

# Impact of Remittance on Consumer Price Index in Nepal

Binod Joshi<sup>1</sup>

Associate Professor, Tribhuvan University, Nepal

## Abstract

*Remittances play a significant role in the economic development of the recipient economy through different micro and macroeconomic channels. The adverse impact of remittances in the form of Dutch disease and inflation cannot be overlooked. This paper examines the impact of remittance on overall inflation measured by the consumer price index in Nepal. It applies time series data for the period 1975 to 2020. Ordinary least squared (OLS) regression method results revealed that remittances, money supply, import trade and budget deficit have a positive impact on inflation whereas the impact of real gross domestic product is negative. The impact of export trade is inconclusive. Given the inflationary nature of remittances, it becomes necessary for the government to channelize the remitted funds into productive investment to avoid a surge in demand-pull inflation.*

**Key Words:** *inflation, remittances, ordinary least squares.*

## Introduction

One of the major goals of macroeconomic policy formulation in developing economies is a low rate of inflation along with high and sustainable economic growth. Inflation can be caused by different factors. It means the explanation of inflation and its determinants differ significantly. Different economists of the different periods have raised different views on inflation in several different theoretical explanations. Nevertheless, inflation is explained with a different set of variables and such variables differ with the macroeconomic environment of an economy.

Inflation has important implications for the economic stability and lifestyle in an economy. It adversely affects the overall growth, the financial sector development and the vulnerable poor segment of the population. A moderate level of inflation is friendlier for growing economies, whereas a high rate of inflation adversely affects economic performance and living standards in the economy (Fergusson, 2005).

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<sup>1</sup> Mr. Joshi is Associate Professor in Economics, associated with Padma Kanya Multiple Campus, Kathmandu and Executive Director, Centre For International Relations, Tribhuvan University, Nepal.

The average growth rate of overall inflation was 8.2 per cent during the last 46 years (MOF, 2021). The growth rates of overall inflation showed that inflation was higher than moderate in Nepal. Remittances are funds received from migrants working abroad and such funds are growing dramatically in recent years from 204.3 million rupees in 1975 to about 961054.6 million rupees in 2021 (MOF, 2021). The inflow of remittance income has the highest share out of all other capital inflow items in Nepal. Consumption is the main driver of GDP because it has a 93.38 per cent share in gross domestic expenditure (MOF, 2021). In this context, this paper examined the impact of remittances on food and beverage inflation in the context of Nepal.

## **Theoretical Framework**

Different factors cause inflation in an economy. Therefore, inflation and its determinants differ significantly. Different economists of the different periods have raised different views on inflation with different theoretical explanations. This section briefly mentioned determinants of inflation suggested by various theories.

Classical and Neo-classical economists analyzed inflation based on the Quality Theory of Money (QTM). To them, the supply of a quantity of money determines the inflationary trend in the economy. They explained the direct and proportional relationship between the quantity of money and the inflation rate. It means an increase in money supply will lead to an increase in the level of price under full employment situation (Shapiro, 2004).

The Keynesian approach of inflation occurs when demand exceeds the potential level of output at full employment. Keynesian approach to price determination emphasized the importance of wages and salary costs in influencing the price level. Hence, the Keynesian theory of inflation is explained in both demand-pull and cost-push inflation (Shapiro, 2004).

According to Monetarists, a higher growth rate of money supply that is above the real output creates an inflationary problem. They believed that increases in costs are inflationary by allowing an increase in the money supply. Here, the monetary model would typically include the rate of change in money supply as having a positive correlation with inflation and a negative correlation with income growth rate. Thus, Froyen (2005) states that inflation is always and everywhere a monetary phenomenon and can be produced only by the more rapid increase in the quantity of money than the real output.

Remittance is an important demand-side variable of inflation and it affects inflation from the perspectives of exchange rates, money supply and balance of payments.

Workers' remittance inflows have a spending effect in the recipient economies. At the micro-level, remittances directly lead to an increase in household income that in turn raises their demand for goods and services. This excess demand brings inflationary pressure to the economy and triggers a non-tradable price level.

The Salter-Swan-Corden-Dornbusch paradigm provides an avenue for understanding the theoretical linkages among remittances, price level and real exchange rate in developing economies. The paradigm suggests that an increase in remittance inflows can appreciate the real exchange rate through raising the domestic prices while the extent of the effect on domestic prices depends on the country's exchange rate regime.

