THE ECONOMIC JOURNAL OF NEPAL, VOL. 44, No. 1 & 2, Jan-June 2021, (Issue No. 155) © CEDECON-TU
DOI: https://doi.org/10.3126/ejon.v44i1-2.55027

An Analysis of Causal Relationship between Remittances and Imports in Nepal

Rajan Phaju[1]

Abstract

This study aims to evaluate the casual relationship between remittances and imports in Nepal. Remittances are considered to be the most significant source of foreign currency that makes strong position of balance of payments, whereas the volume of imports is one of the most significant elements that lowers the volume of foreign currency reserve of the nation. It is generally believed that remittances have positive effects on volume of imports. On the contrary, if there is more imports than exports, it may run out trade deficit. It does make negative impact on the exchange rate of the home country. A weaker currency can raise the value of remittances sent back to the country, encouraging migrants to send more money home that influenced in growth of remittance. To analyze the relationship between remittance and imports, the study used annual data for 46 years from 1975 to 2020 A.D. The study used Vector Autoregressive model as there is no co-integration between the variables as per Johansen's technique. The variance decomposition test is carried out in a similar manner. The results demonstrate that there is a close connection between remittances and imports. But surprisingly, the result of VAR Granger causality test reveals that imports cause remittance rather than the other way around. Since import influences remittances, policymakers should consider enacting policies that discourage import and encourage export.

Keywords: *Remittance, Imports, VAR, Variance decomposition.*

JEL Classification: *F24, F14, C32, C58*

Introduction

Nepal is receiving a significant amount of remittance every year. It increases the household income and thereby increase their purchasing power. Remittance fuels their propensity of migrant families to consume more than what they would have without remittance. No matter how much they earn, a major portion of their earning goes in supporting the livelihood of their family back at home. It

[1]**Mr. Phaju** is a Lecturer at Khwopa College, Bhaktapur, affiliated to Tribhuvan University, Kirtipur, Email: rajanphaju@yahoo.com; ORCID: https://orcid.org/0000-0003-4152-6052.

increases the demand of goods and services. As there is limit in the domestic production of output, it forces the national economy to depend on imports to meet the increased demand. This has been increased the volume of imports over the years.

As in many other developing countries, remittance played an important role in Nepal. World Economic Outlook of WB report shows that Nepal lies in top five highest remittance receiving country in terms of GDP. It is because that twenty percent of total population of Nepal live outside their homes; 53 percent of Nepalese homes had at least one member of the family missing; and 28 percent of the members live outside of the country (CBS, 2010). In Nepal, 56 percent of households receive remittances and each family receives an average of NRs. 80,436 through remittances. 31 percent of remittances go toward family expenses. It also demonstrates that the average remittance flow now is Rs. 9,245 per individual, which is 15 times higher than the average of NRs. 625 from 15 years ago (CBS, 2010). Nepal is sending people in about 170 countries and mostly Nepal receives high remittance from Qatar, Saudi Arabia, Malaysia and other Gulf countries and India.

Nepal has seen openness, deindustrialization, and migration since 1990. The domestic economy is suffering from deindustrialization. Both the number of jobs and economic output are drastically declining. In addition, the economy has not been able to generate more jobs to employ more people. Evidently, unemployment increases. Deindustrialization restricts the ability to produce new jobs (Dhungel, 2016). People have been compelled by this to either return to subsistence farming or move to countries where their labor is in demand. The significance of remittances for immigrant families is still up for debate. Remittances raise household income and purchasing power of immigrant families, which increases their propensity to consume that raises the demand for commodities. Since remittances are typically sent to low-income individuals who have limited purchasing power for foreign items, consumption trends on imported goods will be lower than those resulting from normal income (Kindleberger, 1965).

To the contrary, when the families of remittance beneficiaries get increasingly interested in foreign items after the migrant workers return home, the tendency of remittance recipients to import is higher (Cohen, 2005). Immigrant families primarily use their remittance income for consumption rather than productive investment (Durand & Massey, 1992). Remittances can, however, also have unfavorable effects, such as the 'Dutch Disease' effect, whereby an increase in foreign exchange can cause a real appreciation of the exchange rate and reduce the competitiveness of domestic production, which then results in a decline in exports and an increase in imports.

