

Inflation Caused by Remittance in Nepalese Economy

Netra Prasad Nepal

Lecturer

Faculty of Management, Mechi Multiple Campus, Tribhuvan University

Email: netranepal98@gmail.com

Abstract

Present paper aims at identifying the impact of remittance on inflation in Nepalese economy through econometric methodology such as Cointegration test, Vector Error Correction Models (VECM) and Granger Causality tests. Using annual data series from 1990/91 to 2018/19, the variables under study are found to be cointegrated as reported by Johansen's cointegration test. The VECM also shows the short run and long run relationship between the variables. The Granger Causality test shows the uni-directional causality from remittance to inflation. Present paper focuses on the emphasis of using remittance on capital formation. The returned migrants are to be provided soft loans to establish domestic and small-scale industries. The returned migrants are to be encouraged to forced saving.

Keywords: Cointegration, unit root, capital formation, saving

Introduction

Remittance plays crucial role in both developing and underdeveloped countries. According to Panta (2014), "Remittances have attracted increasing attention in the international discourse, partly owing to their magnitude and stability in the positive growth trend over the past three decades. A growing consensus is emerging that remittances constitute a significant source of external financing" (p.277).

Remittance has positive effect on the economy to contribute economic growth and development. For example, Yaseen (2012) argued that the spread channels by which the funds of remittances of the emigrated workers can have positive effects on the growth of their home country; The transmitted funds can fund the dynamic investment, moreover, when these funds are deposited in financial institutions whether local or intentional in terms of savings, this will imply a significant increasing and raising in the financial resources of these financial institutions, hence it will encouraging these institutions to expand its performance by granting more credit to the companies in their markets for short or long term loans, and granted by non-banking financial institutions to companies or households; on the other hand, when the families of the emigrated workers encounter difficulties of credit rationing, the remittances enable them to get out of these difficulties and are able to finance their needs for consumption or their capital expenditures. Of course, in order this effect takes place, it is necessary that the families which receive these funds, be driven to do that.

The general impression of several observers is that the remittances in the current form are underutilized in Nepal. Primarily, this is because the lion's share of these inflows is used for the purpose of daily consumption, rather than savings, education, or investment. Thus, it does not appear to facilitate the buildup of a domestic capital stock that could help to increase domestic per capita income in the long run (Maskay, Steinkamp, & Westermann, 2014).

Present paper attempts to examine the impact of remittance on inflation through time series econometric methodology. The detail description on econometric tools is provided in

methodology section. The rest of the paper is organized as: next section endeavors the presentation of literature on the impact of remittance on inflation. After review of related literature, next section attempts to present data and methodology; while the section after methodology is devoted to results and discussion and the paper ends with conclusion and policy implication.

Literature Review

This section includes some theoretical and empirical literatures on the impact of remittance on inflation. As a theoretical view, Reinhart and Kenneth (2004) opined that different exchange rate regimes have considerably a number of effects on macroeconomic variables in the economy. Under a fixed exchange rate regime, for instance, an increase in remittances will move resources from the tradable to the non-tradable sector. This will result in an increase in the price level. Since the exchange rate is fixed, the country cannot adjust its international relative prices after a negative shock to the tradable sector. The nominal depreciation is, thus, prevented, and as a result, the tradable output contracts and the price level rises. Narayan et al. (2011) argued that remittance generated inflation in developing countries and the effect of remittance on inflation is more pronounced in the long run.

In fact, remittance is one of the very important receipts to developing countries from foreign countries. Remittance is said to be creating positive effect in developing countries. In addition to positive effect, it also creates negative effect like inflation in the economy. For example, Narayan et al. (2011) examined the determinants of inflation using a sample of 54 developing countries in the world. Their result showed that remittances lead to an increase in inflation and the effect becomes more obvious in long term. However, this research is conducted using statistical data for period of ten years from 1995 - 2004 and does not pay attention to particular features of remittances in the Asian and the Pacific developing countries. In addition, this study has not deeply analyzed the causal effect between remittances and inflation during the research period (Tung & Pham, 2015). Ball, Ropez and Leys (2013) also found the increasing effect of remittance on inflation in GCC countries. Likewise, Khan and Islam (2013) also proved the effect of remittance on inflation for Bangladesh.