Acosta et al. (2007) explained the case of increasing price level when the remittance is high by developing a micro-founded Dynamic Stochastic General Equilibrium (DSGE) model. According to them, an increase in remittance inflows raises the household income that in turn causes a fall in the labour supply. The shrinking labour supply induces higher wages that lead to higher production costs and further contraction of the tradable sector. Therefore, both the real exchange rate and the ratio of tradable to non-tradable output stimulate high spending and resource movement that can potentially generate inflationary pressure.

The inflows of a large amount of foreign exchange by emigrants in the form of remittances increase the money supply of the recipient economy through the conversion of foreign exchange into domestic currency. If this increased money supply is not channelized towards productive sectors and capital investment, it can fuel inflation by shifting to consumption expenditure. Moreover, remittances can drive up inflation by creating a short-run excess demand through raising consumption expenditure that originates from a boost in real wealth.

## **Literature Review**

The empirical literature on determinants of inflation was broad. According to Iqbal and Abdus (2005), the effect of remittances on labour force participation was negative in Pakistan. They also revealed remittances had upward pressure on prices due to supply shortages in the domestic labour market.

Similarly, Acosta et al. (2009) highlighted the fact that remittances result in a decrease in labour supply which leads to an increase in production costs of the non-tradable sector, which is relatively labour intensive. This increases the price of non-tradable goods and services.

Zakaria (2010) revealed that with the increment in household income in the form of remittances, consumer expenditures (on housing, furniture, medical care) or investment in productive activities (like education, manufacturing, farming) increases. Resultantly, the demand for such items increases relatively more than for other items. These shifts in demand combined with price elasticity of supply may result in disproportionate changes in relative prices and overall inflation.

Narayan et al. (2011) modelled the impact of remittances and institutional variables on inflation in both the short run and long run using a panel data set of 54 developing countries over the period 1995 to 2004. They found that remittances generate inflation in developing countries.

Satyal (2011) examined the relationship between inflation and remittances during the period 1975 to 2008. The estimation equation took broad money supply, government total expenditure, the exchange rate of USD to Nepal, GDP at a nominal price, private consumption and Indian inflation rate as control variables with the key variable worker's remittance inflow income. The OLS results showed that a one per cent increase in remittance induces 0.011 per cent inflation in Nepal. It concluded that remittances stimulate consumption and inflation in Nepal.

Ball et al. (2012) analyzed the role of remittances to economic growth, inflation and investment. The results showed that remittances should temporarily increase inflation, GDP, the domestic money supply and appreciate the real exchange rate under a fixed regime.

Nisar and Tufail (2013) examined the impact of remittance on inflation and its different categories, namely, food inflation, footwear and textile inflation, housing and construction inflation. The results showed that remittances, money supply and real per capita income have a positive impact on inflation and its different categories. The results revealed that among different inflation categories food inflation is most affected and housing and construction inflation is least affected by remittances. Given the inflationary nature of remittances, it suggested necessary for the government to channelize the remitted funds into productive investment to avoid a surge in demand-pull inflation.

Roy and Rahman (2014) empirically tested whether growing remittances cause inflation as well as food inflation in Bangladesh using monthly data over the period July 2003 to July 2013 under the post-floating exchange rate scenario. The results showed that remittance inflows cause inflationary pressure in Bangladesh while the responsiveness of food inflation is almost two and half times higher than general inflation.

The empirical literature on key variables on the determinants of inflation was well explained by Khan et al. (2007), Qayyum (2006), Mohammad et al (2009), and Mukhtar (2011). According to Khan et al. (2007), remittance is an important demand-side variable and it is expected that it affects inflation positively. At the micro-level remittances serve as a direct increment in income and increase the domestic demand for goods and services which if exceeds the domestic production creates a positive output gap and creates inflation. The variable is pertinent to be included in the inflation regression due to its effect both at micro and macro level. Moreover, the effect of remittances may not be uniform across all commodity groups. For this reason, the paper has incorporated remittances as a major determinant of inflation.

