NRB Working Paper No. 33

July 2016

Remittances and Exchange Rate Linkages: Experiences of Nepal

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ABSTRACT

The significance of remittances has profound implications for a variety of national policy choices in the current Nepalese context. In such context of growing role of remittances, this paper concentrates on the impact of a few macroeconomic variables—nominal exchange rate, economic activity in host countries and workers' outflow—in determining the remittance inflows to Nepal. More specifically, we focus on the role of the nominal exchange rate in driving remittances inflows. Our empirical strategy includes the use of OLS, Engle-Granger cointegration test and FM-OLS based on the monthly data for the period 2006-2015. Among others, our empirical results show that depreciation of Nepalese currency has a positive impact on remittance inflows. Likewise, the economic activity of India is found to have significant positive impact on remittance inflows in Nepal. Further, the cyclical component of the remittance inflows is positively affected by nominal exchange rate, and economic activity of India, the Gulf nations and advanced economies. These results connote that it may be more practical for the monetary authority to expect higher remittance growth when there prevails depreciation of nominal exchange rate of NC vis-à-vis USD and, accordingly, for it to manage money market operations to absorb the liquidity emanating from surges in remittance inflows. And, it also points to the spillovers of economic activity in host countries through the channels of remittances inflows to Nepal.

JEL Classification: F22, F24, F31

Key Words: Remittance, Cointegration, Exchange Rate

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***All views expressed in this paper are personal and comments are welcome.

I. INTRODUCTION

The evolution of remittances as a major foundation of the Nepalese economy has raised the concerns over its several aspects including the potential role of macroeconomic factors in driving the inflows. In recent years, foreign employment and thus remittance inflows have drawn attention in the national discourse because of its large magnitude and stability in the positive growth trend. Since 2006, it has dwarfed all other types of resource inflows in Nepal's balance of payments, assisting in macroeconomic stability and poverty reduction. Despite such a growing significance, there is a paucity of literatures that analyze the impact of macroeconomic factors in driving Nepal's remittance inflows. In this context, some questions are frequently raised in the discourse: Does the depreciation of nominal Rupee rate with US dollar increase remittance inflows? What is the impact of economic activity in host countries, particularly in India and Gulf countries, on Nepal's remittance inflows? Taking stock of these issues, we try to analyze the role of these macroeconomic factors—nominal exchange rate, economic activity in host countries, and workers' outflow—in determining Nepal's remittance inflows.

As in many developing countries, the importance of workers' remittances as a source of foreign currency earnings is increasing and, thus, they have become the prime determinants of balance of payments (BoP) position in Nepal. It was more than seven times the official development assistance and was about 75 percent of total foreign exchange reserves in 2015. In recent years, workers' remittances are considered to have contributed in reducing poverty, building up of foreign exchange reserves, registering balance of payment surplus and growth of national savings as well as gross investment. In addition, they have contributed to the external sector sustainability, particularly through the financing of imports and payment of external debt. Its positive impact on the BoP rather than other inflows (aid and investment) arises from the fact that it bears no interest and does not have to be repaid.

In the context of the growing role of remittances, it is important to analyze the relationship between the remittance inflows and its macroeconomic determinants. In general, the workers' remittance is determined by socio-demographic characteristics of migrants and their families as well as the macroeconomic and political variables. While the socio-demographic characteristics include variables such as the years of employment of migrated workers, household income level, marital status of migrants and education level, the macroeconomic determinants consist of the economic activity in host countries, wage rates, exchange rates, interest rate differentials and facility of transferring funds, among others. Though a number of empirical studies examine the determinant of remittances in developing countries, the literature often ignores the role that nominal exchange rate plays in driving the remittances inflows. In the case of Nepal, there is a dearth of empirical studies that examine the impact of macroeconomic determinants on the inflows of workers' remittances. In this perspective, this study attempts to fill the gap in the literature by examining the impact of macroeconomic

determinants, namely nominal exchange rate, workers' outflow and economic activity in host countries, on the remittances.

The paper examines the impact of nominal exchange rate, workers' outflow and the economic activity of host countries (India, Gulf countries and advanced countries) on the workers' remittance inflows in Nepal based on monthly data for the period 2006-2015. Primarily, we hypothesize the nominal exchange rate as exogenous to remittance inflows (in US Dollar terms) because of the current peg of Nepalese Rupee with Indian Rupee and relatively small size of the Nepalese economy compared to India. Likewise, the worker's outflow and economic activity in India, Gulf countries and advanced economies may also have impact on remittance inflows. Our empirical approach includes the use of simple OLS, Engle-Granger cointegration test and fully-modified OLS. Moreover, we decompose the total remittance inflows into trend and cyclical components and analyze what determine the cyclical components of remittance inflows to Nepal.

Our results show the important role of nominal exchange rate of Nepalese Rupee with US Dollar, economic activity in host countries and workers' outflow in driving Nepal's remittance inflows. There is a cyclical component in Nepal's remittance inflows, which is positively affected by the nominal exchange rate with US Dollar, and economic activity in Gulf countries (oil price index), India and advanced economies (industrial production indices). Likewise, there exists long-run relationship between the remittance inflows and its determinants—nominal exchange rate, workers' outflow and economic activity in major host country. The nominal Rupee exchange rate with US Dollar has a significant positive impact on the remittance inflows, indicating that 1 percent depreciation in nominal rate is associated with 1.17 percent increase in remittance inflows. Likewise, the remittance inflows is positively affected by workers' outflow and the economic activity in India, and Gulf countries. Such a significant impact of economic activity in host countries and the nominal exchange rate divulges the evidence of the spillovers of business cycles through the channel of remittances. Moreover, this has implications for the liquidity management and monetary operation by Nepal Rastra Bank.

