taylor, J. E. (1992). Remittances and inequality reconsidered: Direct, indirect, and intertemporal effects. *Journal of Policy Modeling*, *14*(2), 187-208.

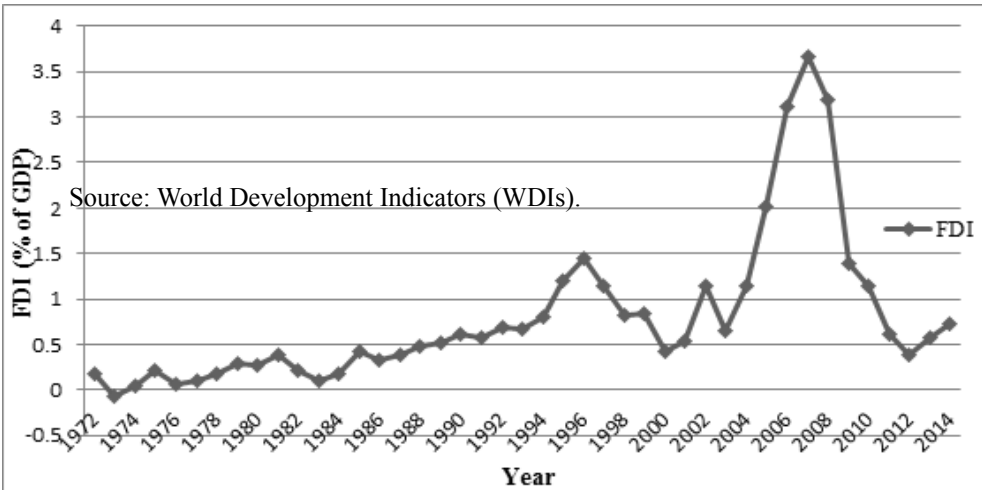
Vijayasri, G. V. (2013). The importance of international trade in the world. *International Journal of Marketing Financial Services and Management Research*, *9*(2), 111-9.

Whyman, P., andBaimbridge, M. (2006). Labor market flexibility and foreign direct investment, employment relations, Occasional Paper, Employment Market Analysis and Research, Department of Trade and Industry, London.

Zeb, N., Qiang, F., & Sharif, M. S. (2014). Foreign direct investment and unemployment reduction in Pakistan. *International Journal of Economics and Research*, *5*(02), 10-17.

Appendix

Figure 1: FDI Inflows to Pakistan (1972-2014)



Source: World Development Indicators (WDIs).

Figure 1: Foreign Remittances in Pakistan (1972-2014)

Source: Pakistan Economic Survey (various issues).

Figure 2: Unemployment in Pakistan (1972-2014)

Source: Pakistan Economic Survey (various issues).

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Impact of Monetary and Other Economic Uncertainties on Demand for Money: Evidence from Pakistan

Shehla Gul1[1]and Ghulam Mustafa Sajid[2]

Abstract

The study investigates the impact of monetary and other economic uncertainties on demand for money for Pakistan in the short run as well as in the long run. To comprehend this objective the auto regressive distributed lag (ARDL) bounds testing approach and error correction model (ECM) developed by Pesaran et al. (2001) are employed to annual data for the period of 1970 to 2014. The empirical results reveal that in the short run both measures of uncertainty are significantly related to demand for money in Pakistan. Whereas, in the long run monetary uncertainty does not influence money demand while other economic uncertainties have long run negative impact on demand for money. The results also indicate that there is long-run relationship between demand for money and other factors considered in the analysis. The findings of ECM supports co-integration among the variables and that the dependent variable adjusts towards equilibrium level with the speed of 51 percent per year. To check the stability of money demand function in the presence of monetary and other economic uncertainties, CUSUM and CUSUMSQ tests are applied to the residuals of the model. The findings of both tests confirm the stability of long run money demand function for Pakistan.