In Nepal, an underdeveloped nation with a meager GDP of US $ 40 billion, remittances play a significant role (World Bank, 2015). The Nepalese economy

is becoming more dependent on remittances that has been rising steadily for almost 20 years (Ratha, 2015). Only 1.3 percent GDP of Nepal was made up of remittances in 1995. But just a few years ago, that amount had increased to approximately 30 percent. In the globe, Nepal is ranked third in terms of GDP percent after Tajikistan and Kyrgyzstan (Sah, 2019).

Since the restoration of democracy in 1990, there has been a great deal of political instability in Nepal. Then, some 30 governments have been established. Political unpredictability is impeding economic growth of Nepal. People are generally frustrated, which contributes to the high rate of worldwide migration of Nepalese. In addition, since the government began sending Nepali workers to abroad for work, the issue has gotten considerably worse. By developing bilateral ties with the nations, the government of Nepal is still looking for new labor-source nations. The Nepalese government has made it apparent that it is still not attempting to break free from the remittance economy by adding countries with relatively weak economies, like Uzbekistan, to its list of labor destinations (Uprety, 2017).

Remittances are not being utilized in any productive sectors because the majority of the family members receiving them are illiterate (Khan et al. 2007). Due to increase in remittances, the purchasing power of remittances receivers rises thereby increase in imports. Remittances may, in this sense, be used to meet short-term demands, but they do not appear to be a solution to long-term issues. Therefore, it is necessary to search how remittances affect economic growth. Remittance inflows are on the rise in developing nations, and there is debate over how they affect economic growth. There is a positive correlation between remittances and imports in terms of their marginal propensity (Khan et al. 2007).

Remittances hinder economic growth from the perspective of the labor supply since the household receiving the remittances discourages the other members of the household from working. The phrase 'Dutch Disease' is also used in economics. The idea of 'Dutch Disease' has the dual effect of accelerating one sector's strong growth while hastening the collapse of other industries (Chen, 2021).

The household that receives remittances spends a small amount of its money on food and other non-sustainable items while utilizing a substantial portion to pay for housing, education, and healthcare (Adams & Page, 2003). Remittance reduction surpasses remittance growth analysis of the effects of remittances on investment, consumption, imports, and production (Glytsos, 2005). If remittances had a favorable impact on imports of capital goods and raw materials, they would not affect demand for imported consumer items (Zaman & Lmrani, 2005). The strain on demand will be relieved if remittances are invested in productive projects, which will improve productivity (Barua et al., 2007).

Several empirical studies have been conducted to examine the relationship between the two variables remittance and imports over the past few decades. Yet there seems to be no consensus regarding the direction of causality between remittance and imports. For some countries, there is a bi-directional causality while for others, there is no causality at all. Still for some countries there is a unidirectional causality running from imports to remittance while for others, there is the opposite causality running from remittance to imports.

Foreign Employment Policy of Nepal

The 'Overseas Employment Policy-2012 (2068 B.S.) of government of Nepal is the framework that directs the process of managing foreign employment and protecting the rights of Nepali workers involved in foreign employment. Migration to foreign land is becoming the major alternative to address the problem of unemployment and pro-migration policies are being formulated. These policies have fostered the migration of Nepali about 1500 a day to foreign countries in search of employment opportunities. The government of Nepal has put a lot of emphasis on these points as part of its goal to identify and develop employment prospects at global markets. For the purpose of creating competitively capable, skilled human resource in order to optimize the advantages of work abroad overseas employment will be made straightforward, dependable, structured, and secure. Concerns about female workers on the job market and making sure their rights are prioritized. The administration of international employment is subject to good governance. Resources from the local, national, and international levels are mobilized to manage foreign employment and to foster cooperation through expanding sectorial partnerships. Remittance is used as much as feasible to support economic growth and the productive sector. Additional safety precautions would be set up for Nepali workers both within the nation and in the destination countries.