We begin with a historical perspective on the evolution of foreign employment in Nepal and examine its linkages to remittances. This is followed by an analysis of exchange rate movement as a major determinant of remittance inflows where a number of country examples are cited. Before discussing the model and data sources in Section IV, a simple illustration is made in the context of Nepal on the link between remittances inflows and nominal exchange rate since 2006. In Section VI, the empirical results are analysed before concluding the study with some policy implications.

II. EVOLUTION OF FOREIGN EMPLOYMENT AND REMITTANCES IN NEPAL

International labor migration in Nepal is not a new phenomenon. It has been triggering the process of socioeconomic transformation in the country for decades. Much of early migrations were the upshot of push factors like excessive tax burden, exploitative agrarian relations and political instability. The more formal and temporary migration began after people started to work in the British army following the Sugauli Treaty that was signed on 2 December 1815. This Treaty permitted Britain to recruit Gurkhas for military service. While both the First and the Second World War generated a huge demand for young army personnel from Nepal, in recent times the scope for out-migration for military services has declined and more and more people have migrated for other types of job. Probably the most positive impacts of labor migration in the local development would be the remittances produced by the migrant worker because it is the most visible product of migration.

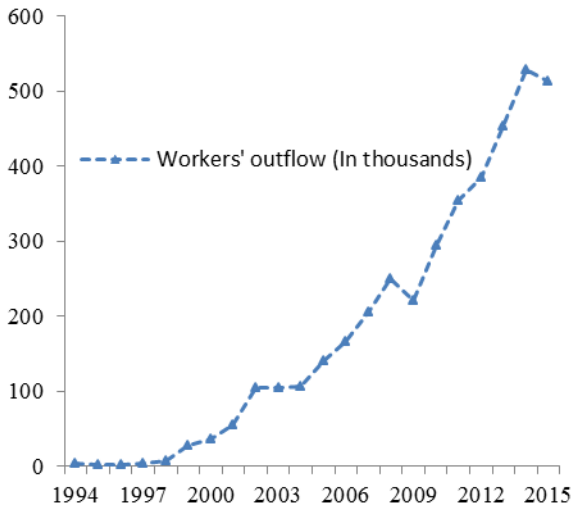
The Government of Nepal formally opened its door for citizens to go abroad for work in late 1980s. With the approval of the Labor Act of 1985, the government officially acknowledged the potential value of foreign labor migration. Beginning from the 1980s, Nepalese began to migrate in significant numbers eastwards to Southeast Asia and the Far East and, from the mid-1990s onwards, westwards to the Gulf countries. It was only after the 1990s and more so in recent years that policy makers began to fully realize the importance of remittances send by Nepalese employed abroad for enhancing the livelihoods of the households, including those in the rural regions. Foreign employment has been regulated in Nepal through the enactment of Foreign Employment Act, 2007 and Foreign Employment Rules, 2008.[1] In addition, Foreign Employment Policy, 2012 aims at promoting safe and inclusive migration, coupled with productive use of remittance. In recent years, poverty, poor employment prospects at home, growing employment opportunities abroad, declining natural resources, and political instability have prompted Nepalese workers to seek employment abroad.

While the total number of workers going for foreign employment was only 3,605 in 1994, it reached 35,543 in 2000. Such figure rose by 16.5 percent to 528,232 in 2014 from 453, 543 in 2013 (Figure 1). Since 2000, the annual average growth of workers going overseas for employment was 22.0 percent. Primarily, the destination of Nepalese migrants includes India, Saudi Arabia, Qatar, and UAE, among others (Figure 3). However, the data shows that Nepalese migrants are working in more than 70 countries (The World Bank, 2016). Because of the geographical proximity, historical and socio-cultural ties, India is a major destination

[1] While the Foreign Employment Act, 2007 incorporated many provisions that respond to the changing dynamics of migration overseas, the Foreign Employment Rules 2008 were formulated to implement the power conferred by Section 85 of the Foreign Employment Act, 2007 and incorporated rules relating to selection of institution or worker, license, prior approval and selection of workers, and training, among others.

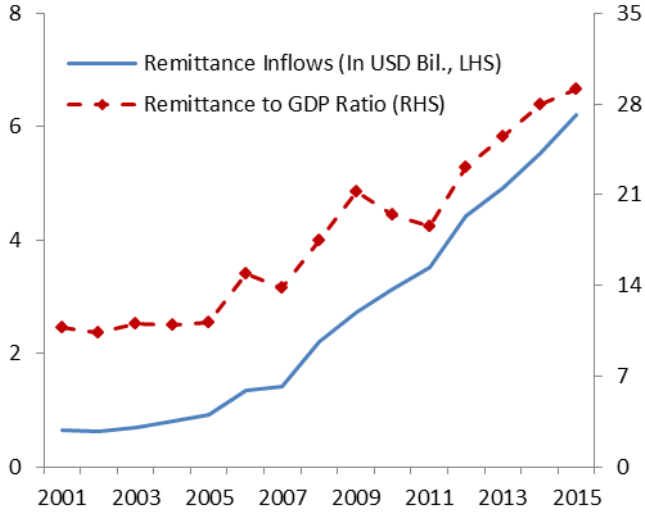
for Nepalese workers, including high seasonal mobility of workers depending on the agricultural harvest. However, the structure of migration is changing with the growing role of other emerging markets.