JEL Classification: E41; E42; E52

Keywords: Demand for money; monetary uncertainty; stability; economic uncertainty

1. Introduction

Money demand has a crucial role both in macroeconomics and monetary economics. In macroeconomics, it has a general impact through transaction, speculation and precautionary motives while in monetary economics it

[1]International Institute of Islamic Economics, International Islamic University, 44000 Islamabad, Pakistan, email: khan.shehla1@yahoo.com

[2]International Institute of Islamic Economics, International Islamic University, 44000 Islamabad, Pakistan, email: ghulammustafa@iiu.edu.pk

has a specific role to play regarding the performance of monetary policy. According to the perception of conventional economics, real demand for money is a function of income and interest rate. The rise in income has the tendency to enhance money demand while the increase in rate of interest declines the desire of economic agents to keep money with them. Monetary uncertainty is also a determinant of money demand which has positive impact on demand for money (Friedman (1984)). When supply of money becomes more uncertain, people raise their demand for money and velocity of money declines. Economic uncertainty is another important determinant of money demand highlighted in the literature (Bahmani-Oskooee & Xi, 2011). The impact of economic uncertainty on money demand is uncertain. It can be positive as in the period of high economic uncertainty a risk averse agent prefers to hold safe and liquid assets. It can be negative in the sense that if monetary value is expected to decline in future due to economic uncertainty, then the economic agents are expected to prefer holding of other assets such as gold and commodities instead of risky assets. Therefore the omission of uncertainty variables from money demand model can result in invalid conclusions which can also influence the monetary policy planning. Thus it is important to include economic and monetary uncertainty variables in money demand equation. The prevailing literature points to the fact that considerable attention has been paid to the investigation of money demand function and its determinants in emerging economies like Pakistan since 1970. However, these earlier studies on demand for money examined just the very common determinants by applying different techniques and have ignored the role of uncertainties as determinants of money demand in Pakistan.

This study is an attempt to fill this gap in the literature on money demand function in Pakistan. Hence the study inclined to revisit the demand for money function in Pakistan by adding two more factors i.e. monetary uncertainty and economic uncertainty. The study also contributes to the available literature on demand for money in Pakistan by investigating whether monetary uncertainty and economic uncertainty along with real income, price level, interest rate and exchange rate plays any role in the stability of monetary aggregate M2 in Pakistan. This study aims to appraise the demand for money function of Pakistan for the time period of 1970 to 2014. To accomplish this aim, the study applies the error correction representation of ARDL model. The stability of money demand function is checked by applying CUSUM and CUSUMSQ tests to the residuals of the model.

The rest of the study is organized as follows. Section 2 reviews literature on the issue. Section 3 contains model specification and estimation technique. Source of data, variable description and construction are discussed in section 4. Section 5 interprets the empirical results. The last section presents conclusions of the study.

2. Literature Review

In 1982 there was a huge decline in income velocity of money which causes real GNP to fall in USA. According to Friedman's volatility hypothesis (1984) this decline in velocity was due to increase in volatility of money supply because of announced variations in the operating techniques of Federal Reserve in October 1979. Whenever money supply becomes more volatile the demand for money increases and velocity declines which in turn reduces GNP (Hall & Noble, 1987). Friedman's volatility hypothesis failed in case of Germany (Bruggemann & Nautz, (1997)), Oskooee and Bohl (2000)) while it did hold for the USA (Choi & Oh, 2003).

Both monetary and economic uncertainties are important determinants of money demand. It is evident from the evidence found by Hun Lee and Chung (1995), Bahmani-Oskooee and Bahmani (2014) for Korea, Jackman (2010) and Atta-Mensah (2004) for Canada, Oskooee et al. (2012) for China, Oskooee and Xi (2014) for six Asian countries[3], Kones (2014) for 21 African countries[4], Kiptui (2014) for Kenya. The studies conducted on different Asian countries such as Ibrahim (1998, 2001) for Malaysia, Khan (1992) for India and Pakistan, Baharumshah et al (2009) for China, Kundu and Mollah (2014) for Bangladesh, Ajmi et al. (2015) for ten Asian countries[5], Apergis, (2015) for East Asian countries, Tang (2007) for five countries of South Asia i.e. Indonesia, Singapore, Malaysia, Philippine and Thailand, proved that the long run demand for money function was stable for these Asian countries.

A number of studies also estimated money demand function for Pakistan by applying different techniques and got diverse results such as Khan (1982) examined the demand for money function in six developing nations of Asia. A significant relationship of expected inflation rate with money demand was found for Pakistan, Korea and Sri Lanka. The study also suggested

[3]Malaysia, Indonesia, Singapore, Pakistan, India and Philippine

[4]Burundi, Cote d'Ivoir, Burkina Faso, Cameroon, Ethiopia, Gabon, Egypt, Ghana, Kenya, Morocco, Niger, Madagascar, Nigeria, Senegal, Mauritius, Seychelles, Rwanda, Sierra Leone, Tanzania, South Africa, and Togo.