According to Qayyum (2006), the money supply is a monetary policy variable and is considered to be an important determinant of inflation. Growth in the supply of money affects the price level through two transmission mechanisms. The indirect mechanism involves the changes in the interest rate and the direct mechanism works through the channel of aggregate demand.

According to Mohammad et al (2009), real GDP is also an important demand-side variable that may determine inflation. It is expected that there exists a negative association between real GDP and inflation because an increase in aggregate supply reduces inflation. After all, it meets growing demand. The budget deficit is a fiscal policy variable that may determine inflation. It is expected that fiscal policy tends to stimulate economic growth through expenditure expansions at the cost of higher inflation and public deficits. The government finances its budget deficit either by borrowing from domestic or international sources or by directing the Central bank to increase the money supply by printing new money. Thus, deficit financing by the government because of increased expenditures leads to liquidity effects and causes the aggregate demand to increase resulting in inflationary pressure in the economy.

According to Mukhtar (2011), trade openness is an important determinant of inflation. Trade openness leads to an increase in efficiency by reducing costs through changes in the composition of inputs employed domestically and internationally and resulting in inefficient allocation of resources and enhancing the utilization capacity. Trade openness results in a rise in foreign investment that expand production and leads to an increase in output thus releasing the pressure on prices. The cheaper imports of finished goods and intermediate goods through direct and indirect price effects lead to an overall

decline in prices. In addition to this, a high level of openness reduces the incentive for policymakers to pursue expansionary policies. Increased foreign competition enhances domestic productivity growth and reduces the producers' ability to push prices up resulting in a negative relationship between trade openness and inflation.

## **Methodology**

### **Data**

This study is based on secondary domestic data. Quarterly Economic Bulletin (QEB) from Nepal Rastra Bank (NRB), Economic Survey Reports, Ministry of Finance, Government of Nepal (MOF, GON), National Accounts of Nepal, and Central Bureau of Statistics (CBS) were the major sources of data and information for the study. The data on real GDP was not readily available. Therefore, real GDP data series estimated as dividing nominal GDP by GDP implicit price deflator of the base year 2000/01. Similarly, annual data series on population and population growth rates were interpolated between census data points and extrapolated based on census data points. Real per capita GDP data sets were calculated by dividing the annual series of real GDP data sets by corresponding annual data series of population.

### **Sample Size**

The study uses time series annual data on different variables for 46 years from FY 1974/75 to FY 2019/2020.

### **Method of Data Analyses**

All the variables of the model were converted into natural logarithms. Basic structures of the transformed variable regarding its central location (mean); spread (standard deviation), minimum and maximum were presented as summary statistics. Augmented Dickey-Fuller (ADF) test was used to test the unit root of the variables. A partial correlation matrix of estimating variables was estimated. Multicollinearity among explanatory variables was detected applying the variance inflation factor test.

Darbin-Watson and Breusch-Pagan-Godfrey Lagrange Multiplier (BPG-LM) tests were conducted to check autocorrelation of the error term and the autocorrelation problem was solved by the Cochrane-Orcutt method. Mathematical Jarque-Bera (J-B test) was used to test the normality of error terms. The problem of heteroscedasticity was detected by Breusch-Pagan-Godfrey Lagrange Multiplier (BPG-LM) test that is

based on Autoregressive Conditional Heteroskedasticity (ARCH) test. The overall explanatory power of the explanatory variables was gauged by adjusted R-squared and R-squared statistics. The F test was used to determine the overall goodness of the model. The t-test was used to test individual coefficients of explanatory variables.

### Model Specification

Based on theoretical explanations and empirical studies, the model of determinants of inflation depends on the monetary aggregates, structural factors and openness of the economy. Under the control variable modeling technique, different variables are defined as follows.

- a) Dependent Variable: Inflation (change in consumer price index, CPI).
- b) Independent Variable: Since this paper examined the relationship of remittances on Inflation. Therefore, the independent variable was private sectors' remittances and it was denoted by REM.
- c) Control Variables: The study applied broad money supply, real GDP, import trade, export trade, and budget deficit. M2, IT, ET, RGDP, and BD denoted these control variables respectively.