Statement of the Problem

Remittance is taken as the most significant source of foreign currency in the case of Nepal that could increase the strength of the position of balance of payments. But if remittance is used in capital goods, raw materials, and other productive activities, that would affect very less on volume of imports. Similarly, remittance can be used for increasing national income, output, and employment by investing in productive activities to support of economic growth and development that can reduce the pressure on the volume of imports. But, the problem is that about 80 percent remittances are being used for consumption of imported final products. It makes high pressure on balance of trade and thereby pressure on balance of payment of Nepal which is the main issues of the study. However, the research questions of the study is like: Is there any causal relationship between remittances and imports of Nepal?

Objectives and Hypothesis of the Study

The general objective of the study is to analyze the causal relationship between remittances and imports of Nepal. However, the specific objectives of the study are to analyze the trend of remittance and imports of Nepal, and to examine effects of remittance on imports through the two-way causal relationship between remittances and imports in Nepal. On the basis of given objectives, the study used two hypotheses like - there is a significant effect of remittances on imports and also there is a significant effect of imports on remittances of Nepal.

Review of Literature

Ahmed et al. (2014) analyzed the import function as how important worker remittances are in determining the imports of economy. They investigated the relationship between remittances and imports using the Johansen Co-integration test, Granger causality, and the ARIMA. The study shows that there is a unidirectional causal relationship between import and remittances. This demonstrates that imports have a beneficial impact on worker remittances in Pakistan while having little to no effect on the demand for imported goods. The findings also indicate a long-term favorable association between remittances and imported commodities.

Glytsos (2005) showed that changes in imports brought by changes in remittances had a negative impact on the value of multiplier since they cause leaks. However, the value of multiplier depends on the value of consuming tendencies of people. It is clear from this that the economy will be heavily dependent on imports if resources are more readily available, as this will increase the value and volume of imports. However, contrary to Uprety's (2017) assertion that remittances are a curse for economic progress of Nepal, remittances do add to GDP and foreign exchange earnings of developing nations to a greater extent.

Muktadir-Al-Mukit et al. (2013) revealed that remittances were very important to both the migrant families and the country of balance of payments. As household income of migrant families rises due to the results of receiving remittances, they may have a tendency to spend more, which will raise the demand for imported items for consumption.

Zaman and lmrani (2005) explained that remittances allow economies to spend more than they generate, imports more than they exports, or invest more than they save. Small economies may even find this to be more relevant (Connell & Conway 2000). Both at the aggregate and disaggregate levels of the import demand functions, remittances have the potential to be significant especially when there is a foreign exchange issue.

Azad (2005) demonstrated that negative trade balance of Bangladesh is caused by more imports than exports, which is similar to the case of Nepal. Remittances,

which are viewed as a main source of foreign currency for countries that export labor, can be used to increase foreign exchange reserves and thereby close this imbalance.

Salim (1992) revealed that unskilled and semi-skilled employees in Bangladesh send significant sum of foreign currency to their home, which is often much more than their country earns from exports of products and services. Remittances are utilized by the government for productive investment and to pay for imports.

Muktadir-Al-Mukit et al. (2013) examined the connection between remittances and imports for the economy of Bangladesh. The study used the Granger causality test and there is a unidirectional causal relationship between remittances and imports. The study demonstrates that imports have a favorable impact on remittances of Bangladesh while having no little effect on the demand for remittances.

Tung (2018) showed that remittances were currently seen as a boost for developing nations like Nepal, however leakage happens as a results of rising imports. Over the past few decades, remittances have been rapidly expanding in the developing world. Remittance and the value of imported commodities are practically identical in the case of Nepal. In order to determine if remittances and imports are causally related in both directions, the study attempts to do so.

Dhungel (2016) has indicated that import is stimulated by remittance rather than exerting a positive shock on remittance of Nepal. It implies that each additional remittance received will be invested in the imports of commodities into the Nepalese economy. The study found that there was a consistent, favorable, and substantial link between remittances and imports in Nepal. A marginal propensity to import is about 0.96 that was specifically obtained by the import function estimation. The study showed that 96 percent of remittance income is used to imports of final products of consumption. It concluded that there is a two-way causal relationship between remittance and imports in short run.