Figure 1: Migrant Workers' Outflow



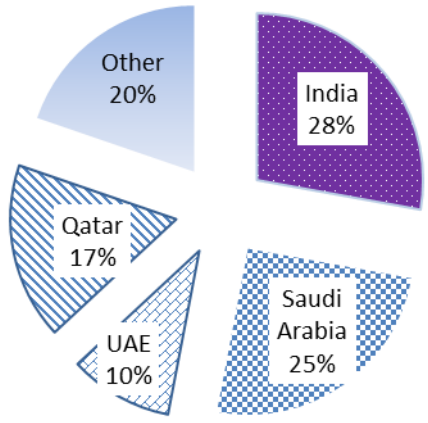
Source: Government of Nepal.

Figure 2: Workers' Remittance inflows to Nepal



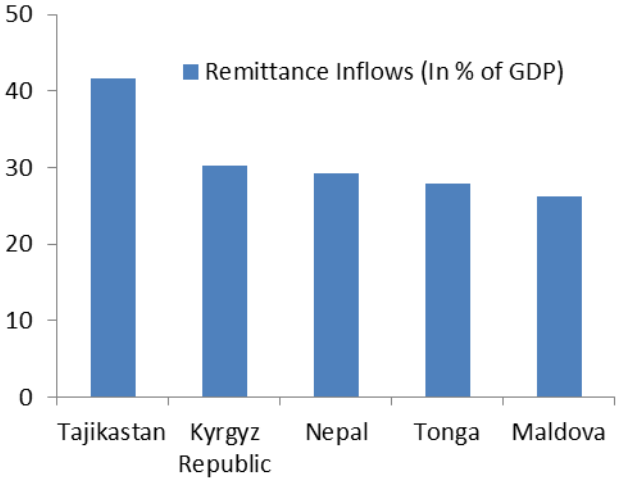
Source: Nepal Rastra Bank.

Figure 3: Distribution of Nepalese Migrants' Stock Across Countries (In 2013)



Source: World Bank (2016a).

Figure 4: Top Five Remittence Receiver by Size of Economy (In 2014)



Source: World Bank (2016b).

With the increase in the number of workers, the inflow of remittances has also taken an upswing (Figure 2). Workers' remittances aggregated USD 0.64 billion in 2001 and went up to USD 1.35 billion in 2006. In 2015, remittances stood at USD 6.2 billion, a rise by 12.2

percent compared to USD 5.53 billion in 2014.[2] Annual average growth of remittance in USD terms has been 18.5 percent since 2001. Likewise, the remittances to GDP ratio increased from 10.7 percent in 2001 to 13.8 percent in 2007 and further to 29.1 percent in 2015, putting Nepal among the top five recipients in terms of size of the economy (Figure 2 and 4). Moreover, the foregoing data demonstrates that remittances have grown dramatically in recent years—the result of growing international migration, rising wages in the destination countries, efforts to promote the use of formal remittance channels, and deprecation of Nepalese rupee vis-à-vis the US dollar.

The upward movement in remittances has led to a surplus in the current account, thereby strengthening the overall BoP position. The share of remittances in total current account receipts, for instance, soared from 27.4 percent in 2001 to 61.5 percent in 2015. Rising inflows of remittances have also eased foreign exchange constraints of the country. Gross foreign exchange reserves of the country reached to USD $ 8.1 billion in mid-July 2015, which is sufficient to finance more than 11 months of imports of goods and services. These illustrations denote that any sharp decline in receipts from remittances could disrupt the structure of the economy from the macro level.

The impact of remittances on national economy can also be exemplified by the fact that it has outstripped exports as the top contributor in the foreign exchange earnings of the country after 2004. While the share of remittances in total current account receipts has been 27.4 percent, 41.3 percent and 61.5 percent in 2001, 2007 and 2015, respectively, and the corresponding share of exports stood at 40.5 percent, 25.9 percent and 8.9 percent.

III. EXCHANGE RATE AS A DETERMINANT OF REMITTANCE INFLOWS

In theoretical framework, there exists a bi-directional relationship between the remittance inflows and the exchange rate. Given the huge flows of remittance to developing countries, the impact of remittances on real exchange rate has been a major concern for policy purposes. On the other hand, the nominal exchange rate changes may also have an impact on the flows of remittances. In this respect, it seems also important to discuss the potential role of the nominal exchange rate in determining the remittance inflows.

