Modeling the Impact of Policy Environment on Inflows of Worker's Remittances in Pakistan: A Multivariate Analysis

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Modeling the Impact of Policy Environment on Inflows of Worker's Remittances in Pakistan: A Multivariate Analysis

by

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Abstract: The study investigates relevant significance of various economic determinants for inflows of worker's remittances to Pakistan. Following precedence from the policy index developed by Burnside and Dollar (2000), we develop a policy index for Pakistan and use it as a proxy for estimating the relationship of this policy index with the remittances in Pakistan. The study has also taken other conventional macroeconomic determinants into account such as GDP, exchange rate, labor force participation and interest rate spread for having efficient and precise coefficient estimates of our estimated model. The study finds that during the period (1972-2011) policy environment is one of the significant determinants of worker's remittances in Pakistan. Further, the application of several post estimation tests ascertains that our empirical model is robust.

Key Words: Workers' remittances, Growth, Policy index, Cointegration, Dynamic Error Correction

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I. Introduction

During past few ten folds, remittances have come up as a most prominent source of foreign inflows in Pakistan. The size of remittances was US$ 1848.29 million in 1990 escalated up to US$ 2389.05 million in 2000-01 and then while manifesting a record growth went up to US$13,186.58 million in 2011-12. The exercise becomes even more important with respect to a country like Pakistan where substantial percentage of the employed labor force moves abroad to find better employment opportunities and higher wage incomes, Ahmed (2011).

In view of the fact that studies have largely established a constructive association between remittances and economic growth[3], the valuation of important determinants of remittances particularly in a developing country context has gained much currency in recent years. Now where, the theoretical work while theorizing the significant determinants of remittances have covered several socio-economic factors for both the time series and cross sectional empirical settings of data series, the empirical studies have either opted for cross sectional or panel analysis, or have emphasized on the link between remittances and other economic variables. But as it is stated,

"Development assistance can contribute to poverty reduction in countries pursuing sound policies".

The same was further validated as

"Good governance and a sound policy environment are the most important determinants of foreign inflows" (WB, 1998, CIDA, 2000).

And none of the previous works[4] have been found to touch upon the relevance of this crucial exogenous economic policy environment *viz-a-viz* the growth of workers' remittances in a single country environment.

The work becomes salient in a way that a good economic policy does not only help to stabilize the national economy but also incentivize the foreigners to send their hard earned incomes back home for investment and consumption purposes. Now whether the form of economic policy is significant regarding the growth of workers remittance or whether it is neutral to the behavior of workers' remittances in Pakistan; the subject study intends

[3] see for example, Eswar S. Parsad (2007), Fayissa and Nsiah (2010)
[4] Nishat and Bilgrami (1991), Malik and Sarwar (1993), Ratha (2003), Arif (2009), Rashid et al. (2012), Anwar and Mughal (2012).

to answer this important question at large. Unlike the past studies we opt for a single country time series data, introducing a policy index to incorporate the nature of economic policy environment and test whether this variable is more significant as compare to other conventional factors of worker's remittances in case of Pakistan. Further, note that Country's workers staying abroad remitted more than US$ 1 billion during ten months of the fiscal year (2011). For detail inspection (See Table 1.1).

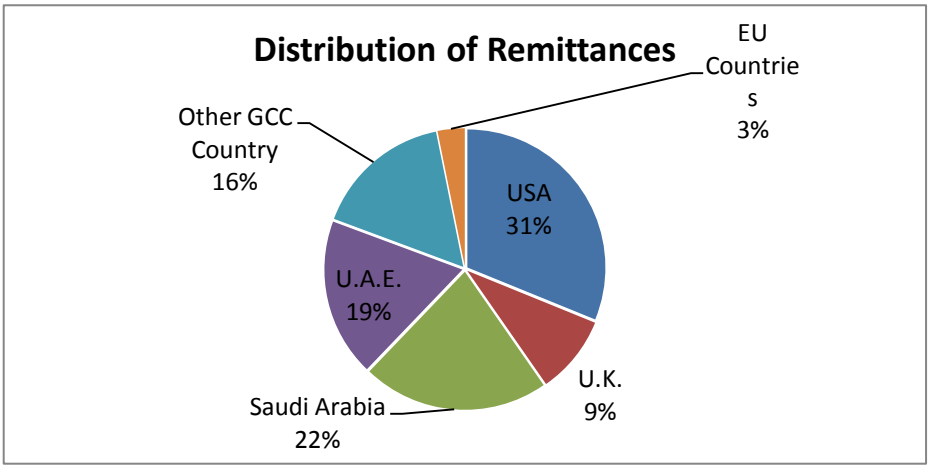
Table 1.1: Remittances Inflows to Pakistan in $ US Millions

