The Determinants of International Migration in Pakistan: New Evidence from Combined Cointegration, Causality and Innovative Accounting Approach

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THE DETERMINANTS OF INTERNATIONAL MIGRATION IN PAKISTAN: NEW EVIDENCE FROM COMBINED COINTEGRATION, CAUSALITY AND INNOVATIVE ACCOUNTING APPROACH

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Abstract

This study investigates the determinants of international migration over the period of 1980-2013 for Pakistan. In order to investigate the relationship between migration, inflation, remittances and unemployment, we have applied Bayer-Hanck combined cointegration to test whether a long run relationship exists between variables or not. The results predict that series are stationary at 1st difference and cointegration exist among variables. VECM Granger causality explains that inflation, remittances and unemployment cause migration in both short and long run. Variance Decomposition Approach shows that unemployment has highest share in explaining migration and migration also has highest share in explaining unemployment in both short run and long run. Policy maker should focus on reduction of unemployment by promoting real sector economic activates to control international migration.

Keywords: Migration, Remittance, Unemployment, Cointegration, Innovative Accounting Approach, Pakistan

JEL classification: F22, F24

1. Introduction

Migration is not a new phenomenon. It has started after the creation of humans. History of mankind is completed with the examples of people migrating from a country to another country either for permanent settlement or for a short duration in search of better social and economic life. History of migration showed that there were few checks on the movements of the people leaving one country for another owing to the reason of better quality of life. But the present migration between the countries is not open-ended. There are strong state interventions usually in the form of statutory and regulatory measures both in the country of origin and destination of migrants. There are many push and pull factors of migration exist in the literature. According to Lee, (1966); Datta, (1998), (2002); Solimano, (2002) and Borjas, (2001), push factors include lack of jobs opportunities, primitive conditions, desertification, famine, persecution, forced labour, poor medical care, loss of wealth, natural disasters, death threats, bullying, discrimination and poor chances to marrying, and pull factors include job opportunities, better living condition,

freedom of religion, freedom of enjoyment, education, better medical care, attractive climates, security, friends and family links, industry and better chances to marrying.

Pakistan as a developing and emerging economy continuously doing efforts for its growth. Population of Pakistan is increasing continuously. It was 188.02 million during the year 2013-2014 by comparing 184.35 million during the year 2012-13 and 180.71 million in 2011-12. Due to increase in population, total labour force has also increased from 57.2 million in 2010-11 to 59.7 million in 2012-13. Total number of people employed during 2012-13 was 56.0 million. Unemployment rate has also increased to 6.2 percent in 2012-13 as compared to 6.0 percent in 2010-11 (Economy survey of Pakistan 2013-14). Due to increase in unemployment rate, people are migrating across the world. High inflation rate is also affecting migration in Pakistan. It was 8.7% in 2014 which is high by comparing 5.8% in 2013. (Economy survey of Pakistan 2012-13, 2013-14)

Due to increase in unemployment and inflation, international migration has increased. The reduction of unemployment is the main objective of the government, which has introduced policies, wherein, measures have been taken with a view to release the pressure of unemployment. In this direction, emigration is one of the significant and immediate steps, which may help in eradicating the menace of unemployment. International migration in 2014 was 14647 for highly qualified people and 6216 for highly skilled people. When we compare this with 2012, we found there is a huge gap exist by 9298 for highly qualified and 4202 for highly skilled people. Skilled, semi-skilled and unskilled people have increased international migrations by 287649, 120204 and 323750 respectively in 2014. When we compare this counting with 2012 which was 261531 for skilled people, 104240 for semi-skilled people and 259316 for unskilled people was very low (Bureau of Emigration and overseas employment, 2013). The government is making sincere efforts to boost overseas employment. The total number of emigrant was 0.45 million in 2011 which has increased to 0.63 million in 2012 which include 0.26 million unskilled, 0.26 million skilled, 0.1 million semi-skilled workers. (Economy survey of Pakistan 2012-13)

According to Migration and Remittances report of the World Bank (2014), Pakistan is ranked on 7th number, in terms of the largest recipient of officially recorded remittances in the world. After India, Pakistan is the second largest recipient of remittances in South Asian region. The available data suggest inflow of the remittances for the period of July-April 2013-14 stood at $ 1,289.46 million compared to $ 1,156.98 million during the corresponding period last year, which is 11.45 percent higher over the previous period (Economy survey of Pakistan 2013-14). Pakistan is one of the 20 countries of the world where remittances cover more than 20 percent of imports and more than 30 percent of exports. Pakistan has remained an attractive labour market for manpower recipient countries. Last two decades, the outflow of Pakistani workers was toward Europe, USA, Canada and mainly to UK. Last two decades, the expansion of developmental activities and growing economies in the advanced countries specially oil rich countries of Gulf and Middle East which are still scarce in manpower resources have paved the way for a countries having surplus labour economy like Pakistan to deliberate over and make effective and constructive polices to capture the labour markets of manpower needy countries. So that, the government of Pakistan has signed agreements with Malaysia, Qatar, Oman, Saudi Arabia and Kuwait for exporting her labour to reduce unemployment through migration.