[5]Malaysia, Singapore, Indonesia, Korea, Japan, India, China, Philippines, Fiji and Hong Kong

that interest rate has a considerable role in determining the opportunity cost of holding money in Pakistan. Nisar and Aslam (1983) also observed the same results regarding significance of interest rate for Pakistan. Khan and Sajjid (2005) investigated a long run stable relationship between demand for money and real variables i.e. rate of inflation, real income, foreign interest rate, and real effective exchange rate. Haider et al. (2013) also discovered a stable money demand function for Pakistan. Other studies which examined money demand function for Pakistan includes "Akhtar (1974), Abe et al. (1975), Mangla (1979), Khan (1980,1982), Nisar and Aslam (1983), Sarwar et al. (2010), Azim et al. (2010), Qayyum (2001, 2005), Khan and Sajjid (2005), Omer (2009), Anwar and Asghar (2012), Mall (2013), Naseer (2013) , Faridi and Akhtar (2013), Haider et al. (2013)". A common feature of all these studies is that they analyze the relationship of money demand with its determinants by applying different techniques. Most of these studies also checked the stability of money demand function for Pakistan using CUSUM and CUSUMSQ tests.

2.1 Literature Gap

The literature reviewed above make it clear that no study[6] has been conducted on Pakistan by considering uncertainties (monetary and other economic). Therefore this study estimates the relationship of money demand with monetary and other economic uncertainties and also checks the impact of these uncertainties on the stability of money demand for Pakistan.

3. Model Specification

Real or nominal GDP, price level, interest rate and exchange rate are considered as main determinants of money demand in every country. Money demand function for Pakistan has no exception. Therefore we identify the demand for money function which relates the demand for broad money M2 to real GDP, nominal effective exchange rate, price level, interest rate and two measures of uncertainty (monetary and economic). The leading model of money demand for Pakistan is presented in equation (1) which is a standard specification:

[6]Bahmani-Oskooee (2014) conducted a study on Asian countries including Pakistan similar to our study. but we started work independent of it and it was not available on internet at that time. Our study is different in one aspect; we measure economic uncertainty by an index of five variables, while Bahmani-Oskooee (2014) measured it by a single variable (GDP).

$$LM_t = \beta_\circ + \beta_1 LY_t + \beta_2 LP_t + \beta_3 R_t + \beta_4 LEX_t + \beta_5 V_t + \beta_6 EU_t + \varepsilon_t \quad (1)$$

L is the log of variables.

The equation (1) states that real money demand is the function of real GDP, price level, interest rate, nominal effective exchange rate and two uncertainty variables (monetary and economic). V represents monetary uncertainty while EU is economic uncertainty index. Following the literature, the sign of β_1 and β_2 are anticipated to be positive, β_3 to be negative. β_4 could be positive or negative depending on the value of exchange rate. Increase in exchange rate reflects decline in the home currency value. Thus with the rise in exchange rate the value of overseas possessions in the form of home currency increases, that is rise in the value of assets, which may give rise to money demand. However if there is an expectation of further decline in value of currency, it may lead to increase in demand for foreign currency or decrease in demand for domestic currency. β_5 and β_6 could take any sign. If a measure of uncertainty persuades people to be more careful and to hold more liquid assets, value of coefficients will be positive. However, if any measure of uncertainty (monetary or economic) creates substitution effect so that people move away from holding cash towards less volatile assets then the signs of β_5 and β_6 can be negative.

In order to estimate the short run and the long run coefficients equation (1) is transformed into error correction format. Thus, following the ARDL bound testing approach of Pesaran et al. (2001), we have the following equation:

$$\begin{aligned}\Delta LnM_t = \alpha_\circ + \sum_{i=1}^{n} \alpha_1 \Delta LM_{t-i} + \sum_{i=0}^{n} \alpha_2 \Delta LY_{t-i} + \sum_{i=0}^{n} \alpha_3 \Delta LP_{t-i} + \sum_{i=0}^{n} \alpha_4 \Delta LEX_{t-i} + \\ \sum_{i=0}^{n} \alpha_5 \Delta r_{t-i} + \sum_{i=0}^{n} \alpha_6 \Delta V_{t-i} + \sum_{i=0}^{n} \alpha_7 \Delta EU_{t-i} + \rho_\circ LM_{t-1} + \\ \rho_1 LY_{t-1} + \rho_2 LP_{t-1} + \rho_3 LEX_{t-1} + \rho_4 r_{t-1} + \rho_5 V_{t-1} + \rho_6 EU_{t-1} + \varepsilon_t\end{aligned} \quad (2)$$