Year	Remittances	Year	Remittances	Year	Remittances	Year	Remittances
1995	**1866.10**	**2000**	**983.73**	**2005**	**4600.12**	**2010**	**8906**
1996	**1461.17**	**2001**	**1086.57**	**2006**	**5493.65**	**2011**	**11201**
1997	**1409.47**	**2002**	**4236.85**	**2007**	**6451.24**		
1998	**1489.55**	**2003**	**3871.58**	**2008**	**6449**		
1999	**1060.19**	**2004**	**4168.79**	**2009**	**7811**		

Source: State Bank of Pakistan

By way origin it can be seen that remittances from other countries showed considerable growth in the past few years and almost all of this growth was done via official channels or banking channels. The inflow of remittances from USA, KSA and UAE are about twice than the others. The inflow of remittances in 2011 period from USA, UK, KSA, UAE, Other GCC countries (Bahrain, Kuwait, Qatar and Oman) and EU countries amounted as $2068.67 million, $1199.67 million, $2670.07 million, $2597.74 million, $1306.18 million and $354.76 million respectively. The respective distribution in percentage can be seen in the following figure 1.1.

Figure 1.1: Country Wise Remittances

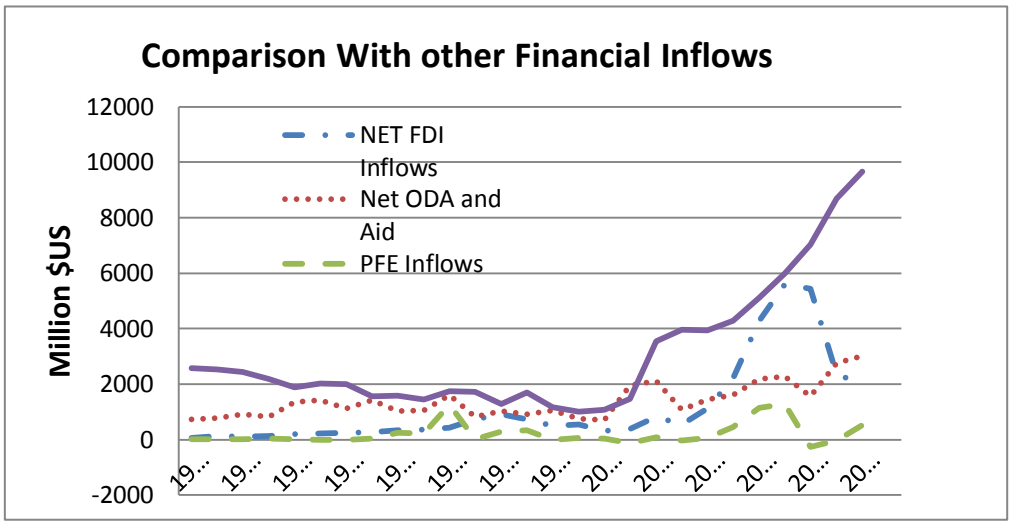


Source: Economic Survey by Government of Pakistan 2011-2012

The above statistical description connotes that remittances by and large have not only concentrated towards the Gulf and North American regions but also depend on the domestic economic environment based on its fluctuations in the early half of 21st century and then subsequent contraction in the later period.

The following graph shows that remittances are more resilient than the other financial flows like foreign direct investment, official development assistance, aid and portfolio equity inflows even during Global financial crisis.

Figure 1.2: Pliability of Worker's Remittances as Compared to Other Financial Flows to Pakistan



Source: World Bank, 2012

It can be seen that Pakistan has tremendous growth in remittances over the last two decades. Although, capital flows to developing countries seem to

increase during good economic phases and fall in bad eras; remittances on the other hand appear to show notable stability over the times.

A plethora of research on remittances has shown that workers' remittances are least volatile, stable or even we can say that remittances have negative relationship with political, economic and environmental fluctuations Mohapatra at el., (2009), Ratha (2003). This observing fluctuation in the growth of workers' remittances in Pakistan, one can infer that the remittances trends might have significant bearings for factors other than traditional economic variables such as GDP, Exchange rate and Interest rate differentials. The growth of remittances at the dawn of 21st century when the expansionary fiscal and monetary policies along with lesser trade barriers were in place alludes to prospect that there can be some exogenous factors such as the policy environment that may have significant relevance for the behavior of workers' remittances in Pakistan. And the current study will try to fill that missing link.