This study contributes in existing literature in following ways. First, this study investigates the relationship between migration, remittances, inflation and unemployment. Before this, there is

not a single study that has checked the impact of remittances, inflation and unemployment on migration collectively. Second, this study applies combined cointegration proposed by Bayer and Hanck, (2014) to test the long run relationship between variables. Third, this study differentiates long run and short run relationship between variables. Forth, it applied VECM Granger causality approach to find the direction of causality. Finally, robustness of causality results is examined by using innovative accounting approach (IAA). Section 2 shows literature review. Section 3 covers Data collection, Methodology and model construction. Similarly, section 4 explains statistical and empirical analysis. Whereas, section 5 covers conclusion and recommendations.

2. Literature review

In literature review, the work of different researchers has been summed up. The number of studies regarding factors that can affect the migration have been undertaking during the last two decades to assess the determinants of migration. Rotte and Vogler, (1998) delved the determinants of international migration from 86 African and Asian developing countries to Germany. Trade, development and migration have used to estimate determinants over the period 1981-1995. The estimation results confirm the existence of an inverse u-shaped relationship between development and migration, as well as the importance of the political situation in sending countries and of network effects. Similarly, Jennissen, R. (2003) investigated economic determinants of net international migration in Western Europe for time spam from 1960-1998. Net migration, GDP per capita, unemployment and average educational level have utilized to estimate time series regression. The results revealed that GDP per capita has a positive effect and unemployment has a negative effect on a country's net international migration.

Mendoza, (2006) probed the macroeconomic determinants of Mexican migration to the USA by using information on the regional economic characteristics of the Mexican states, in a context of economic integration with the US economy. A cross sectional database at the regional level is used to estimate a weighted least squares regression. The results show that the PIB per capital had a negative effect, state unemployment rates and permanent migrant stocks displayed a positive effect on the rates of migration growth. Hix and Noury, (2007) found the determinants of European Union migration policies. The passage of six pieces of migration and immigrant integration legislation in the fifth European Parliament (1999–2004) have used to estimate regression analysis. The results provided that the strongest determinants of policy outcomes on migration issues in this arena are the left-right preferences of EU legislators. Poveda, (2007) probed determinants of migration in rural population in south of Veracruz state of Mazico by applying three level multinomial logistic model. Individual, family and local characteristics of the migration have used to identify three different spaces of migration, traditional market, the northern border and United States. Each case of migration appears associated with certain local and family situations, and favors certain characteristics of the migrants.

Mayda, (2010) estimated the determinants of bilateral flows of international migration for OECD countries by taking time period 1980 to 1995. The results of panel data regression were due to pull factors income of destination countries will improve which will cause increase in emigration and due to push factors, level of per worker GDP will decline. Further it is confirmed that the effect of push factors remains negative and pull factors effect remains negative in those days when immigration laws become less restricted. Similarly, Ahmad et.al. (2008) found

macroeconomics determinants of international trade by taking time serial data from 1973 to 2005 for Pakistan. They have applied Johansen cointegration which has confirmed cointegration between variables. According to results, inflation rate, real remittance and unemployment rate have positive relationship with migrant workers and real wage rate has negative relationship with migrant workers. Sanderso, (2010) found the relationship between international migration and human development in destination countries. A cross section analysis of less developing countries has completed by using data from 1970 to 2005. The results indicated that higher level of international migration are associated with lower scores on the human development index but that effect of international migration is relatively small.

Kim, (2010) explored the determinants of international migration inflows to 17 Western countries and outflows from 13 of these countries between 1950 and 2007 in 77,658 observations from multiple sources using panel-data analysis techniques. The independent variables most influential on inflows were demographic like population of origin and destination and infant mortality rate (IMR) of origin and destination and geographic such as distance between capitals and log land area of the destination. Social and historical determinants were less influential. Mahinchai, (2010) investigated demographic and household characteristics of migrants for Nang Rong, Thailand. Survey has been conducted in 1994-1995 and 2000-2001 for data collection. The variables gender, age, years of schooling, and family size have significant impact on migration. Household head has significant positive effects on both rural-to-urban and rural-to-rural migration. This could be explained by the fact that a household head tends to possess the highest human capital, which leads to the highest returns from this migration decision, after taken into account migration cost to the urban settings. Beyene, (2011) estimated determinants of internal and international migration to rural areas and to other urban areas in Ethiopia. For international migration, wealth and network variables are found to be important. For internal migration, Human capital variables like age and education matters only. Social capital variables have strong explanatory power for international migration. The new economics of labour theory migration is important for all migrations.

Beine and Parsons, (2012) studied climatic factors as determinants of international migration by using 1960 to 2000 panel data for 226 origin and destination countries. This study estimated the utility maximization model has derived by income maximization approach of neo classical. According to results, Urbanization due to natural disasters cause internal migration and that Environmental changes tend to result in more temporary internal movement. Those countries have less ground water reserve their migration is high and countries heavily depends upon agriculture their migration is low. Climate change and climate variations have little impact upon international migration. Similarly, Beine and Parsons, (2012) evaluated determinants of international migration by incorporating climatic factors. Unexpected short-run factors, captured by natural disasters and long-run climate change and climate variability captured by deviations and volatilities of temperatures and rainfall from and around their long-run averages have analyzed in this study by using data spam 1960 to 2000. This study found evidence that shortfalls in precipitation constrain migration to developing countries from those which rely more heavily upon agriculture and spur movements to developing countries from those with fewer groundwater reserves. Ullah, (2012) estimated determinants of international labour migration. It applied the gravity model to investigate panel data of migration from Bangladesh to 23 destinations during the period from 1995 to 2009. The results revealed that economics, demographic and cultural factors have significant influence on migration. Institutional strengthening has priority to develop skilled manpower, to foster emigration in the OECD.