The 2nd equation is the error correction representation of ARDL model. This is a bit different from the standard error correction model in the sense that all variables from equation (1) are included in equation (2) in their lagged level form instead of including lagged error term. This specification is mostly favored by Pesaran et al. (2001) because by estimating equation (2) the short run and long run effects of variables can be found in one step

estimation. The estimates of the coefficientsα_1, α_2, ….α_7, reflects the short run effects whileρ_1, ρ_2, …, ρ_6 normalized by ρ_0 reflects the long run effects. However, in order to make estimates of the long run coefficients meaningful, there is need to check co-integration among the variables.

To establish co-integration Pesaran et al. (2001) proposed a nonstandard F test (also called bound test), which has new critical values for joint significance of lagged level variables. They provide the upper bound and lower bound critical values. For the existence of co-integration among variables, the calculated F statistics should be greater than the upper-bound critical value. However if the test statistics lies below the lower bound then the null hypothesis of no co-integration is accepted. If the test statistic lies between the upper and lower bounds, the results are considered as inconclusive. Co-integration is checked by applying F-test on the output of equation 2. Equation (1) is estimated to get the residuals which are further used as error correction term. Equation (2) is re-estimated by replacing the variables representing long run relationship (lagged level variables) with the lagged error correction term. The estimated value of error correction term will provide evidence for co-integration among variables and also shows the adjustment of variable towards equilibrium only if it has significantly negative value.

4. Source of Data, Description and Construction of Variables

Annual data for the period of 1970 to 2014 are collected from different issues of Economic Survey of Pakistan, annual reports of the State Bank of Pakistan and International Financial Statistics (IFS). Detail of variables is given bellow:

M2= real money supply. Its data is obtained from annual reports of SBP.

Y= GDP at constant market prices. The data is taken from economic survey of Pakistan.

P= log of CPI. CPI data is also obtained from economic survey of Pakistan

EX= nominal effective exchange rate. It is defined as the value of dollar in terms of rupee. Its data is taken from IFS.

R= interest rate as Govt bond yields. Its data is also taken from IFS.

V= monetary volatility. It is estimated by applying GARCH (1,1) technique on monthly data of nominal M2. Monthly data of nominal M2 is taken from monthly bulletins of the State Bank of Pakistan. The volatility calculated from monthly data of M2 is then converted into annual volatility by taking the average of every 12 monthly observations.

EU= economic uncertainty index. It is the index of five variables which are; government expenditures, exports, imports, foreign remittances and foreign direct investment (FDI). Volatility of variables is calculated by taking the standard deviation of each five observation through rolling method. The index is then constructed by putting values in the formula:

$$EU = \sum_{i}^{n} \gamma_i \left(\frac{(V_i - \overline{V_i})}{\delta_v}\right)$$

where V_i shows the volatility of variable 'i', $\overline{V_i}$ is the average volatility, δ_v δ_v is the standard deviation of volatility and γ_i represents the actual weights attached to each factor.

5. Discussion and Interpretation of Results

One of the preconditions of ARDL model is that, none of the variables should be I(2) and It can be used with a mixture of I(0) and I(1) variables. Therefore the Augmented Dickey Fuller (ADF) unit root test is applied to all variables both at level and first difference to check time series properties of variables. The results of the test are reported in table 1. Which indicates that all variables are stationary at first difference except interest rate which is stationary at level I(0). The results also shows that no one of the variables is I(2). Thus it provides the validation for ARDL bound testing approach to be used for examining the determinants of money demand for Pakistan.

Table 1: Results of ADF Test

Null hypothesis: There is unit root in the data

At level	Optimal lags	t-statistics	At first difference	Optimal Lags	t-statistics
LM2	0	-0.2567	DLM2	0	-5.3597***
LY	0	-1.2106	DLY	0	-4.7118***
LP	1	-1.1902	DLP	0	-3.3595**
LEX	0	-2.0640	DLEX	0	-5.0113***
R	1	-3.2916**	DR	1	-5.7099***
V	0	-1.9770	DV	0	-4.6227***
EU	0	-1.6036	DEU	0	-5.6549***

Note: *** and ** represents significant at 1% and 5% level of significance respectively

The first step in application of error correction model is the optimal lag selection for each variable. First we impose 3 lags on each first differenced

variable and just one lag on level variables and estimate the equation. The insignificant lags are dropped out one by one through Schwarz Criteria (SC). The short run coefficients are reported in table 2 while the table 3 reports long run estimates of ARDL model. It is clear from table 2 that at least two coefficients of each variable are significant which means that monetary and economic uncertainties along with all other variables have short run significant impacts on money demand. The same result was found by Bahmani- Oskooee et.al (2012) for China and Choi and Oh (2003) for USA.