We will use different econometric techniques in this study organized as, firstly, for stationarity and the nature of data generating process of the series Dickey-Fuller test (1979) is used in this regard. Secondly, following Johansen (1988), a test based on trace and maximum Eigen value statistics is applied to determine long run association among variables having similar integration order. Thirdly, we estimate the dynamic Error Correction Model (ECM) following Sargen (1964).

II. Literature Review

On theoretical grounds Stark and Bloom (1985), classify that the whole family is involved in distribution of expenditures and benefits of remitting, Russell (1986) has outlined theoretical underpinnings costs and benefits of remittances viz-a-viz household utility preferences. On the basis of current theoretical works, the remittances has therefore been focused on that the household or family relations can play an important role in determining remittance choices but on the other hand, Johnson and Whitelaw (1974) discussed that there are pure altruistic incentives behind a migrant to remit. Some authors argue that altruistic choices drive the pace of remittances (Lucas & Stark). Some have argued that remittances can either augment economic growth or alleviate poverty Gupta et al. (2007) and Buch et al. (2002).

On empirical grounds, Wahba (1989) developed a model and suggest that workers will send their remittances officially or use official channels if the black market premium is less than the cost of using the black market. Buch et al. (2002) pointed out that such flows can effect economic growth via official

or non-official channels. However, the level of remittances via official one depends on how much economic environment and government plans are strong enough for investment activities. At the domestic grounds, remittances may encourage business sector activities and private investment Yang (2003), Woodruff and Zenteno (2004). El-Badawi and Rocha (1992) discussed two different approaches in a model on remittances. The first approach enlightened that government policy has less effect on required level of remittances. The second approach, associated with the portfolio tells that residual level of remittances was determined from the macroeconomic settings in the home and host countries. Jongwanich (2007) focused on that remittances bear a significant impact on reducing poverty and have little impact on growth. Further, Catrinescu, et. al., (2006) found that in the long run worker's remittances have positive but a weak impact on growth.

There are studies which found inverse relationship between the remittances and inflation rate in the recipient as well as between sending country's output and recipient's interest rates Katseli and Glytsos (1986). Singh et.al, (2009), found that workers' remittances behave as countercyclical to the changes in per capita growth on. The prior findings are the parallel to the outcomes of Chami, et. al, (2003). They used panel data techniques and found, remittances negatively related with economic growth. Chami et al, (2005) discussed that remittances are not profitable source but have a compensatory trend and have an adverse impact on economic growth contrary to the other capital flows like FDI. Also Chami et al. (2009) found that inflow of remittances provide an alleviating effect on growth. They focused on that if remittances used for consumption purposes rather than investment purposes then any growth effects through investment could be submissive.

In Pakistan, Rashid et al. (2012), Arif (2009) highlights the inflow of remittances thorough formal and informal channels and argued that about half of the remittances are transferred through informal channels. Some papers have estimated remittances multipliers for economies such as Pakistan and Mexico. See, for example, Nishat and Bilgrami (1991) and Adelman and Taylor (1990). Malik and Sarwar (1993) estimated consumption pattern of households in Pakistan by checking several hypotheses with or without remittances. Faini (1994) found that the depreciation in the real exchange rate is directly related with the amount of remittances being received by a country. Iqbal et al, (2005) showed that real GDP growth and remittances are positively correlated and later one is seem to emerge as a third important source of capital for economic growth in Pakistan. Kock and Sun (2011) established that exchange rate exhibit a significant impact and increase the level authorized

remittances or remittances through formal channels into the country. Anwar and Mughal (2012) using micro level data from household income and economic survey (HIES) of Pakistan and explain the demographic and geographical features of remittances and conclude that pure altruism motive is behind the migrant to send the remittances back to Pakistan. Remittance inflows can reduce poverty by increasing incomes of the beneficiaries, improving human development through financing on non-tradable sector. Therefore, remittances contribute heavily in economic uplift of the poor families (Munir et al., (2007), Qayyum et al., (2007)).

There are several research studies on the subject of workers' remittances that has shown; workers' remittances is one of the least volatile and steady source during political crisis, economic falls, or even to environmental fluctuations in home country as compared to other economic variables Ratha (2003) and World Bank (2006a). Remittances may shift from formal to informal sector and can discourage the remitter to remit or to send money because of policies and institutions in the home country, such as restrictions on exchange rate and black market premium IMF (2005), El-Sakka & McNabb (1999). Remittances improve the welfare and human capital or in other words remittances help to improve the living standard of the household while these are spent on social welfare. As a result, remittances increase productivity, freedom of choice and reduce poverty Buch and Kuckulenz (2010) and Maclellan and Mares (2005).