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Sprenger, (2013) investigated the determinants of international migration in European Union. This study took time series data from 2000 to 2009 for 21 developed countries including EU and OECD. Estimated models were OLS, Poission, NB1 and NB2 and results indicate that all traditional, geographic, demographic and cultural variables are significant. Same language for both host and home country cause high migration. Low distance and free movement of workers have positive impact on migration. One reason of failure in migration gain for European Union is difference in culture. Ahmad, et. al. (2013) searched the determinants of internal migration in Pakistan by analyzing data from 2010 to 2011. Logistic regression model has used to study age, education, female education and other factors and it concluded that female education is a significant determinant of internal migration. However, Cuaresma, et. al. (2013) studied determinants of global bilateral migration flows by using gravity model for international migration. According to results, gravity model can be explained by GDP differences, distance or bilateral population. Tabassum, (2014) evaluated the determinants of migration and its role in environment restoration in dry areas of Pakistan. Primary data has collected through questionnaires covering 465 randomly selected households, in-depth interviews and focus group discussions at community level. Findings suggested that environment change has significant influence on migration by effecting agricultural production.

Mahendra, (2014) investigated the effects of trade liberalization on migration by using North American Free Tread Agreement (NAFTA) as a quasi- natural experiment. This paper has integrated data from DEMIG-C2C and MOxLAD for 1974 to 2010 period. The findings of this paper suggest that trade and migration are short-run complements and long-run substitutes, with a significant period of adjustment. Similarly, Farooq, et. al. (2014) studied the determinants of international migration for Pakistan which has compelled the people of lower wage countries to higher wages countries. The poor economic opportunities, resources inequality and demographic behavior have found the main determinants of international migration. Probit model technique proved that individuals from less resources communities were migrated to Middle East and European countries in order to improve their household income. Mahmud, et. al. (2014) explored the impact of social sector development on internal migration. The results revealed 63% of the people who have migrated in last ten years have moved to an urban area. Out of these, the majority 56% moved to the provincial or the federal capital. Individual give preference to the degree of social sector development in these urban districts. Economic opportunities and the degree of urbanization of the destination districts as the important pull factors for rural migration.

3. Methodology, data collection and model construction

Data has collected from Bureau of Emigration and Overseas Employment, Govt. of Pakistan and International Financial Statistics, IMF for annually time period 1980 to 2013. The general discussion in existing international literature leads us to use a general function of migration as following:

$$M_t = f\,(Inf_t, r_t, umemp_t) \qquad (1)$$

$$M_t = \beta_0 + \beta_1 inf_t + \beta_2\, r_t + \beta_3\, unemp_t + \mu_t \qquad (2)$$

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Sum of people that have migrated from Pakistan to rest of the world including highly qualified, highly skilled, semi-skilled, skilled and unskilled people is used as dependent variable. Inflation rate proxies by consumer prices as annual percentage, unemployment rate and foreign remittances in US dollars per year have taken as independent variables. The contribution of this study is to estimate international migration by incorporating remittances, unemployment and inflation for extended time spam from 1980 to 2013. Walsh, (1974) explained that inflation and unemployment both are necessary and sufficient for people to move from developing countries to rest of the world for better earning and employment opportunities. We have transformed series into logarithm for empirical purpose. Logarithm function is following:

$$\ln M_t = \beta_0 + \beta_1 \ln inf_t + \beta_2 \ln r_t + \beta_3 \ln unemp_t + \mu_t \quad (3)$$

$\ln M_t$ shows natural log of number of people who have migrated from Pakistan to rest of the world, $\ln inf_t$ shows natural log of inflation rate proxies by consumer prices as annual percentage, $\ln r_t$ shows natural log of foreign remittances in US dollar and $\ln unemp_t$ shows natural log of unemployment rate. In the time series analysis, series are unreliably integrated if two or more series are individually integrated. Firstly, this study has applied the Ng-Perron unit root test to avoid the problem of spuriousness. Standard cointegration approaches require information about the unit root properties of the variables. Traditional unit root test such as ADF, DF-GLS and PP provide vague results once data span is small. Ng-Peroon unit root test provides consistent and efficient results and suitable for small data set. Several techniques have been developed in time series literature to address the cointegration phenomenon. These techniques include Engle and Granger, (1987) cointegration approach, Johansen (1991) Johansen maximum Eigen value test, Phillips and Ouliaris (1990) Phillips-Ouliaris cointegration test and Error Correction Model (ECM) based F-test of Peter Boswijk (1994), and the ECM based t-test of Banerjee et al. (1998). These all tests provide different results.