Table 2: Estimates of Short-Run Coefficient

	Lag Order			
Variables	0	1	2	3
DLM2	– –	0.3859*** (3.91)	0.2192*** (3.16)	0.2813*** (3.98)
DLY	1.3318*** (4.65)	1.2532*** (3.69)	2.1676*** (6.42)	1.3014*** (4.53)
DLP	-0.836*** (6.04)	0.9120*** (6.47)	– –	-0.2881 (1.36)
DLEX	-0.170*** (3.199)	– –	– –	0.4521*** (7.37)
DR	-0.002 (1.01)	0.0157*** (5.52)	0.0052* (2.03)	0.0179*** (8.38)
DV	-0.003** (2.53)	0.0022*** (3.19)	– –	0.0010 (1.79)
DEU	-0.001** (2.24)	0.0005 (1.34)	0.0021*** (7.75)	0.0016*** (5.50)

Note: *, **and *** represents significant at 10%, 5% and 1% level of significance respectively
Figures in parenthesis represent t-statistics value

Table 3 shows that coefficients of all variables except monetary uncertainty are significant and have their expected signs. The real GDP and price level have positive signs which are according to economic theory.

Table 3: Estimates of Long run Coefficients

Variables	Coefficients	t-statistics	p-value
C	8.5394	4.6569	0.0009
LY	0.3479	2.413	0.0365
LP	0.4479	5.204	0.0004
LEX	-0.2327	5.523	0.0003
R	-0.0173	3.903	0.0029
V	0.0014	1.206	0.2557
EU	-0.0019	3.398	0.0068

R-squared= 0.99 Adjusted R-squared= 0.97 F-statistic= 40.08
Prob(F-statistic)= 0.000 Durbin-Watson stat= 2.078

The findings of the study are consistent with the findings of almost all studies conducted on money demand for Pakistan and other countries such as Akhtar (1974), Hun Lee and Chung (1995), Ibrahim (1998, 2001) Choi and Oh (2003), Atta-Mensah (2004), Qayyum (2001, 2005), Anwar and Asghar (2012), Naseer (2013), Bahmani-Oskooee and Bahmani (2014), Bahmani-Oskooee et.al (2012) and Apergis (2015).

The other variables such as R, EX and EU are negatively related to demand for money. The reason for the inverse relation between exchange rate and money demand may be that a rise in EX indicates decrease in value of domestic currency (M2) due to which demand for M2 declines. People convert their holdings (in the form of M2) into foreign assets due to expectations of further decline in the value of domestic currency. Similarly whenever interest rate gets higher, the returns on saving deposits and other assets increases which in turn raises the opportunity cost of holding money. Therefore people prefer to hold alternatives to money and hence demand for money declines. This is consistent with theory and in line with the findings of Mangla (1971), Ibrahim (2001), Inoue and Hamori (2008) and Kiptui (2014) for different countries. All these studies found that both interest rate and nominal exchange rate have significant but inverse relationship with money demand. However the relationship of monetary uncertainty with money demand is statistically insignificant for Pakistan in the long run. This result is consistent with the results of Oskooee and Wang (2014), Kones (2014). The reason for insignificant coefficient of monetary uncertainty can be the less

volatile behavior of M2 money supply in Pakistan. The less volatile behavior is predicted from very small values of volatility series for money supply calculated through GARCH technique.

The negative and small value of coefficient of economic uncertainty means that although its impact on money demand is negative but very small in case of Pakistan. The inverse relationship of economic uncertainty with demand for money is supported by the findings of Bahmani-Oskooee and Xi (2014) for Malaysia and Indonesia. However, to make these long run coefficients meaningful it is necessary to establish co-integration among these variables. Therefore we move towards Table 4.