Lastly, remittances act as insurance against adverse shocks during crisis and natural disasters and for developing countries like Pakistan, and one of the important sources of foreign inflows Ratha (2003). Since remittances can affect the life of many people all over the world. So it is important to understand the flow of remittances from policy perspectives. Pakistan, on the similar count has witnessed tremendous growth in its foreign remittances during the past few years. As they have escalated up to US$13,186.58 million in 2011-12 from US$986.73 million in 2000-01 and now rising up to US$ 1347.67 million in Oct'2013 (State Bank of Pakistan). The highest amount of remittances received in history of Pakistan. Looking at these trends, it becomes important to gauge the macroeconomic determinants of remittances while covering *inter alia* those probable factors that have not yet been tapped by the researchers.

III. Methodology

In this study, we use variables by taking macro level data and high lightening the important factors of workers' remittances and model the impact of policy environment on Workers' remittances to conduct our empirical estimations following Swamy (1981), Sayan (2004), Aydas at el. (2005), Lueth and Arranz (2008) internationally, while on the other side, Nishat and Nighat (1993), Makhlouf and Mughal (2011), Anwar and Mughal (2012), Ahmed and Zarzoso (2013), at national level. None of these studies and existing literature finds out the impact of the policy environment in recipient country on Workers' remittances. On the basis of past empirical works, it can be inferred that in a given economy remittances; with other factors being constant, can generally be modeled as a function of Real GDP, Real Exchange Rate, Interest Rate Spread, Labor Force Participation rate and the main contribution of our study is to include Policy variable *i.e.*

$$LWR_t = f(LGDP_t, LEXC_t, LIRS_t, LLFP_t, P_t, \mu_t) \quad (1)$$

Where

LWR_t= Log of Real Workers' Remittances

$LGDP_t$= Log of Real Gross Domestic product

$LEXC_t$= Log of Real Exchange rate at LCU

$LIRS_t$= Log of Interest Rate Spread

$LLFP_t$= Log of Labor Force Participation Rate

LP_t = Log of Policy[5] Variable

μ_t = White noise[6] error term

The Augmented Dickey Fuller (ADF) (1979), test is applied to check the occurrence of unit root on log of all variables, using constant and trend. If the value of ADF test–statistic is less than critical value 5% level of significance then null hypothesis will be rejected and we will conclude that series is stationary using the following equation.

$$\Delta\log(x_t) = \alpha + \beta t + \rho\log(x_{t-1}) + \gamma\sum_{i=1}^{k}\Delta\log(x_{t-i}) + \varepsilon_t \quad (2)$$

[5] Unlike Javed and Qayyum (2011), we construct Policy index using a growth regression.

[6] White noise means a stationary process having all autocorrelation functions equal to zero.

Sims (1980) introduced the concept of VAR model for the multivariate analyses. Keeping in mind that the dynamics of VAR is difficult to interpret Lutkepohl (1993), however there are some authors who interpret the coefficients of VAR as the long run elasticities e.g. Hallam and Zanoli, (1993). Further, Johansen (1988) suggested that Error Correction Mechanism (ECM) has different designs or methods. The application of Vector Autoregressive (VAR) process to obtain Vector Error Correction Model is one of them. We apply conventional time series techniques to attain the stationarity of the data series and VAR/ECM will be used to estimate interdependence of the variables.

For this, we adopt the K-dimensional VAR process written as

$$X_t = a_o + a_1 \sum_{i=1}^{k} X_{t-i} + a_3 D_t + \varepsilon_t \qquad (3)$$

Where X_t is vector of variables that are used in this study i.e. LWR_t, $LEXC_t$, $LIRS_t$, $LIFP_t$ and LP_t. D_t is set of exogenous dummy variables included in the model to capture the effect of structural breaks in the model and ε_t is white noise error term. Now after doing some algebraic manipulation the above equation can be written as follows and is known as Error Correction Mechanism, first used by Sargen (1964).

$$\Delta X_t = a_o + a_1 t + \Pi X_{t-k} + \sum_{i=1}^{k} a_2 \Delta X_{t-i} + a_3 D_t + \varepsilon_t \qquad (4)$$