3.1. Bayer and Hanck Combined Cointegration

To enhance the power of cointegration, Bayer and Hanck invented combined cointegration based on several cointegration tests. The null hypothesis explains that there is no cointegration among series of variables. Similarly, alternative hypothesis explains that cointegration exist among variables. This technique called *Bayer and Hanck, (2013) combined cointegration.* Following Bayer and Hank (2013), the combination of the computed significance level (*p*-value) of individual cointegration test in this paper is in Fisher's formulas as follows:

$$EG - JOH = -2\,[ln(P_{EG}) + (P_{JOH})] \quad (4)$$

$$EG - JOH - BO - BDM = -2[ln\,(P_{EG}) + (P_{JOH}) + (P_{BO}) + (P_{BDM})] \quad (5)$$

where P_{EG}, P_{JOH}, P_{BO} and P_{BDM} are the p-values of various individual cointegration tests respectively. It is assumed that if the estimated Fisher statistics exceed the critical values provided by Bayer and Hanck (2013), the null hypothesis of no cointegration is rejected.

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3.2. VECM Granger Causality

After checking cointegration, we apply VECM Granger causality to test the direction of causality. The Granger causality test with VECM frame work is as follow:

$$\Delta Lm_t = \vartheta_1 + \sum_{i=1}^{p} \vartheta_i \Delta Lm_{t=i} + \sum_{j=1}^{q} \vartheta_j \Delta LInf_{t=j} + \sum_{k=1}^{n} \vartheta_k \Delta Lr_{t=k} + \sum_{l=1}^{m} \vartheta_l \Delta Lunem_{t=l} + \eta_1 ECM_{t-1} + \mu_i \quad (6)$$

$$\Delta LInf_t = \lambda_1 + \sum_{i=1}^{p} \lambda_i \Delta LInf_{t=i} + \sum_{j=1}^{q} \lambda_j \Delta Lm_{t=j} + \sum_{k=1}^{n} \lambda_k \Delta Lr_{t=k} + \sum_{l=1}^{m} \lambda_l \Delta Lunem_{t=l} + \eta_2 ECM_{t-1} + \mu_i \quad (7)$$

$$\Delta Lr_t = \delta_1 + \sum_{i=1}^{p} \delta_i \Delta Lr_{t=i} + \sum_{j=1}^{q} \delta_j \Delta Lm_{t=j} + \sum_{k=1}^{n} \delta_k \Delta LInf_{t=k} + \sum_{l=1}^{m} \delta_l \Delta Lunem_{t=l} + \eta_3 ECM_{t-1} + \mu_i \quad (8)$$

$$\Delta Lunem_t = \gamma_1 + \sum_{i=1}^{p} \gamma_i \Delta Lunem_{t=i} + \sum_{j=1}^{q} \gamma_j \Delta Lm_{t=j} + \sum_{k=1}^{n} \gamma_k \Delta Lr_{t=k} + \sum_{l=1}^{m} \gamma_l \Delta LInf_{t=l} + \eta_4 ECM_{t-1} + \mu_i \quad (9)$$

where, Δ is a difference, ECM represents the error correction term which is derived from long run cointegration. $\vartheta_1, \lambda_1, \delta_1$ and γ_1 are constant and η (i=1,2,3,4) are uncorrelated error term with zero mean. The optimal lag *p* is determined by Akaike Information Criterion (AIC) because of its superior properties for small data set. The long run causality is expressed by the significance of lagged *ECM* terms using t test. For short run causality is determined by F-statistics or Wald test. Further, this study has also applied Innovative Accounting Approach (IAA).

4. Empirical estimation and results interpretation

Table 1 shows descriptive statistics and results of correlation matrix. Jarque-Bera results has reported in table which shows that series are normally distributed having zero mean and constant variance. Correlation matrix shows mutual relationship between variables. According to results, Inflation, remittance and unemployment have positive correlated with migration. Remittance is positively correlation and unemployment is negatively correlated with inflation. Similarly, unemployment is positively correlated with remittance.

Table 1 - Descriptive statistics and correlation matrix

Variables	$\ln m_t$	$\ln Inf_t$	$\ln r_t$	$\ln unemp_t$
Mean	11.95941	2.048650	21.77949	1.639663
Median	11.84808	2.124291	21.56036	1.688393
Maximum	13.36701	3.009937	23.40607	2.112635
Minimum	10.96823	1.069573	20.71926	1.122003
Std. Dev.	0.620226	0.481069	0.756001	0.300649

Skewness	0.823740	-0.429023	0.766210	-0.268735
Kurtosis	2.898637	2.452069	2.559855	1.976171
Jarque-Bera	3.145173	1.468336	3.601224	1.894225
Probability	0.145173	0.479905	0.165198	0.387859
$\ln m_t$	1.0000			
$\ln Inf_t$	0.445165	1.0000		
$\ln r_t$	0.838891	0.269723	1.0000	
$\ln unemp_t$	0.443163	-0.136328	0.217025	1.0000

Source: Author's calculation

To analysis cointegration, testing the stationary of data is precondition. For this purpose, there are many unit root test is available such as ADF by Dicky and Fuller (1981), P-P by Philip and Perron (1988), DF-GLS by Elliot et al. (1996) and NG-Perron (2001). Traditional unit root test ADF, DF-GLS and PP provide ambiguous results for small data time period. Ng-Peroon unit root test provides consistent and efficient results and suitable for small data set. That's why this study has applied Ng-Perron unit root test and results are shown in table 2. All variables are not stationary at level with intercept and trend. But when we take 1st difference, all variables such as migration, inflation, remittance and unemployment have become stationary.