Table 4: Results of Diagnostic Tests

F-statistic	ECM_{t-1}	Adj R^2 R^2	LM	CUSUM	CUSUMSQ
25.9206	-0.5123 (3.68)	78.60	4.8465 (0.09)	Stable	stable

The ARDL bound test result shows that the value of F-statistic is much higher than upper bound critical value (3.61). Therefore the hypothesis of co-integration among variables is accepted.

Next, we run the regression of real demand for money on its determinants at level to get the error correction term. The lagged level variables are then replaced with the lagged level error correction term (EC_{t-1} C_{t-1}). The resultant equation is re-estimated. A negative significant value of error correction term is obtained which indicates the adjustment of money demand towards equilibrium at the speed of 51% per year. The value of Long-range multiplier (LM) test is also reported in the table which is applied to check serial-correlation. The LM statistics is much smaller than the critical value 9.48, which is an evidence of no serial correlation in the residuals.

One of the objectives of the study is to check the stability of money demand function for Pakistan in the presence of uncertainties variables. Therefore after estimating the money demand function, we check its stability with the help of CUSUM and CUSUMSQ tests proposed by Brown et.al (1975). The results of the tests are presented in figure 1 and 2. The dotted straight lines in both figures signify the critical bounds at 5% level of significance. Both figures show that money demand function is stable even

with the introduction of two new variables in the model because the test lines lie inside the critical bounds.

Figure 1: CUSUM test to the residuals of equation (2)

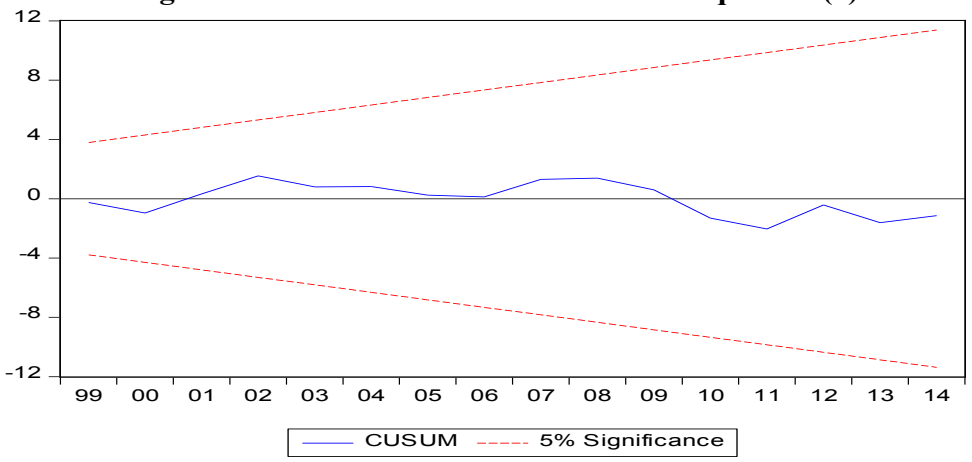
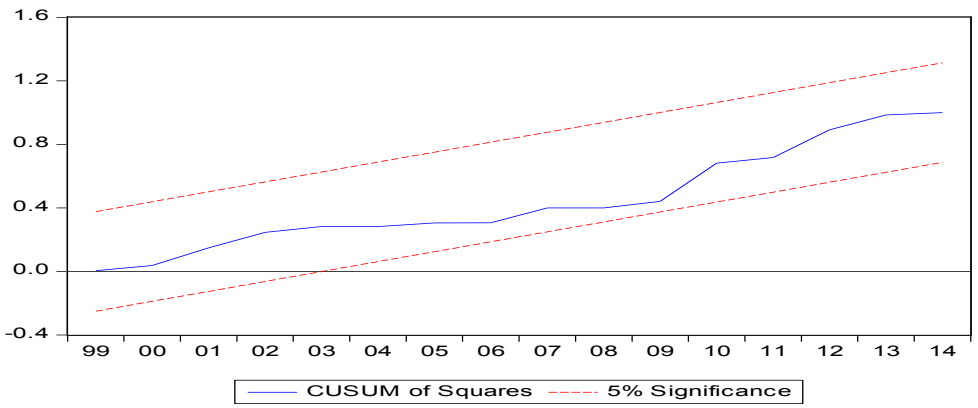


Figure 2 CUSUMSQ test to the residuals of equation (2)