In any organization there must be an affirmative association between inflation and relative price variability (RPV) because of the price setting behavior of different commodities' characteristics and marketplaces in which these commodities are transacted. This impact also depends on those industries, which stream these commodities (Viqueira, 1991, & Snudden, 2017). However, Risso and Carrera (2009) argued that the increase in government spending and policy of exchange rate expand the space between relative prices of transacted vis-à-vis non-traded commodities during earlier Mexican economic crises of 1994. Meyer and Shera (2017), and Rogers and Wang (1995) revealed that it was strong evidence regarding the fiscal policy; real money growth, asset market turbulence, and exchange rate, which were the main causes of inflation. They further concluded that the money growth and fiscal shocks have played the most influential factors in inflation.

Methodology

In order to analyze the impact of remittance on inflation empirically, the econometric techniques such as Johansen's Cointegration Test, Vector Error Correction Models and Granger Causality Test have been used. Present paper uses annual data sets for remittance and inflation from 1990/91 to 2018/19. The data sets are taken from Economic Survey, Ministry of Finance, Nepal. The Consumer's Price Index (CPI) as proxy for inflation has been transformed into the

natural logarithmic form is denoted by LnP_t , and it is found to be non-stationary at level and stationary at first difference. The variable $LnCPI$ in its first difference is denoted by $dLnP_t$.

The nominal data sets of remittance are first converted into real term with base year 2005/06 and transformed into logarithmic form and is denoted by $LnRemit$, which is found to be non-stationary at level form and stationary at first difference. The first difference of $LnRemit$ is represented by $dLnRemit_t$. The level data have been used in Cointegration and VECM, while first differenced data are used in Granger Causality test.

Results and Discussion

Johansen's Cointegration Test

Before carrying out the cointegration test of Johansen, it is necessary to find out the appropriate lag of the concerned variables. There are various criteria for selecting the lag length. Table-1 reveals the selection of lag length through VAR technique.

Table 1

Selection of Appropriate Lag Using Different Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	8.8370	NA	0.0001	-0.353763	-0.21771	-0.3079
1	214.3926	361.2794	9.48e-10	-12.2662	-11.7220	-12.0831
2	258.4506	69.42475	1.15e-10	-14.3909	-13.4386*	-14.0705*
3	264.7296	8.7524	1.41e-10	-14.2260	-12.8655	-13.7682
4	279.8747	18.357*	1.05e-10*	-14.5984	-12.8298	-14.0033

It is observed from the Table 1 that HQ and SC statistics for lags 2 are significant at 5 % level. So lags 2 are selected for each endogenous variable in their autoregressive and distributed lag structure in estimable cointegrating equations and VEC models.

The Johansen method of cointegration is based on Max-Eigen and Trace Statistic value. The following results (Table-2 and Table-3) have been revealed for Johansen approach while allowing linear deterministic trend (intercept and trend in cointegrating equation and no intercept in VAR) in the data.

Table 2

Results from Cointegration Test Based on Maximum Eigen Value (λ_{\max})

H_0	H_a	λ_i	λ_{\max}	0.05 Critical Value
$r = 0$	$r = 1$	0.5596	28.7029	25.8232
$r \leq 1$	$r = 2$	0.3178	13.3864	19.3870

Using second order VAR of the two endogenous variables (LnP_t & $LnRemit_t$) under investigation, the hypothesis of $r = 0$ is strongly rejected in favor of the alternative hypotheses $r = 1$ employing the maximum Eigen-value test as reported by the 4th column of Table 2. The maximum Eigen-value test of $r = 1$ versus $r = 2$ fails to reject the null hypothesis of $k = 1$, implying one cointegrating vector. Based on the Maximum Eigen-Value Test, one cointegrating vector ($r = 1$) is detected. Thus, on the basis of maximum Eigen-value test, the variables under study are found to be cointegrated.