Where $\sum_{i=1}^{k} a_2 \Delta X_{t-i}$ are (VAR) component in their 1st differences and ΠX_{t-k} is error-correction components in levels. X_t is a vector of variables, *t* is the time trend, k is a lag length, D_t represents dummies and ε_t is a vector of error terms. Also the matrix Π is equivalent to the product of $\alpha\beta'$ i.e. $\Pi = \alpha\beta'$

For cointegration analysis, Johansen (1988), Maximum Likelihood approach is applied emphasizing on the relationship between characteristic root and rank of the π matrix. There are two LR test-statistics used to test the number of cointegrating relationships between Workers' remittances and its determinants based on characteristic roots named as, Trace Statistic and Maximum-Eigen Value Test Statistic are used in this study. It can be inferred that the trace test is a joint test as compared to the Maximum-Eigen Value test.

Note that these test stats are distributed as $\chi^2 \sim r(k-r)$ when t$\rightarrow \infty$. Note that if these two tests reports different number of cointegrating vectors then choose trace test as it is more powerful than maximum-eigen value test because it contains all $k-r$ values of the least eigen vector and in case of

non-normality Chueng and Lai (1993) and Hubrick et al. (2001) preferred trace test over maximum-eigen value test.

The desired model for dependent variable can be written as follows

$$\Delta \mathrm{LWR_t} = \alpha_0 + \alpha_1 \mathrm{t} + \Pi \mathrm{X_{t-k}} + \sum_{\mathrm{i=1}}^{\mathrm{n-1}} \alpha_{1\mathrm{i}} \Delta \mathrm{LWR_{t-i}} + \sum_{\mathrm{i=1}}^{\mathrm{n-1}} \alpha_{2\mathrm{i}} \Delta \mathrm{LGDP_{t-i}} + \sum_{\mathrm{i=1}}^{\mathrm{n-1}} \alpha_{3\mathrm{i}} \Delta \mathrm{LIRS_{t-i}} + \sum_{\mathrm{i=1}}^{\mathrm{n-1}} \alpha_{4\mathrm{i}} \Delta \mathrm{LEXC_{t-i}} + \sum_{\mathrm{i=1}}^{\mathrm{n-1}} \alpha_{5\mathrm{i}} \Delta \mathrm{LLFP_{t-i}} + \mathrm{e_t} \quad (5)$$

In this study, the dynamic error correction model is estimated following Hendry (1993) General to Specific Methodology, starting with general model including set of all variables, optimal lags of the variables as suggested by the lag selection criterions, dummy variables and the lag of error correction term. At the end, the final frugal model is obtained by dropping the insignificant variables keeping in mind that the error correction term is negative and significant throughout the estimation process.

The short run model can be estimated by following the ECM techniques and can be written as

$$\Delta LWR_t = \emptyset_0 + a_{1i} \sum_{i=1}^{n-1} \Delta LWR_{t-i} + a_{2i} \sum_{i=1}^{n-1} \Delta LGDP_{t-i} + a_{3i} \sum_{i=1}^{n-1} \Delta LIRS_{t-i} + a_{4i} \sum_{i=1}^{n-1} \Delta LEXC_{t-i} + a_{5i} \sum_{i=1}^{n-1} \Delta LLFP_{t-i} + \delta_1 ECM(-1) + \vartheta_t \quad (6)$$

Where $ECM(-1)$ is the error correction term and can be defined as:

$$ECM = LWR_t - \beta_0 - \beta_1 \sum_{i=1}^{n} LWR_{t-1} - \beta_2 \sum_{i=1}^{n} LGDP_{t-1} - \beta_3 \sum_{i=1}^{n} LIRS_{t-1} - \beta_4 \sum_{i=1}^{n} LEXC_{t-1} - \beta_5 \sum_{i=1}^{n} LLFP_{t-1} + \epsilon_t$$

The coefficient δ_1 is expected to be negative and significant and shows the speed of adjustment in the model and remaining coefficients in the model

are short rum dynamic coefficients which shows the adjustment of the long run equilibrium.

During the procedure of model selection, different tests are applied to identify the problem of autocorrelation, non-normality and Heteroscedasticity. To detect these problems Breusch-Godfrey Serial Correlation LM test (1978), Jarque-Bera test (χ^2) of normality (1980) and White Hetroscedastisity (ARCH) LM test (F-stat.) respectively are applied. Finally the stability of the parameters of estimated dynamic error correction model is checked by CUSUM and CUSUMSQ suggested by Brown, Durbin and Evans (1975).