6. Conclusion

The demand for money in any country depends upon the price level, real income, opportunity cost variable and the exchange rate. However, the monetary and economic uncertainties are also considered as the important variables affecting demand for domestic currency. Both the variables can have a positive or negative relationship with the demand for money. The purpose of this study is to investigate the impact of monetary and other economic

uncertainties on the demand for money in Pakistan. For this purpose the money demand function was estimated by applying ARDL bound testing approach of Pesaran et al. (2001). The monetary uncertainty was calculated through GARCH model while economic uncertainty was obtained through standard deviation. It is concluded that both measures of uncertainty are significantly related to demand for money in the short run. But in the long run only economic uncertainty has significantly negative impact on money demand, while monetary uncertainty has no effect on demand for money in the long run for Pakistan. The negative impact of economic uncertainty justifies the substitution effect due to which people move away from holding cash towards less volatile assets. In addition to it, it is also concluded that money demand function is stable for Pakistan even in the presence of both uncertainty variables (monetary and other economic uncertainties).

References

Abe, S., Fry, M. J., Min, B. K., Vongvipanond, P., & Yu, T. P. (1975). The demand for money in Pakistan: Some alternative estimates. *The Pakistan Development Review*, *14*(2), 249-257.

Ajmi, A. N., Apergis, N., & Montasser, G. E. (2015). Old wine in a new bottle: money demand causality for 10 Asian countries. *International Journal of Emerging Markets*, *10*(3), 491-503.

Akhtar, M. A. (1974). The demand for money in Pakistan. *The Pakistan Development Review*, *13*(1), 4-54.

Anwar, S., & Asghar, N. (2012). Is demand for money stable in Pakistan? *Pakistan Economic and Social Review*, 50(1), 1-22.

Apergis, N. (2015). Long-run estimates of money demand: new evidence from East Asian countries and the presence of structural breaks. *Applied Economics*, *47*(31), 3276-3291.

Atta-Mensah, J. (2004). *Money demand and economic uncertainty*. Bank of Canada. Working paper 2004-25

Azim, P., Ahmed, N., Ullah, S., Zaman, B. U., & Zakaria, M. (2010). Demand for money in Pakistan: an Ardle Approach. *Global Journal of Management and Business Research*, *10*(9), 76-80.

Baharumshah, A. Z., Mohd, S. H., & Masih, A. M. M. (2009). The stability of money demand in China: Evidence from the ARDL model. *Economic systems*, *33*(3), 231-244.

Bahmani-Oskooee, M., & Bahmani, S. (2014). Monetary uncertainty and demand for money in Korea. *Asian Economic and Financial Review*, *4*(3), 317-324.

Bahmani-Oskooee, M., & Bohl, M. T. (2000). German monetary unification and the stability of the German M3 money demand function. *Economics letters*, *66*(2), 203-208.

Bahmani-Oskooee, M., Xi, D., & Wang, Y. (2012). Economic and monetary uncertainty and the demand for money in China. *Chinese Economy*, *45*(6), 26-37.

Bahmani-Oskooee, M., & Xi, D. (2011). Economic uncertainty, monetary uncertainty and the demand for money in Australia. *Australian Economic Papers*, *50*(4), 115-128.

Arize, A. C., Spalding, J. B., & Umezulike, B. N. (1991). Impact of foreign monetary developments on demand for money: regression estimates and forecast results. *Journal of Economic Studies*, *18*(2), 39-48.

Bahmani-Oskooee, M., & Xi, D. (2014). Economic uncertainty, monetary uncertainty, and the demand for money: Evidence from Asian countries. *Australian Economic Papers*, *53*(1-2), 16-28.

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society. Series B (Methodological)*, 37(2), 149-192.

Brüggemann, I., & Nautz, D. (1997). Money growth volatility and the demand for money in Germany: Friedman's volatility hypothesis revisited. *Review of World Economics*, *133*(3), 523-537.

Cheong Tang, T. (2007). Money demand function for Southeast Asian countries: an empirical view from expenditure components. *Journal of Economic Studies*, *34*(6), 476-496.

Choi, W. G., & Oh, S. (2003). A money demand function with output uncertainty, monetary uncertainty, and financial innovations. *Journal of Money, credit, and Banking*, *35*(5), 685-709.

Faridi, M. Z., & Akhtar, M. H. (2013). An Estimation of money demand function in Pakistan: Bound Testing Approach to Co-integration. *Pakistan Journal of Social Sciences (PJSS)*, *33*(1).

Friedman, B. M. (1984). Lessons from the 1979-1982 monetary policy experiment. *American Economic Review*, 74(2), (May 1984), 382-387.