This study used the OLS technique of estimation with the dependent variable as overall Inflation (CPI) and Workers' Remittances (REM) as an independent variable. Therefore, the conceptual equation of the study is:

$$CPI = f(REM)$$

- (1) Several other factors such as broad money supply, total trade, budget deficit, real per capita income etc. also affect food and Beverage Inflation. Therefore, the study introduces some Control Variables (CV) into the above equation (1). The inclusion of CV helps control variability. Thus, the modified growth equation is:

$$\text{Food and Beverage Inflation} = f(REM, CV)$$

- (2) Based on the above equations, the following econometric model is specified to examine the relationship between Inflation and Remittances in Nepal.

$$CPI_t = \alpha_0 + \alpha_1 REM_t + \alpha_2 M2_t + \alpha_3 IT_t + \alpha_4 ET_t + \alpha_5 RGDP_t + \alpha_6 BD_t + \varepsilon_t$$

- (3) Where, CPI = Consumer Price Index (CPI), M2 = Broad Money Supply,

IT = Import Trade, ET = Export Trade, RGDP = Real Gross Domestic Product, BD = Budget Deficit, Subscript t = Time and  $\varepsilon_t$  = Error Term.



## Results and Discussion

Table (1) presents descriptive statistics of all variables in the analyses. It contains the mean, the standard deviation, the maximum and the minimum value of the data that can be observed. All the explanatory variables are measured in Rs. Million whereas food and beverage inflation is measured in percentage. It is used to see the overall outlook of the data.

**Table 1: Descriptive Statistics**

Variables	Mean	Std. Deviation	Minimum	Maximum
CPI	9.73284	6.8356	-3.78	22.538
REM	123196.4	213542.2	222.45	773456.9
M2	421943.6	676321.7	2064.40	3164902.0
IT	673469.5	53776.7	18146.0	1196799.0
ET	43128.4	33167.9	8896.0	97709.0
RGDP	453298.4	197745.9	136103.30	884732.3
BD	19873.3	20729.4	222.50	114567.7

**Source:** Author's calculations.

The correlation matrix is estimated to detect the correlation among the variables: LNFBI, LNREM, LNM2, LNIT, LNET, LNRGDP and LNBD. Table (2) shows the correlation matrix of the variables used, and inflation is positively correlated with workers' remittance inflow income. Similarly, other control variables M2, IT and BD are positively correlated with CPI whereas ET and real GDP are negatively correlated with CPI.

**Table 2: Correlation Matrix**

Correlation	CPI	REM	M2	IT	ET	RGDP	BD
CPI	1.000	-	-	-	-	-	-
REM	0.569	1.000	-	-	-	-	-
M2	0.715	0.913	1.0000	-	-	-	-
IT	0.743	0.965	0.916	1.0000	-	-	-
ET	-0.386	0.421	0.672	0.875	1.000		
RGDP	-0.568	0.8652	0.8652	0.9025	1.000	1.000	-
BD	0.5836	0.8123	0.8241	0.8034	0.7363	0.5624	1.0000

**Source:** Author's Calculations



Individual time series data must be stationary before running a regression analyses. Otherwise, the regression results will be spurious. Therefore, it is better to determine the order of integration of the individual variable employed in the model. To check the unit root in the individual variable, the Augmented Dickey-Fuller (ADF) test is conducted. The unit root results showed that all variables are suffered unit root at log level form. First difference data at log level completely root free and all series are integrated of order one. Unit root results both at log level and log first difference are presented below.

**Table 3: Unit Root Results of Variables at Log Level Form**

ADF Test Statistics		
Variables	Log Level Form	
	$\tau$ -statistics	p-value
LNCPI	0.59734	0.8194
LNREM	0.81275	0.7963
LN2M	-0.6648	0.8073
LNIT	-0.8745	0.6537
LN2T	-0.5739	0.3365
LN2GDP	-0.3874	0.7483
LN2BD	-0.7384	0.7102

*Source:* Author's Calculations

**Table 4: Unit Root Results of Variables at First Difference**

Variables	ADF test Statistics		
	$\tau$ -statistics	p-value	Order of Integration
DLN2CPI	-4.98356	(0.0003)*	I (1)
DLN2REM	-7.35873	(0.0000)*	I (1)
DLN2M2	-6.38795	(0.0000)*	I (1)
DLN2IT	-7.8493	(0.0000)*	I (1)
DLN2ET	-8.9372	(0.0005)*	I(1)
DLN2RGDP	-5.58741	(0.0000)*	I (1)
DLN2BD	-6.14638	(0.0000)*	I (1)

*Note:* The symbol \* shows the variable is significant at a 1 per cent level.