Variables[7] used in this study for estimation from (1972-2011) are; The volume of Workers' Remittances (US$ Million), Gross Domestic Product (US $ Million), Exchange rate (LCU per US$, period average), Interest Rate Spread (annual %), Labor Force Participation Rate and Policy variable used as an index, generated by following Burnside and Dollar (2000). The growth regression includes Rate of inflation CPI (Annual %), Budget deficit (US $ Million) and trade openness (US$ million). However interest rate spread is calculated by difference between lending and borrowing interest rate while trade openness is calculated by sum of export and imports.

IV. Results and Discussion

1. Burnside-Dollar Model for Policy Index

Turning towards policy Index, The Burnside and Dollar form an index mentioning aspect of different economic policies. There are three main policies; namely, Fiscal, Monetary and trade policies that are measured by budget deficit (BD), level of inflation (*Inf*), and trade openness (TO) respectively. Now to elude the problem of collinearity Burnside and Dollar generate an index based on weighted average of three indicators as shown in the following growth regression.

$$Policy = -0.000165BD - 0.037151\,Inf + 17.56212\,TO \qquad (7)$$

The signs of the coefficients are very important regarding construction of Policy Index. Following the different studies[8] including Pakistan the coefficients of budget deficit and inflation are negative while the coefficient of

[7] All variables are transformed in Logarithmic form because it reduces the variance in data.
[8] Durbarry, et al. (1998), Easterly and Rebelo (1993), Ali (2005), Khan (2010), Iqbal and Zahid (1998) and Randel, et al. (2004).

trade openness is to be positive. Therefore the above regression validates the expectations quite sizably. The Index shows that good economic policy leading to more openness, low inflation and budget deficits will affect growth.

2. Augmented Dickey Fuller Test

Firstly we examine the all series graphically to determine the trend and intercept which has been introduced in the ADF equation. The test shows that all the series are random walk at their levels i.e. non-stationary. The following table shows all the series become stationary by applying first degree difference operator.

Table 4.1: Augmented Dickey Fuller (ADF) Test of Unit Root

Level				
Variables	**Constant/Trend**	**Lags**	**Level/ADF − Stat.**	**Decision**
LWR	C	1	-2.35	I(1)
LGDP	C, t	0	-2.02	I(1)
LEXC	C, t	0	-3.08	I(1)
LIRS	C	0	-1.94	I(1)
LLFP	C	1	-0.65	I(1)
LP	No C, t	1	-0.66	I(1)
First Difference				
Variables	**Constant/Trend**	**Lags**	**Level/ADF − Stat.**	**Decision**
LWR	No c, t	0	-3.19	I(0)
LGDP	C	1	- 4.26	I(0)
LEXC	C	0	-4.48	I(0)
LIRS	No c, t	0	-5.90	I(0)
LLFP	C, t	1	-5.57	I(0)
LP	No C, t	0	-8.05	I(0)

3. Cointegration Analysis

For finding the cointegration between variables first the VAR model has been estimated with five variables (LWR_t, $LGDP_t$, LEX_t, $LIRS_t$, $LLFP_t$

and LP_t) and two exogenous dummies are added, named as D LFP $_{1995}$ and DLFP $_{2001}$.

In the cointegration test we used the fourth model having restricted intercept and trend as explained by the Johansen (1995). Given the fact that cointegration test is very sensitive to the lag order so lag length has been selected by the following criteria given in the Table 4.2. On the basis of these results, we estimate our model with one lag to avoid over parameterization.

Table 4.2: Lag Selection

Lags	LL	LR	FPE	AIC	SC	HQ
0	49.14	NA	6.81e-09	-1.88	-0.98	-1.50
1	282.43	346.60*	9.27e-14*	-13.05*	-10.65*	-12.22*
2	347.58	46.83	6.85e-14	-13.56	-9.68	-12.18

Note: * indicates appropriate lag length at 5% significance level selected by criterion

Trace test, indicates one cointegrating relationship between the variables but on the other hand Maximum Eigenvalue test calculated by maximum likelihood method in Johansen (1988) indicates no cointegrating relationship (See Table 4.3). Although these two tests report different number of cointegrating vectors yet we choose trace test because it is more powerful than maximum-eigen value test and it contains all k-r values of the least Eigen vector. Again in case of non-normality Chueng and Lai (1993) and Hubrick et al. (2001) preferred trace test over maximum-eigen value test. In this study we consider the results of trace test having one cointegrating relationship. That is because the null hypotheses $r = 0$ and $r \leq 1$ is overruled against the alternate ones $r \geq 1$ and $r \geq 2$ one-to-one at 5 % significance level.