In the pegged exchange rate system, the nominal exchange rate becomes exogenous and, thus, has impact on remittance inflows, whereas the reverse is less likely. The exchange rate through the 'substitution' and 'wealth' effects could influence the level of remittance (Bouhga-Hagbe, 2004). In a situation of currency depreciation, the goods in the home country become less expensive and, thus, migrants do not need to send back as much money as before

[2] The size of remittance flows examined in this section refers to the workers' remittances under the current account of the balance of payments (BOP) data compiled by the Research Department of the NRB.

for purchasing a given amount of goods by their families. This enables migrants to substitute some goods in the home country for some more expensive goods in the country of residence. This is termed as a substitution effect. On the other hand, a devaluation or depreciation of the home country's exchange rate enables its migrant citizens to accumulate more wealth, which provides incentives to send back more money to buy even more goods, including building residence and investing in real estate, in the home country. This is the 'wealth effect' of the exchange rate devaluation or depreciation. Moreover, the migrants may also send back future planned remittances by taking advances or loans in order to take benefit of favorable exchange rate (Chamon et. al, 2005).

A number of country-specific studies have been conducted for analyzing the impact of exchange rate on remittance inflows in the case of developing countries. For instance, while analyzing the impact of exchange rate in remittances, Lin (2011) establishes that a 1-percentage-point appreciation of the Tongan currency results in a 1-percentage-point decrease in the growth of remittances to households compared to a 5 percentage-point decline in the growth of remittances to non-profitable organizations. Chamon et.al (2005) found that growth in remittance inflows in Samoa is significantly affected by the changes in real exchange rate. One percent real depreciation of the Samoa's currency would increase remittances by 1.2 percent. Barua et. al (2007) also illustrated that depreciation of domestic currency appears to be positively correlated with the flow of workers' remittances in Bangladesh. Gupta (2005) found insignificant impact of exchange rate on remittance inflows in India.

Dakila and Claveria (2007) analyzed the impact of different measures of exchange rates on remittance inflows to Philippines. The results confirmed that a depreciation of the peso vis-à-vis a basket of currencies of major destination countries for Filipino workers increases the remittances. But, the impact of nominal peso-dollar rate to the remittance inflows to Philippines is found insignificant. Vargas-Silva (2007) examines the relationship between remittances, exchange rates and money demand in Mexico and finds the existence of a bi-directional relationship between remittances and the exchange rate.

According to Olubiyi and Kehinde (2015), the direction of effect of exchange rate on remittances is governed by a number of factors such as the motive of remitting on the one hand and the nature of exchange rate behavior on the other. If remittances are used for investment purposes and exchange rate changes are anticipated, depreciation will create additional cost of investment, thereby attenuating the inflow. In this case, there is an adverse impact on remittances. However, if it is unanticipated, remittances will be impacted positively (Golberg, 2008). If remittances are altruistic in nature, depreciation is expected to lower remittances while appreciation raises it, ceteris paribus. Hence, the effect of exchange rate on remittances is inconclusive and needs to be re-assessed.

IV. A FIRST GLIMPSE ON DATA OF REMITTANCE INFLOWS AND EXCHANGE RATE

In order to examine the relation between remittance inflows and nominal exchange rate, we first look at the evolution of remittance inflows and nominal exchange rate since 2006. We take the monthly inflows of remittances in US Dollar terms and monthly average nominal exchange rate (Rupee/USD). Taking the remittance in US Dollar terms nullifies the nominal effect of the exchange rate which is observed if remittance is measured in Nepalese Rupee terms. Figure 5 clearly illustrates that the growth of remittance inflows in USD terms becomes higher when the nominal exchange rate of Nepalese Rupee against USD is higher. Likewise, when the nominal exchange rate becomes low, the remittance growth seems to slow down. We also plot the growth of the remittance inflows in USD terms against the depreciation of the nominal exchange rate (taking base value of July 2006) (Figure 6). It also indicates the positive association between the remittance growth and the nominal exchange rate changes. The remittance inflows is positively associated with the nominal exchange rate depreciation, that is, the growth of remittances is higher when there is exchange rate depreciation and vice versa.