Table 2 - Ng-Perron Unit Root Analysis

Variables	MZa	MZt	MSB	MPT
$\ln m_t$	-6.12232	-1.61548	0.26387	14.7645
$\ln Inf_t$	-7.78045	-1.97211	0.25347	11.2127
$\ln r_t$	-1.57209	-0.70780	0.45074	42.1214
$\ln unemp_t$	-8.53171	-2.03172	0.23814	10.7905
$\Delta \ln m_t$	-32.1057*	-3.99994	0.12459	2.87554
$\Delta \ln Inf_t$	-15.9329***	-2.80751	0.17621	5.80758
$\Delta \ln r_t$	-15.7399***	-2.79426	0.17753	5.85466
$\Delta \ln unemp_t$	-14.6414***	-2.70177	0.18453	6.24643

*and *** Represents significant at 1% and 10% level of significance.
Source: Author's calculation

We find all variables are stationary at 1st difference or integrated at I(0) which lead us to apply Bayer and Hanck, (2013) combined cointegration approach and Johansen cointegration approach to test the cointegration among variables. For this purpose, we need to select optimal lag. Table 3 shows results of lag length criteria for optimal lag selection. There are many criteria's such as sequential modified LR test statistic, final prediction error, Akaike information criterion, Schwarz information criterion and Hannan-Quinn information criterion. This study is flowing AIC for best lag selection due to its superior properties. There are 3 optimal lag by AIC which we are using in our analysis.

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Table 3 - Lag length criteria

VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	1.996823	NA	0.066724	0.129237	0.314268	0.189553
1	7.059439	8.492114	0.051411	-0.132866	0.098422	-0.057472
2	10.03804	4.804207*	0.045345	-0.260519	0.017027	-0.170046
3	12.40116	3.659031	0.041651*	-0.348462*	-0.024658*	-0.242910*

* indicates lag order selected by the criterion.
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
Source: Author's calculation

Table 4 reported the results of combined cointegration including EG-JOH and EG-JOH-BO-BDM tests. The result reveals that Fisher statistics for EG-JOH and EG-JOH-BO-BDM are greater than critical values at 1% and 5% significance. This indicates that both EG-JOH and EG-JOH-BO-BDM statistically reject the null hypothesis of no cointegration between variables. This implies that long run relationship exists between migration, inflation, unemployment and remittances. Table 5 shows results of long run analysis. All variables (remittance, inflation and unemployment) have positive significant impact on migration from Pakistan in long run. These results are also confirmed by Ahmad et al, (2008); Mayda, (2010); Ahmad et.al. (2008). Coefficient values of inflation, remittance and unemployment are 0.24. 0.57 and 0.43 respectively. It means that 1% increase in inflation, remittance and unemployment will lead to increase in migration by 0.24%, 0.57 and 0.43 respectively. R squared value is 0.86 which shows that 86% model is explaining by independent variables. F-statistics value is significant at 1% which shows that overall model is significant.

Table 4 - The Bayer and Hanck Combined Cointegration Analysis

Estimated model	EG-JOH	EG-JOH-BO-BDM	Cointegration
$M_t = f(Inf_t, r_t, umemp_t)$	12.26707**	45.889556*	Yes
$Inf_t = f(M_t, r_t, umemp_t)$	11.79927**	23.112804**	Yes
$r_t = f(Inf_t, M_t, umemp_t)$	11.47844**	77.183199*	Yes
$umemp_t = f(Inf_t, r_t, M_t)$	11.20292**	26.785986**	Yes

*and **Represents significant at 1% and 5% level. Critical values at 1% level are 16.259 for (EG-JOH) and 31.169 for (EG-JOH-BO-BDM) and
5% level are 10.637 for (EG-JOH) and 20.486 for (EG-JOH-BO-BDM). Lag length is based on minimum value of AIC.
Source: Author's calculation

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Table 5 - Long Run Analysis

Dependent Variable: $\ln m_t$			
Constant	Coefficient	Std. error	T-statistics
$\ln Inf_t$	0.242685***	0.119147	2.036860
$\ln r_t$	0.572354*	0.106779	5.360172
$\ln unemp_t$	0.436816***	0.250595	1.743113
R-squared	0.869922		
F-statistic	54.50158		
Prob. Value	0.000000		

Note: significance at 1% and 5% is shown by *, ** and *** respectively.
Source: Author's calculation

The results of short run analysis have displayed in table 6. According to results, Inflation and remittance have significant positive impact on migration. Unemployment has positive insignificant impact on migration. Coefficients explain that 1% increase in inflation and remittance will lead to increase in migration by 0.17 and 0.42% respectively. Error Correction Model (ECM) shows speed of adjustment from disequilibrium to equilibrium. Lagged value of ECM is negative 0.49 and significant. It means that model will move disequilibrium to equilibrium by speed of 49% each year. F-statistics shows overall model is significant in short run. Figure 1 and 2 show the results of stability tests such as CUSUM and CUSUM sum of square which indicates parameters are stable. So, we can rely on our results.