Table 3*Results from Cointegration Test Based on Trace Statistics (λ_{Trace})*

H_0	H_a	λ_i	λ_{max}	0.05 Critical Value
$r = 0$	$r = 1$	0.5596	53.6639	42.9152
$r \leq 1$	$r = 2$	0.3178	24.9610	25.8721

Turning to the trace test as reported by Table-3, the null hypothesis $r \leq 1$ cannot be rejected while the hypotheses $r = 0$ is rejected at 5 percent significant level indicating one cointegrating vector ($r = 1$). The trace test also indicates that the variables under study are cointegrated.

Both Maximum Eigen-Value test and Trace Test indicate that the variables P_t , $Remit_t$ and PG_t are cointegrated, there is found to be long run equilibrium relation among these variables during the study period 1975-2012.

Vector Error Correction (VEC) Models

A vector error correction (VEC) model is a restricted VAR designed for use with non-stationary series that are known to be cointegrated. The VEC has cointegration relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the *error correction* term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. As indicated by VAR lag selection criteria in Table 1, lags 2 are suitable for each endogenous variable in accordance with SC and HQ criteria. The estimable VEC models are presented as:

$$dP_t = \gamma_1 + \rho_1 Z_{1t-1} + \alpha_1 dP_{t-1} + \alpha_2 dP_{t-2} + \beta_1 dRemit_{t-1} + \beta_2 dRemit_{t-2} + \varepsilon_{1t} \quad (1)$$

The results from Vector Error Correction Models are presented in Table 4. With dP_t as dependent variable the coefficient of error correction term (Z_{1t-1}), $\rho_1 = -0.44$ is significant at 1% level, which indicates that the short run shocks significantly affect the long run relationship between the variables under study. The negative value of $\rho_1 = -0.44$ indicates that $dLnP_t$, following any positive short run shocks, declined. Consequently, the short run shocks appeared to pull down the dP_t below the long run equilibrium level. The absolute value of the coefficient of Z_{t-1} to be lower than unity, i.e. $|\rho_1| < 1$, which implies that $dLnP_t$ converged to the long run equilibrium level following a short run shocks. Thus, long run relationship between dP_t as dependent variable and $dRemit_t$ as independent variable is found to be stable. Consequently, the short run dynamics defined an 'equilibrium' process. The coefficient of $dLnRemit_{t-1}$ is positive and significant only at 10% level. This implies that there is little economic significance regarding the relationship between inflation and remittance in short run. The remittance at time ' $t - 1$ ' is found causing the inflation at time ' t '.

Table 4*Results from Vector Error Correction Models*

Variables	Coefficients	Standard Errors	t-Statistic
γ_1	$\gamma_i = -0.1256$	0.0852	-1.4731
Z_{1t-1}	$\rho_1 = -0.4404$	0.1275	-3.4521
dP_{t-1}	$\alpha_2 = 0.1452$	0.1459	0.9952
dP_{t-2}	$\alpha_3 = -3000$	0.1465	-2.0479
$dRemit_{t-1}$	$\beta_1 = 0.0343$	0.0183	1.8699
$dRemit_{t-2}$	$\beta_2 = 0.0071$	0.0147	0.4841

Granger Causality Test Based on Wald Test

In order to identify the causality between the variables, present study employs the Granger causality/ Block exogeneity Wald test. This test detects whether the lags of one variable can Granger-cause any other variables in the VAR system. The null hypothesis is that all lags of one variable can be excluded from each equation in the VAR system. For example, this test helps to answer whether or not all lags of $dLnRemit_t$ can be excluded from the equation of $dLnP_t$ or not. Rejection of the null hypothesis means that if all lags of $dRemit_t$ cannot be excluded from the dP_t equation then dP_t is an endogenous variable and there is causality of $dRemit_t$ on dP_t . The test statistic is (Enders, 2003):

$$(T - 3\rho - 1)(\text{Log}|\sum re| - \text{Log}|\sum un|) - \chi^2(2\rho) \quad (2)$$

Where T is the number of observations; $\sum un$ is variance/covariance matrices of the unrestricted VAR system; $\sum re$ is variance/covariance matrices of the restricted system when the lag of a variable is excluded from the VAR system; and p is the number of lags of the variable that is excluded from the VAR system.