Figure 5: Remittance Growth and Nominal Exchagne Rate

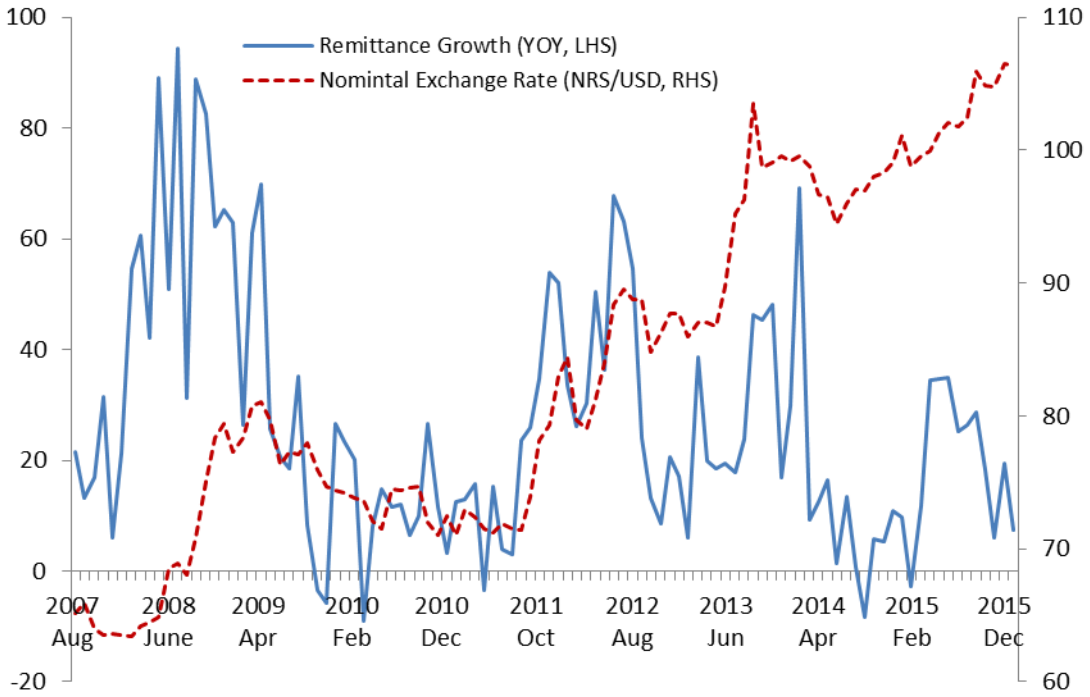
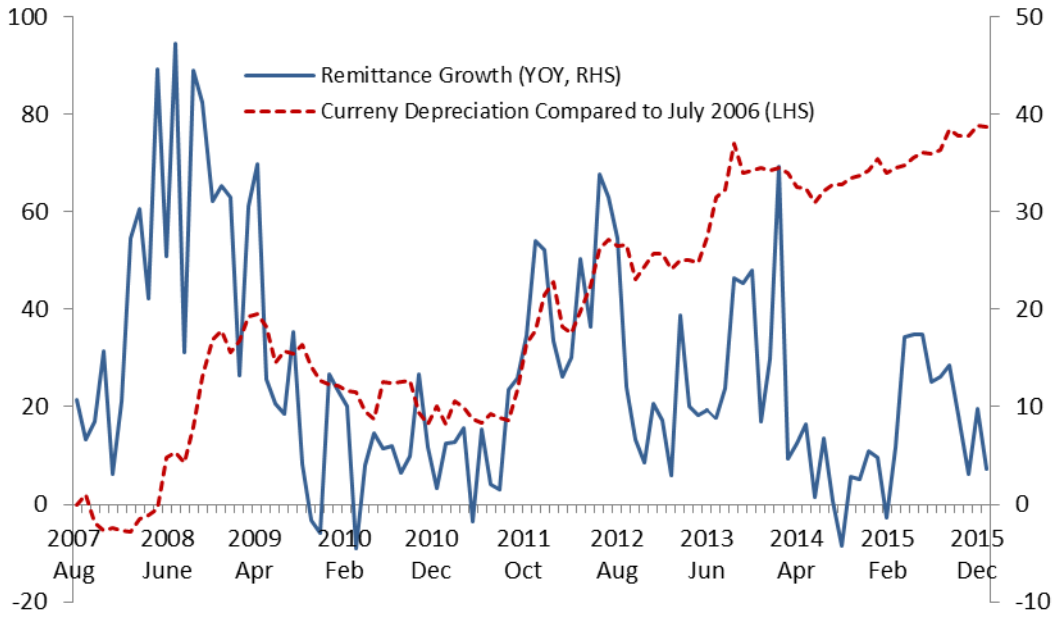


Figure 6: Remittance Growth and Nominal Exchagne Rate Depreciation



There exists positive association between the remittance inflows and the nominal exchange rate, as shown by the simple pairwise correlation (Table 1). The correlation coefficient between the remittance inflows in USD terms and the nominal exchange rate (RS/USD) is 0.82, which is statistically significant at 1 percent level. This high positive correlation substantiates the positive association between the remittance inflows and nominal exchange rate. These preliminary observations on remittance inflows and exchange rate provide us further motivation to examine the relationship between remittance and nominal exchange rate in the case of Nepal.

V. MODEL, DATA SOURCES AND ESTIMATION METHODOLOGY

In order to analyze the nexus between remittances and exchange rate, this study assumes that remittance inflows depend on nominal exchange rate, workers' outflow and economic activity in host countries. Thus, the hypothesized specification can be written as follows.

$$REM = f(ER, EA, WO) \quad \text{..... (1)}$$

Where, REM stands for workers' remittance inflows measured in USD terms, ER for nominal exchange rate between Nepalese Rupee and US dollar, EA for economic activity in destination countries and WO stands for workers' outflow. We take the industrial production index of India (II) and advanced countries (IA) and the oil price index (PO) as the proxies for economic activity in destination countries. Thus, the function (1) in linear form using log can be written as:

$$logREM_t = \beta_1 + \beta_2 logER_t + \beta_3 logIA_t + \beta_4 logPO_t + \beta_5 WO_t + \beta_6 logII + \varepsilon_t \text{ ..... (2)}$$

In the equation (2), β_1 stands for a constant and β_2, β_3, β_4, β_5 and β_6 are the coefficients of ER, IA, PO, WO and II respectively.