Table 6 - Short Run Analysis

Dependent variable: $\ln m_t$			
Constant	Coefficient	Std. error	T-statistics
$\ln Inf_t$	0.173460***	0.101877	1.702635
$\ln r_t$	0.426017**	0.174108	2.446853
$\ln unemp_t$	0.400981	0.242043	1.656655
ECM_{t-1}	-0.494856*	0.176625	-2.801742
R-squared	0.343608		
F-statistic	3.664357		
Prob. value	0.016014		

Note: significance at 1%, 5% and 10% is shown by *, ** and *** respectively.
Source: Author's calculation

There must be unidirectional or bidirectional causality among variables if cointegration is confirmed. We have applied VECM Granger causality approach to test the direction of causality in both short and long run. It helps to provide a clear picture of causality relationship among variables for policy makers. The results which are reported in table 7 explain that Inflation, remittance and unemployment cause migration in both short and long run. It means that unidirectional causality exists between migration and inflation, remittance and unemployment. Similarly, migration, remittance and unemployment cause inflation only in long run. Migration, inflation and unemployment cause remittance only in long run. Unidirectional causality exists between migration, inflation and remittance to unemployment in long.

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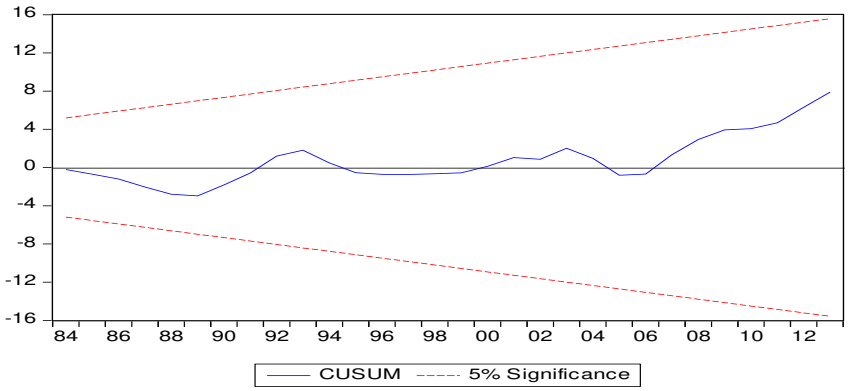
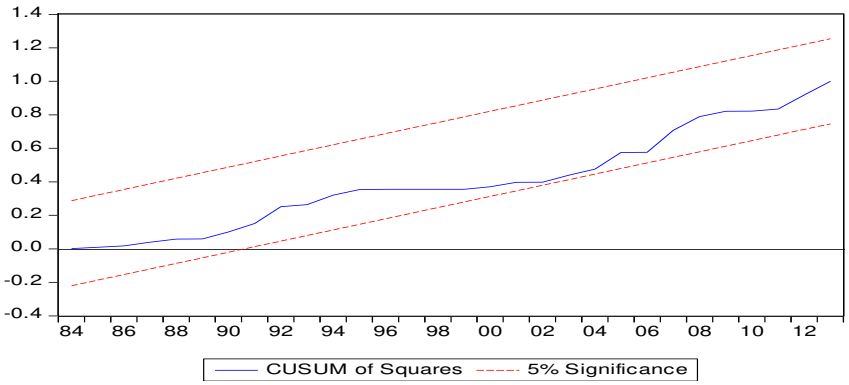


Straight lines represent critical bounds at 5% significant level
Source: Author's calculation

Figure 1 - Plot of CUSUM sum of Recursive Residuals



Straight lines represent critical bounds at 5% significant level
Source: Author's calculation

Figure 2 - Plot of Cumulative Sum of Squares of Recursive Residuals

The VECM Granger causality is favorable only to detect a causal relationship between the variables within the sampled period. To evaluate causality forward the sample period, the innovative accounting approach is much better. VECM Granger causality does not provide magnitude of predicted error variance and effect of shocks. These deficiencies can be covered by applying the innovative accounting approach which is the combination of variance decomposition and the impulse response function. Pesaran and Shin, (1999) has indicated generalized forecast error variance decomposition method. It shows the proportional contribution in one variable due to innovative shocks stemming in other variables. The main advantage of this approach is that like orthogonalized forecast error variance decomposition approach; it is insensitive with ordering of the variables because ordering of the variables is uniquely determined by VAR system. Further, the generalized forecast error variance decomposition approach estimates the simultaneous shock effects. Engle and Granger, (1987) and Ibrahim, (2005) argued that with VAR framework, variance decomposition approach produces better results as compared to other traditional approaches.