Table 4.3(a): Johansen Maximum Likelihood Test

(Variables = LWR_t, $LGDP_t$, $LEXC_t$, $LIRS_t$, $LLFP_t$, LP_t and Order of VAR is 1)

Null	*Trace Test*			
Alternative	*Chi−square*	5% *C.V*	*Prob.***	
r = 0	r ≥ 1	126.28*	118.71	0.013*
r ≤ 1	r ≥ 2	85.34	88.81	0.09
r ≤ 2	r ≥ 3	53.09	63.88	0.29

r ≤ 3	r ≥ 4	30.95	42.92	0.45
r ≤ 4	r ≥ 5	14.76	25.87	0.59
r ≤ 5	r ≥ 6	4.46	12.52	0.68

Note: Trace test statistic indicates one cointegrating equation or cointegrating vector at the 0.05 level.* denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values

Table 4.3(b): Johansen Maximum Likelihood Test

Null	Maximal Eigenvalue Test			
	Alternative	*Chi−square*	5% *C.V*	*Prob**.*
r = 0	r = 1	40.95	44.50	0.12
r ≤ 1	r = 2	32.24	38.33	0.21
r ≤ 2	r = 3	22.14	32.12	0.48
r ≤ 3	r = 4	16.19	25.82	0.53
r ≤ 4	r = 5	10.31	19.48	0.59
r ≤ 5	r = 6	4.46	12.52	0.68

Note: Max-eigenvalue test statistic indicates no cointegration or cointegrating vector at the 0.05 level.* denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.

4. Long Run Equation

From the cointegration analysis, we obtain long run coefficients of our variables for the desired workers' remittances function that are given below. Chi-Square values are reported in parentheses (.).

$$LWR_t = 0.58\,t - 0.67LGDP_t - 7.39\,LEXC_t + 0.36\,LIRS_t - 1.78\,LLFP_t - 2.93\,LP_t \quad (4.1)$$

(5.81) (5.34) (12.25) (4.00) (1.00) (17.06)

The above equation explains that GDP has significantly negative relationship with workers' remittances in a way that for 1 % increase in the GDP there will be 0.67% decrease in the workers' remittances. There is significant negative relationship between exchange rate and workers' remittances. If there is 1 % increase in the exchange rate there will be 7.39 % decrease in the workers' remittances. There is significant positive relationship between interest rate spread and worker remittances showing that there is 1 % increase in the domestic interest rate spread the remittances will boost up by

0.36 %. There is negative relationship between labor force participation rate and worker's remittances highlights that 1% increase in labor force participation rate there will 1.78% decrease in the inflow of workers' remittances.

5. Dynamic Error Correction Model (ECM)

The following equation 4.2 is the error correction model of study. The ECM represents two parts that are short run dynamics and long run. (t-statistics are given in parentheses)

$$\Delta \mathrm{LWR}_t = \underset{}{3.25} + \underset{(4.24)}{0.54}\Delta \mathrm{LWR}_{t-1} - \underset{(-3.14)}{2.73}\Delta \mathrm{LGDP}_t - \underset{(-2.14)}{1.68}\Delta \mathrm{LEXC}_t - \underset{(-3.74)}{3.17}\Delta \mathrm{LEXC}_{t-1}$$
$$+\underset{(2.40)}{0.21}\Delta \mathrm{LIRS}_{t-1} - \underset{(-2.85)}{0.93}\Delta \mathrm{LP}_t + \underset{(2.26)}{0.42}DWR_{2000} + \underset{(4.76)}{0.78}DLFP_{2001} - \underset{(-3.51)}{0.60}DINF_{2003}$$
$$-\underset{(-2.41)}{0.52}DINF_{2007} - \underset{(-2.29)}{0.09}ECT_{t-1} \qquad (4.2)$$

Diagnostic Test

$R^2 = 0.74$, $\bar{}R^2 = 0.62$, Log likelihood = 24.84, F-statistic = 6.09

Serial Correlation LM Test = 0.18 White Heteroskedasticity Test = 1.54

ARCH Test = 1.47 Jarque-Bera Test = 1.32 Ramsey RESET Test = 9.20

From above equation, t-statistics of differenced independent variables show that short run estimates and t-statistics of lagged error correction term (ECM) indicate long run relationship that is derived from the long run equation of our study. The above mentioned equation is estimated with one lag length selected on the basis of diagnostics tests. The list of diagnostic test can be seen in table 4.4.