We hypothesized the nominal exchange rate between NC/$ as exogenous to remittance inflows to Nepal and, thus, the depreciation of nominal exchange rate of the Nepalese Rupee vis-à-vis the US dollar may increase the inflows of remittance. The depreciation of NC with US dollar may work through the following: a) wealth effect, which cause Nepalese migrants to feel wealthier and encourage them to send back more remittances; b) transfer of future planned remittances to take advantage of existing favorable exchange rate; and c) encouraging migrants to take more loans from relatives and other institutions abroad for sending back remittances to Nepal. Thus, we expect the sign of the coefficient of nominal exchange rate (β_2) positive.

We take only the major destination countries in the estimation. The major destination for migrants includes India, and oil-producing Gulf countries (UAE, Saudi Arabia, Kuwait and Qatar). Likewise, advanced economies are also the destinations for Nepalese migrants, and the economic activity in these countries may have spillover impact on remittance inflows. However, the migrants to the advanced economies generally include the skilled workers, and are permanent in nature, not contributing more in remittance inflows. We employ the oil prices for the economic activity of the Gulf countries, and industrial production index for other destinations. Thus, the impact of growing economic activity in destination countries is positive on the remittance inflows, which can make the coefficient, β_4, β_5, & β_6, positive.

On the basis of availability of data, the workers' outflow is used to proxy the migrants' stock abroad. It is expected that the workers' outflow affects the remittance inflows positively, which may make β_5 positive.

We use the monthly data on these variables to estimate equation (2). The data on the variables under study are taken from Nepal Rastra Bank, International Financial Statistics of International Monetary Fund, and Department of Foreign Employment, Government of Nepal. The details of the variables and the sources of data are presented in Appendix A.

In order to estimate equation (2), we rely on simple OLS, cointegration analysis and the estimation of cointegration regression using fully-modified OLS (Phillips &Hansen, 1990). In the first step, we examine the time series properties of data using Augmented Dickey-Fuller (ADF) test. In order to examine the cointegration between remittances and its determinants, we employ Engle-Granger cointegration test (Engle-Granger, 1987). Finally, we estimate the cointegrating regression using fully modified OLS (FMOLS).

VI. EMPIRICAL RESULTS

The first step in examining the relationship between the remittance inflows and its determinants is to examine the time series properties of the variables under study. We employ the Augmented-Dickey Fuller (ADF) unit root test for this purpose. The log of monthly inflows of remittance in US dollar terms, the nominal exchange rate, industrial production index of India and the oil price index are found to be non-stationary at level and stationary at first differences. Thus, these are I(1) processes. On the other hand, the industrial production index of advanced countries was found to be stationary at level or I(0) process (Table 2). These facts allow us to examine cointegration among I(1) variables.

Determinants of Cyclical Components of Remittances

Remittance inflows show a strong linear trend over the sample period. The linear upward trend in remittance inflows is exhibited in Figure 7. The linear trend equation, presented in Figure 7, also shows the positive significant coefficients, denoting the positive upward trend in remittance inflows. We decompose total inflows of remittances into trend and cyclical components using Hodrick-Prescott (HP) filter. There is also a strong cyclical (or seasonal) component in remittance inflows (Figure 8).

Figure 7: Evolution of Remittance Inflows

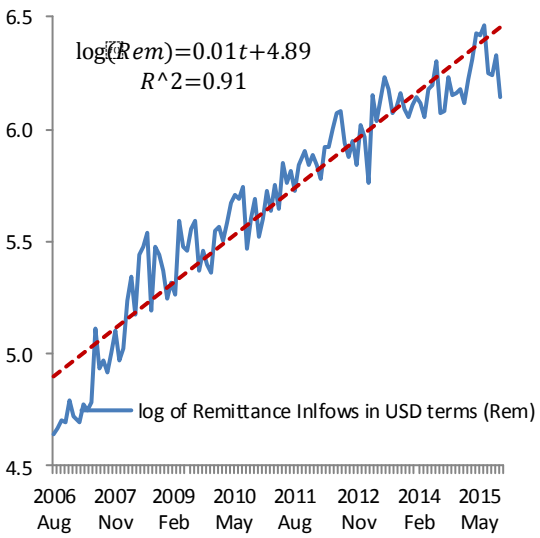


Figure 8: Trend and Cycle in Remittance Inflows (Estimates based on HP Filter)

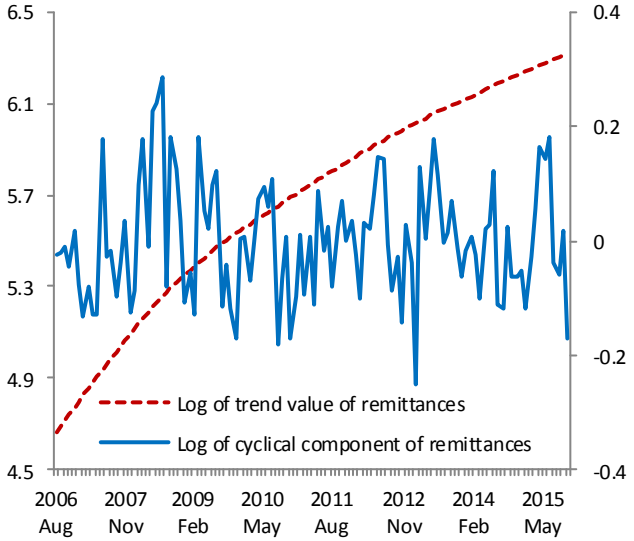


Table 3 presents the OLS results for the determinants of the cyclical component of the remittance inflows (REM_CY). As mentioned earlier, we estimate the cyclical component (REM_CY) using HP filter. As per the time series properties, the non-stationary variables are regressed in first differences, which include nominal exchange rate, workers' outflow, oil

price index, and industrial production index of India. The estimated model in Table 3 is robust on the basis of stability, serial correlation, normality and heteroskedasticity consideration.[3]