The results from VEC Granger causality/block exogeneity Wald test have been presented through Table 5 that portrays the block exogeneity Wald tests of three equations. Equation first has the dependent variable $dLnP_t$ and equation second has the dependent variable, $dLnRemit_t$. Equation first has the hypotheses:

H_{01} : $dLnRemit_t$ does not Granger cause $dLnP_t$ up to lag 2

H_{a1} : $dLnRemit_t$ Granger causes $dLnP_t$ up to lag 2

Equation second has the hypotheses:

H_{01} : $dLnP_t$ does not Granger cause $dLnRemit_t$ up to lag 2

H_{a1} : $dLnP_t$ Granger causes $dLnRemit_t$ up to lag 2

Table 5

Results from Granger Causality Test

Excluded	Chi-Square	Degree of Freedom	Probability
<i>dLnP_t as dependent variable</i>			
<i>dLnRemit_t</i>	7.7205	2	0.0211
<i>dLnRemit_t as independent variable</i>			
<i>dLnP_t</i>	3.8000	2	0.1496

The probability value of excluded variable $dLnRemit_t$ is 0.0211 and Chi-square statistic at 2 degree of freedom is 7.720. There is strong evidence of rejecting the null hypothesis H_{01} as indicated by Chi-square statistic and probability value. This allows us to consider the alternative hypothesis H_{a1} . Therefore, it can be concluded that $dLnRemit_t$ up to its 2 lags has Granger caused $dLnP_t$. However, the null hypothesis H_{02} : $dLnP_t$ does not Granger cause $dLnRemit_t$ up to lag 2, cannot be rejected as implied by low χ^2 and high probability value. This concludes that dP_t up to lag 2 has not Granger caused $dLnRemit_t$.

It is, therefore, under VEC model, the dependent variable $dLnP_t$ is found to have Granger caused by the independent variable, $dLnRemit_t$ up to lags 2. Hence, it can be concluded that Nepalese inflation is caused by inflow of remittance.

Conclusion and Policy Implications

Present study is devoted to identifying the impact of remittance on inflation in Nepalese economy with the help of annual data sets of consumer's price index (proxy for inflation) and remittance over the period 1990/91-2018/19 employing econometric methodology. Johansen's cointegration test, Vector Error Correction Model and Granger causality test were the main econometric methodologies to identify the impact of remittance on Nepalese inflation during the study period. Before carrying out these econometric tools, stationarity test on the variables were performed. Using ADF unit root test, the variables were found to be non-stationary at level forms and they were identified as stationary at their first differences.

As reported by Johansen's cointegration test, there is found to be long run equilibrium relationship between remittance and Nepalese inflation. In other words, these two variables are found to be cointegrated as reported by Eigen value test and Trace statistics during the study period. There is found to be one cointegrating vector between remittance and inflation. The VECM reported that short run shocks found to be affecting the long run relationship between inflation and remittance. Finally, Granger causality test reported that there is found to be uni-directional causality between remittance and inflation and causality is found to be running from remittance to inflation.

Present study throws some light in policy perspective. Remittance is one of the causes of Nepalese inflation. Though remittance invites inflation, it is most inevitable factor to contribute Nepalese GDP. It occupies more than 26% of the GDP in Nepal. Remittance should further be increased in the economy. Proper management of remittance is necessary. Government should encourage the remittance earners to use it in productive activities. The remittance should be emphasized to use in capital formation. The remittance earner families should be given tax concessions if they use remittance in domestic and small scale industries. The returned migrant should be provided soft loan facilities for establishing the industries. The creation of environment of investment will obviously discourage the use of remittance in unproductive activities. The demonstration effect of consumption can gradually be reduced and there will emerge the environment of capital formation. Additionally, the remittance earners are to be encouraged to increase saving.

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