The short run equation (4.2) is tested through the above mention diagnostic tests for the sake of reliable and accurate results. To be specific, we applied several diagnostic tests to check validity and reliability of model and test the hypotheses of non autocorrelated, homoskedastic and normally distributed residuals. The serial correlation hypothesis is tested by using the Lagrange-Multiplier test (up to the maximum lag), Next, White's test is applied to detect the hetroskedasticity and the Jarque-Bera test is applied to

check the normality. So first the Breusch Godfrey LM test has been applied on the residual of the model to test the autocorrelation and from the F-statistics (0.18) we cannot reject the null hypothesis of no autocorrelation. The F statistics of White Heteroskedasticity test that is 1.54 showing that we cannot rejects the null hypothesis of no Heteroskedasticity. To test normality of residual Jarque-Bera test has applied and chi-square value that is 1.32 cannot rejects the null hypothesis that residual are normal. This information takes us to believe that the estimated ECM is stable and significant enough for the prior analysis.

Figure 4.9.a: CUSUM Test of Mean Stability

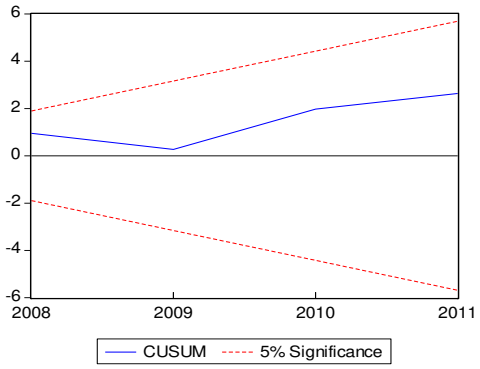
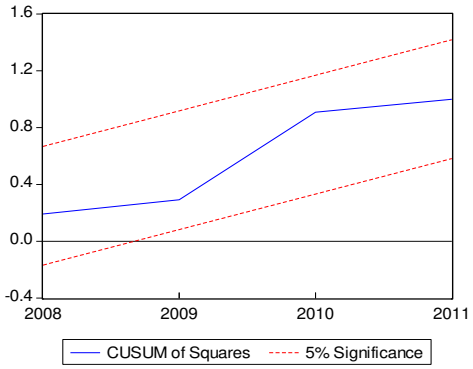


Figure 4.9.b: CUSUM of Square Test of Variance Stability



Since structural shifts can be present in the parameters of the model. Therefore the following test is designed to detect the nonzero mean of recursive residuals. The Cumulative Sum of Recursive residual (CUSUM) and CUSUM of squares tests have been applied to test the mean and variance stability of the model. If the CUSUM and CUSUM of Squares are away from zero mean line means the underlying model is unstable.

The result indicates that coefficient of error correction term (ECM (-1)) is negative and significant at 5 % level which validates that there exist a long run relationship between variables. Further, the value of estimated coefficient of error correction term is 0.09% which shows a slow speed of adjustment to the long run equilibrium. Its mean error term is correcting its previous disequilibrium to the long term.

V. Conclusion

The study highlights that both the policy index and the GDP although appears to have negative relationship with the growth of workers' remittances in Pakistan, one may not generalize this to the conclusion that GDP growth

rate is not good for the country or the policy makers should always pursue bad economic policies to attract more remittances. Both of these relationships underline the complex nature of our economy, variations in the observed patterns of data and the relevance of externals economic shocks for defining the trends of workers' remittances. On average, the periods of presumably bad economic policies with low growth and high inflation did witness higher workers remittances not entirely because bad policies attracted more remittances but because negative economic shocks and natural disasters and resultant inflow of remittances have successfully outweighed the negative impacts of these bad policies in Pakistan. The study has thus uncovered a unique paradox for Pakistan regarding its experience for the growth of workers' remittances during the last four decades. Bad policies coupled with shocks have resulted into net gains as far as the growth in workers' remittances in Pakistan.

The study has also established that prudent monetary policy, i.e. stabilizing interest and exchange rates will attract more workers remittances' in Pakistan. Negative relationship between GDP and workers remittances is more because of the nature and composition of growth processes during the last four decades rather than the impact of growth itself. Furthermore, the episodes of economic shocks though might have positive impacts on the growth of workers remittances, one cannot overlook the negative effects of these shocks on other economic variables including public and private investment and spending. The policy makers should therefore, pursue sound economic policies consistently and ensure that the future volume of remittances becomes reliably dependent more on the consistent positive growth and favorable economic policies than being negatively determined by cosmetic economic growth and inconsistent economic policies (good or bad).

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