Table 3: Determinants of Cyclical Component of Remittances (REM_CY)

Explanatory Variables	**OLS Results**
Lag of REM_CY	0.28*
	(0.10)
Nominal exchange rate (Rs/USD)	1.34*
	(0.45)
Workers' outflow	0.01
	(0.02)
Industrial production index of India	0.30**
	(0.14)
Oil price index	0.18***
	(0.11)
Industrial production index of advanced economies	0.31***
	(0.17)
Constant	-1.45***
	(0.78)
	R2=0.23, DW=2.03

Notes:

1. *, ** and *** indicate the statistical significance at 1 %, 5% and 10% respectively.
2. The figures in parenthesis are heteroskedasticity consistent standard errors.
3. Dependent variable is cyclical component of remittances estimated using HP filter. Nominal exchange rate, workers' outflow, industrial production index of India, and oil price index are regressed in first differences.

The results shows that the coefficients of the exchange rate, oil price index and industrial production indices of India and advanced economies are statistically significant and positive, implying the positive impact of these variables in remittance inflows in Nepal. As indicated by the higher and significant coefficient of nominal exchange rate, 1.34 percent increase in cyclical remittance inflows is associated with 1 percent depreciation in Rupee exchange rate with US dollar. Likewise, the cyclical component of remittances inflows is positively associated with the oil price index, industrial production index in India and advanced economies. In other words, the cyclical or seasonal nature of remittance inflows is also determined by the economic activity in India, Gulf-countries and advanced economies. The significance of the oil price coefficient supports the hypothesis that the activity in Gulf

[3] The results of normality, stability, and serial correlation test are not shown in Table and available on request.

countries, where more than 50 percent of the total number of workers go annually, has significant impact on remittance inflow to Nepal.[4] Likewise, the positive impact of economic activity in India implies the seasonal nature of labor mobility and spillover of Indian economic activity through remittance channels. But, workers outflow is found to have no statistically significant impact on cyclical component of remittance inflows.

Testing of Cointegration and FMOLS Estimates

Though the remittance inflow in Nepal is determined by several microeconomic and macroeconomic factors, this paper seeks to examine the relationship between the remittance inflows and its macroeconomic variables—nominal exchange rate, economic activity in host countries and workers' outflow. More specifically, the long-run relationship between the remittance and the exchange rate is investigated by employing the Engle-Granger test (1987) of cointegration. The test is conducted by simply applying unit root tests to the residuals obtained from single equation OLS, in which remittance inflows is taken as dependent variable.

Table 4: Results from Engle-Granger Cointegration Test

Tau-statistics	5.51*
	(0.01)
Z-statistics	40.87*
	(0.01)

Notes: * indicates the statistical significance at 5 percent level. The dependent variable is remittance inflows. The figures in parenthesis are Mackinnon (1996) p-values.

In order to examine the long-run relationship between the remittances and its macroeconomic determinants, we take only the variables integrated with order one I(1)–the remittance inflows, exchange rate, oil price index and industrial production index of India. And, the optimal lag length for examining cointegration relation is selected based on Schwarz's Information Criteria. The results from Engle-Granger test show that the null hypothesis of no cointegration is rejected by both tau-statistics and normalized autocorrelation coefficient (z-statistic) at 5 percent significance level (Table 4). This implies that there exists the cointegration between the monthly remittance inflows to Nepal and its determinants–nominal exchange rate, economic activity in destination countries and workers' outflow.

[4] UAE, Saudi Arabia, Kuwait, Qatar, Bahrain and Oman are the major destinations for Nepali migrant workers. For instance, total number of workers that went to these countries in 2015 were 290146, forming 56.6 percent of total outflow of migrant workers, excluding outflows to India. Such share was 91 percent in 1993/94.

Table 5: Determinant of Remittance Inflows

Explanatory variables	**FMOLS Estimates**
Nominal exchange rate (Rs./USD)	1.17*
	(0.21)
Workers' outflow	0.14**
	(0.07)
Industrial production index of India	1.84*
	(0.25)
Oil price index	0.04
	(0.08)
Constant	-9.54*
	(0.74)
	R2=0.88, SE=0.16

Notes:

1. * and ** indicate the statistical significance at 1 % and 5 % level respectively.
2. The figures in parenthesis are standard errors. The FM-OLS estimates have been calculated using Bartlett weights with lag based on Schwartz Information Criteria.