**Source:** Author's Calculations

The empirical results between inflation growth and remittances along with control variables in Nepal are presented below.

**Table 5: Regression Results DLNCPI as Dependent Variable**

Variables	Coefficients	Standard Error of Coefficients	t-statistics	P-value
Constant	8.9478	0.5945	15.051	(0.0000)*
DLNREM	0.1563	0.03847	4.063	(0.0000)*
DLNM2	0.2936	0.09147	3.209	(0.0007)**
DLNIT	0.1721	0.0978	1.7658	(0.0085)**
DLNET	-0.1037	0.7483	0.1385	(0.3763)
DLNRGDP	-0.3594	0.1026	-3.5029	(0.0074)**
DLNBD	0.2538	0.08493	2.9883	(0.0095)**
$R^2 = 0.86$ Adjusted $R^2 = 0.85$		DW = 1.993 N = 45 after adjustments F = 3891.6 Probability of F statistics = (0.0000)*		

Notes: \* and \*\* denote the statistical significance at the 1 per cent and 5 per cent levels respectively.

**Source:** Author's Calculations

The adjusted coefficient of determination ( $Adj. R^2$ ) is 0.85. The F-statistics, which shows the overall fitness of the model, is statistically significant at a one per cent level. The results have shown the fact that a positive significant impact of remittances is observed on the food and beverage inflation of Nepal. The coefficients of remittance have positive signs whereas the coefficient of real GDP is significant having negative signs. The coefficients of broad money supply, import trade and budget deficit are significant with expected positive signs whereas export trade is insignificant. Although there is a good association between the variables is seen, to check the reliability of the model, regression diagnostic tests have been made that suggest that the model is free from the omission of autocorrelation, multicollinearity, heteroscedasticity and normality.

The DW statistics is very near to 2 (1.993) indicating that the equation may be free from autocorrelation. However, the Breusch Pagan-Godfrey Serial Correlation LM Test is conducted to test the autocorrelation as well as its order. The observed R-squared statistics at lag 1 and lag 2 are 7.9482 and 13.6073 with the probability of 49.5 per cent and 78.7 per cent respectively. The LM statistics show that the null hypothesis of no serial correlation at lag 1 and lag 2 cannot be rejected. Hence, the residuals are not serially correlated.

Breusch-Pagan-Godfrey test of heteroscedasticity of the variance of error terms from inflation equation shows that the observed R squared statics is 38.9 with the probability of 59.3 per cent. This result indicates that the residuals are homoscedastic. The result of the Jarque-Bera (J-B) statistics showed that J-B is 3.9482 having a probability value of 62.8 per cent. As the probability value is reasonably high, the residuals are normally distributed because the null hypothesis cannot be rejected. The coefficients of Variance Inflation Factor (VIF) are less than 5 and it confirms that there is no multicollinearity among explanatory variables.

## **Conclusions and Policy Implications**

This paper is an attempt to determine the role of remittances in causing inflation in Nepal. The determinants of inflation were estimated with a particular focus on remittances using the ordinary least squares method during the period 1975 to 2020. The results indicate that all the explanatory variables significantly explain the changes in inflation except export trade. The regression results suggest that remittances are positively associated with overall inflation. Apart from remittances, money supply, import trade and budget deficit also affect food and beverage inflation positively, while real GDP has a negative effect on food and beverage inflation.

The finding of the study suggests that there is a need to focus on reducing excess consumption as increased demand followed by increased consumption creates positive output gaps and results in inflation. Policies should be made to direct the use of remittances in a way that these monetary flows remain beneficial for the recipient economy.

Empirical evidence suggests that to have benefited from remittances, it is necessary to invest these flows in productive sectors. Accordingly, remittances should be directed towards productive investment projects. The government may provide attractive investment opportunities to encourage the use of remittances for investment purposes rather than

for consumption. One way of doing this is to increase the saving rate. The investment environment can also be made favourable by keeping the cost of business manageable and by ensuring political and structural stability in the economy. The government may also take measures to explore new markets for workforce export and to lower the cost of remitting funds through official channels to get a stable level of remittances.

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