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Table 7 - The VECM Granger Causality Analysis

Variables	Direction of Granger Causality				
	Short Run				Long Run
	$\ln m_t$	$\ln Inf_t$	$\ln r_t$	$\ln unemp_t$	ECT_{t-1}
$\ln m_t$	----	4.1068**	4.0115**	2.7003***	-0.9070*
		(0.0298)	(0.0320)	(0.0884)	(-4.7414)
$\ln Inf_t$	2.5415	----	1.0553	0.7330	-0.6669**
	(0.1006)		(0.3643)	(0.4913)	(-2.8065)
$\ln r_t$	2.4570	0.1943	----	0.7241	-0.3198**
	(0.1079)	(0.8247)		(0.4955)	(-2.1045)
$\ln unemp_t$	1.1480	0.5073	0.0231	----	0.3534**
	(0.3348)	(0.6087)	(0.9772)		(-2.1758)

Note: *, ** and *** represent significance at 1%, 5% and 10% levels respectively.
Source: Author's calculation

Table 8 - Variance Decomposition Approach

Variance Decomposition of $\ln m_t$					
Period	S.E.	$\ln m_t$	$\ln Inf_t$	$\ln r_t$	$\ln unemp_t$
1	0.224709	100.0000	0.000000	0.000000	0.000000
3	0.438507	85.15475	1.143967	9.929696	3.771586
5	0.523068	74.36782	1.789937	15.28801	8.554234
7	0.607734	70.16138	3.958953	15.89532	9.984342
9	0.691336	68.09256	4.702704	15.62455	11.58018
11	0.758578	66.87934	4.475094	14.72155	13.92402
13	0.813715	65.94107	4.160530	13.62499	16.27341
14	0.837097	65.51177	3.996904	13.09828	17.39305
15	0.857771	65.08768	3.839236	12.60694	18.46615
Variance Decomposition of $\ln Inf_t$					
Period	S.E.	$\ln m_t$	$\ln Inf_t$	$\ln r_t$	$\ln unemp_t$
1	0.367299	4.898134	95.10187	0.000000	0.000000
3	0.470339	6.532598	91.47826	1.739540	0.249602
5	0.484939	6.669998	88.39900	4.666215	0.264788
7	0.505332	8.601801	83.44352	7.679110	0.275569
9	0.536079	12.70684	76.38724	10.58709	0.318839
11	0.564959	16.87646	69.91913	12.37601	0.828404
13	0.593481	20.81267	64.17049	13.18756	1.829276
14	0.607413	22.61399	61.56650	13.34364	2.475867
15	0.620844	24.25931	59.16690	13.37636	3.197425
Variance Decomposition of $\ln r_t$					
Period	S.E.	$\ln m_t$	$\ln Inf_t$	$\ln r_t$	$\ln unemp_t$
1	0.226300	21.61804	4.796472	73.58549	0.000000
3	0.445004	30.97982	15.13828	52.72157	1.160334
5	0.638714	38.93993	16.23074	43.87774	0.951586
7	0.792188	44.24806	14.63984	38.68740	2.424696
9	0.927770	48.12616	13.12431	34.03272	4.716811

11	1.046691	50.82221	11.66267	30.12917	7.385954
13	1.148211	52.55870	10.38300	26.91198	10.14631
14	1.192540	53.14131	9.828244	25.53606	11.49438
15	1.232655	53.56621	9.330240	24.30476	12.79879
Variance Decomposition of $\ln unemp_t$					
Period	S.E.	$\ln m_t$	$\ln Inf_t$	$\ln r_t$	$\ln unemp_t$
1	0.161773	12.29119	1.071305	1.359835	85.27767
3	0.223044	28.30134	1.709456	1.866664	68.12254
5	0.264296	29.23730	2.450231	2.670611	65.64186
7	0.289938	25.67065	4.460062	5.074656	64.79463
9	0.306090	23.11991	5.763438	8.037167	63.07948
11	0.318951	21.63896	7.150182	11.04557	60.16528
13	0.331510	21.47926	8.401088	13.84201	56.27765
14	0.338031	21.88785	8.896784	15.04344	54.17193
15	0.344808	22.57294	9.294239	16.06909	52.06373

Source: Author's calculation

The results of Variance Decomposition Approach (VDA) has described in table 8. The results explained that 65% portion of migration is explaining by its own shocks. Inflation explains migration by 3%, remittance describe migration by 12% and unemployment illuminate's migration by 17% which is highest among all variables. Similarly, migration, remittance and unemployment contribute to explain inflation by 24%, 13%, and 3% respectively. Inflation is contributed by its own shocks by 59%. Inflation and unemployment are explaining remittance by 9% and 12% respectively. Migration has highest share in explaining remittance by 53%. Remittance is explaining by 24% of its own shock. Similarly, migration, inflation and remittance are explaining unemployment by 22%, 9% and 16% respectively. Unemployment is explaining by its own innovative shock by 52%. By simplifying, this study find that bidirectional causality exists between migration and unemployment. Unidirectional relationship exists between migration and inflation. Migration is causes remittance.

Figure 3 is showing impulse response function. The impulse response function is alternative to variance decomposition approach. It shows how long and to what extent dependent variable reacts to shock stemming in the independent variables. The results express that response in migration due to shocks stemming in inflation and unemployment is positive increasing and then partially constant after 3rd and 5th time horizon respectively. The response of migration due to inflation is positive and then negative after 5th time horizon. The response of inflation due to migration is positive. Response of inflation due to remittance is negative than positive after 3rd time horizon. Inflation responses constant due to unemployment. The response of remittance due to migration and inflation is positive and negative respectively. Similarly, the response of unemployment due to migration and remittance are positive and negative correspondingly. Inflation contributes negative after 3rd time horizon.