We also employ FM-OLS of Phillips and Hansen (1990) to examine the cointegrating relation between the remittance inflows and its determinants. The results of FM-OLS are presented in Table 5. The coefficients of the nominal exchange rate, workers' outflow and industrial production index of India are statistically significant and enter with expected sign. The long-run elasticity of remittances with respect to the nominal exchange rate is 1.17, which implies that 1 percent depreciation of the nominal exchange rate with US dollar is associated with 1.17 percent increase in the remittance inflows in US Dollar terms. This result provides evidence for the working of wealth effect and tendency of Nepalese migrant workers to take advantage of favorable exchange rate by sending back more remittance at the depreciated nominal exchange rate. The coefficient on the economic activity in India is positive and statistically significant. It supports our hypothesis that the high labor mobility with India, which is a natural outcome of long-open border, socio-cultural ties, and historical relations, determines the remittance inflows to Nepal. Likewise, the remittance inflow is also positively associated with the workers' outflow.

VII. CONCLUSION

Given the growing role of workers' remittances in the development process of Nepal, a scrutiny of the determinants of remittance inflows is crucial for policy purposes. Though many studies have examined different aspects of remittances inflows to Nepal, there still

exists a gap in analyzing the dynamics of workers' remittances and the nominal exchange rate movement. In this context, this paper, the first of its kind to the best of our knowledge, attempts to fill this gap by examining the impact of some specific macroeconomic variables, namely nominal exchange rate, economic activity in host countries and workers' outflow, on the inflows of workers' remittances using monthly data from 2006-2015.

The growth of workers seeking employment abroad and, thus, workers' remittance inflows to Nepal have been quite significant in recent years. Domestic economy factors such as unemployment, ongoing demographic transition, lackluster policies formulated by Government of Nepal to promote foreign employment and growth prospects in emerging markets have largely increased the outflow of Nepalese workers. Correspondingly, due to the upsurge in workers' remittance inflows, Nepal has been remaining in the top five positions among the countries in terms of the size of the economy or remittance to GDP ratio for the last few years.

Empirical results show an instrumental role of macroeconomic variables in determining the remittance inflows to Nepal. The cyclical component of Nepal's remittance inflows is positively affected by the nominal exchange rate with US Dollar, and economic activity in host countries (India, Gulf countries and advanced economies), indicating the spillovers of business cycles through the remittance channel. In addition, there is an evidence of the cointegration or long-run relationship between the workers' remittance inflows in USD terms and its determinants—nominal NC-US exchange rate, economic activity in host countries and the workers' outflow. The impact of depreciation of NC vis-à-vis USD on the workers' inflows to Nepal is positive. This supports the hypothesis that both the substitution and wealth effect work in the direction to increase the remittance inflows to Nepal in the episode of depreciation. There is also the tendency of Nepalese migrant workers to take advantage of favorable exchange rate by sending back more remittances at the depreciated nominal exchange rate. Likewise, the growing economic activity in India has positive impact on remittance inflows. Given the high labor mobility and large share of India in Nepal's remittance inflows, this result demonstrates the positive link of Nepalese remittance inflows and the economic cycle of Indian economy. Finally, as expected in theory, the workers' outflow has significant impact on remittance inflows.

Some policy implications can be drawn from this paper. First, the positive impact of depreciation of NC vis-à-vis USD on remittance inflows implies that Nepal's monetary authority may expect higher growth of remittances in a situation of depreciation of NC vis-à-vis USD and, thus, need to manage the money market operations. In addition, the volatility of remittance inflows has direct effect on the liquidity situation in the Nepalese economy due to the lack of clear operational framework for absorbing such liquidity and inadequate tools for sterilization. Second, the direct significant link of workers' remittance inflows to Nepal with the economic activity of Gulf countries and India may compel the Government of Nepal to

adopt some measures to withstand the adverse impact that may emanate from the recession in these countries through remittance linkages. Despite these policy implications, the study possesses a limitation about the availability of data for long time period.

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Appendix A: Data Sources and Definitions

Variable Name	Definition of the Variable	Source
Remittance	Workers' remittance on the current account, measured in USD terms	Balance of Payments Division, Nepal Rastra Bank.
Exchange rate	Monthly percentage change in nominal exchange rate of Nepalese rupee with respect to US dollar	*Quarterly Economic Bulletin*, Nepal Rastra Bank.
Oil prices	Oil price index	*International Financial Statistics*, IMF.
Industrial production index	Monthly industrial production index of India and advanced countries	*International Financial Statistics*, IMF.
Workers' outflow	Monthly outflow of migrant workers	*Department of Foreign Employment*, Government of Nepal.

Table 1: Correlation Coefficient between Remittance Inflows and its determinants

	REM	ER	WO	II	OPI
REM	1				
ER	0.82*	1			
WO	0.71*	0.57*	1		
II	0.88*	0.68*	0.66*	1	
OPI	0.23**	-0.10	0.29**	0.26***	1

Note: * and ** stand for statistical significance at 1 % and 5% respectively.

Table 2: Augmented-Dickey Fuller Unit Root Test

Variables	**Level**	**First Difference**
Remittance inflows	-1.95	-11.45*
	(0.31)	(0.00)
Nominal Exchange Rate	0.06	-8.67*
	(0.96)	(0.00)
Industrial Production Index of AEs	-2.56**	-2.64*
	(0.10)	(0.09)
Workers' outflow	-1.74	-6.74*
	(0.41)	(0.00)
Industrial production index of India	-1.93	18.41*
	(0.32)	(0.00)
Oil price index	-2.18	-6.68*
	(0.22)	(0.00)

Note: * and ** indicate the statistical significance at 1 % and 10 %level respectively.