5. Conclusion and recommendation

The purpose of this study was to investigate the determinants of international migration for Pakistan. Annually data set from 1980 to 2013 has been used to determine the relationship

between migration, inflation rate, remittance and unemployment rate. Ng-Perron unit root test has applied to check stationarity of data. Bayer-Hanck combined cointegration has applied to check long run relationship among variables. The results reveals that series of data are integrating at 1st difference. Cointegration approach has confirmed the existence of long run relationship. This study found unemployment, inflation and remittance have significant impact on migration in long run. Lagged value of ECM is negative and significant value which shows 49% speed of adjustment from disequilibrium to equilibrium per year. So it requires approximately 2 years to move from disequilibrium to equilibrium. VECM Granger causality shows inflation, Unemployment and remittance cause migration in both short run and long run.

The results of Variance Decomposition Approach show that major portion of migration is explaining by unemployment and migration also explain higher portion of unemployment. The major share of Inflation and remittance is explaining by migration. Policy makers should focus on push factor such as unemployment and inflation. Migration can be control by reducing unemployment through increasing real sectors economic and employment activities. Government should also take some steps for reduction of inflation. Remittance leads to increase migration. Remittance can be used to enhance economic activates which can help us to reduce inflation and unemployment.

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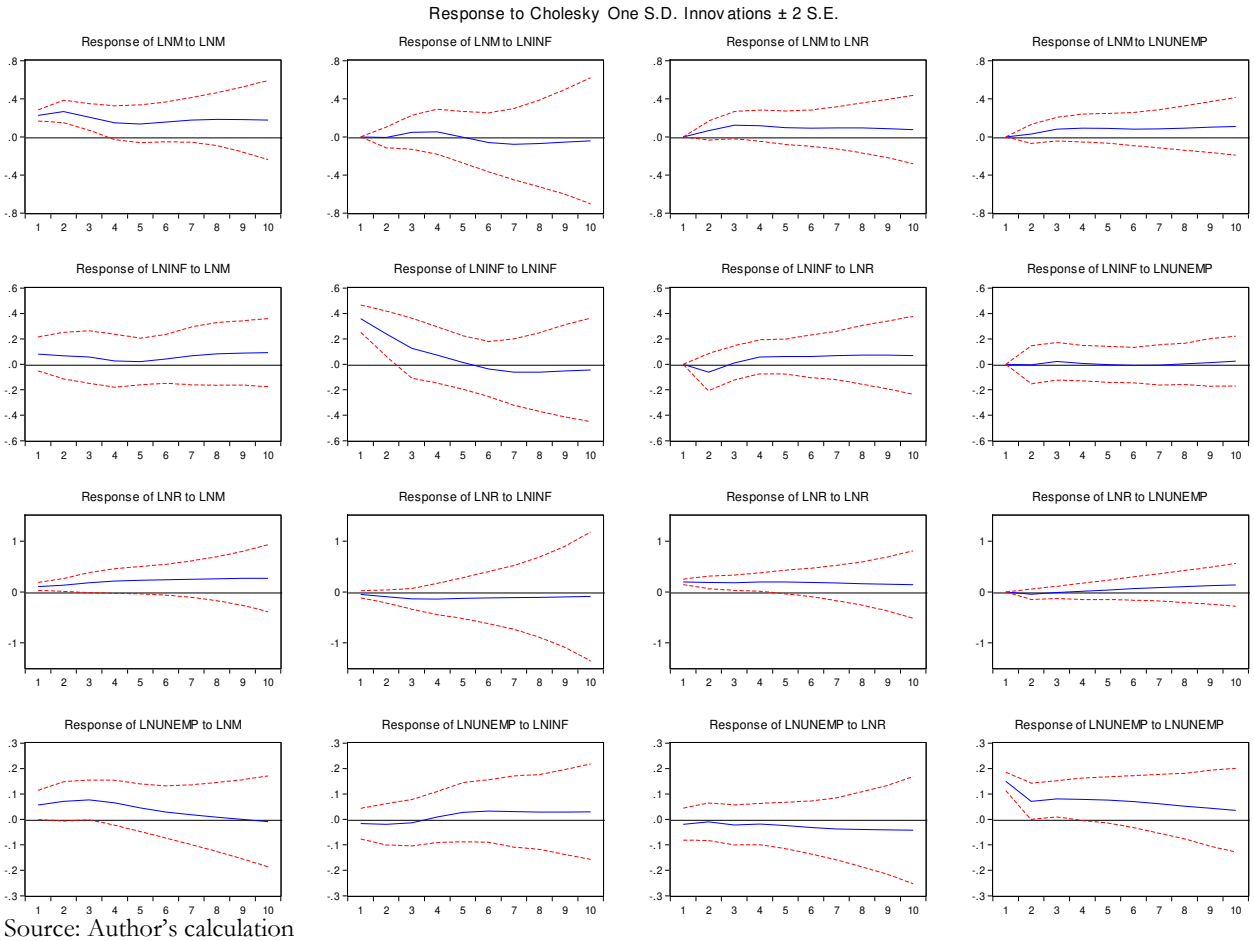
Appendix



Source: Author's calculation

Figure 3 - Impulse response function