Research Gap

The given set of review of literature showed that there is a strong association between remittances and imports. Nepal has been ranked well for remittances in terms of the GDP to remittance ratio for more than ten years. But, there are only few studies that look at the causal relationship between remittance and imports of Nepal. There is also no clear evidence on the direction of causality between these two variables. So, keeping in view all this, the study examines the causal relationship between remittances and imports in Nepal by using Granger causality test based on VAR and few econometric tools. So, the study will help to fill up the gap of knowledge on economic implications of remittances and also potential effects of remittances on imports of Nepal through empirical analysis.

Methodology and Data

Research Design

The study basically used quantitative analysis with the deductive method using annual time-series data of the selected variables for 46 years from 1975 to 2020. To examine two way causality between remittance and imports of Nepal, few econometrics tools were used like unit root test, optimum lag length test, Johansen co-integration test, model stability tests, Granger Causality etc. For this purpose, the time-series data of the concerned variables were confirmed to follow a normal distribution and the unit root test was performed to confirm whether all concerned variables were stationary of the same order or not. To run the data for computing the required value of variables and data analysis, E-views version 9 of computer software is used.

Conceptual Framework

Remittances have a tendency to give more purchasing power to households in Nepal, which might enhance consumer expenditure notably on imported items. Remittances can also be used to invest in industries that depend on imports, manufacturing, and construction which may result in an increase in imports. Imports can have an impact on currency exchange rates between countries. If a country imports more goods and services than it exports, it may run a trade deficit, putting downward pressure on the country's currency. A weaker currency can raise the value of remittances sent back to the country, encouraging migrants to send more money home. There is a causal relationship between remittance and imports as shown in given chart.

Figure 1: Causal Relationship Remittance and Imports

Nature and Source of Data

The study is fully based on secondary data using annual time series data of remittances and imports for 46 years from 1975 to 2020 A.D. All the required data and information were obtained from the website of the Ministry of Finance (MoF), Nepal. The series was converted into a natural log so that the series of data becomes in small units and the results can be interpreted in terms of percent. Similarly, log transformation of the series of data helps to reduce the problem of heteroskedasticity.

Tools and Methods

The study used the 'Unit Root Test' to test whether the data series of all selected variables are stationary or non-stationary. It becomes non-ststionary at the level of the data but stationary at the first difference. So, co-integration test can be run. The outcome demonstrates that co-integration is absent. It indicates that there is no long run relationship. Therefore, the study used Vector Autoregressive (VAR) model, Johansen Co-integration Test, Granger Causality, Heteroskedasticity, Diagnostic Checking, and Variance Decomposition Test. To run the data for computing the required value of variables, E-views version 9 of computer software is used.

Model Specification

A more rigorous methodological approach, such as econometric analysis, is required to establish a causal relationship between remittances and imports. A vector autoregression (VAR) model is a common way to establish causality. The following is the specification for a VAR model to analyze the causal relationship between remittances and imports:

$$\text{Remittance}_t = \alpha_0 + \alpha_1 \text{ Remittance}_{(t-1)} + \alpha_2 \text{ Import}_{(t-1)} + \mu_t \text{.....(1)}$$

$$\text{Import}_t = \beta_0 + \beta_1 \text{ Import}_{(t-1)} + \beta_2 \text{ Remittance}_{(t-1)} + \varepsilon_t \text{.....(2)}$$

Where,

Remittances_t and Imports_t are the dependent variables at time period 't'. $\text{Remittances}_{(t-1)}$ and $\text{Imports}_{(t-1)}$ are the lagged values of the dependent variables at time $_{t-1}$.α_0, α_1, α_2, β_0, β_1, and β_2 are the coefficients or parameters of the variables of the model.

μ_t and ε_t are the error terms.

The lags in the dependent variables and the lags in the independent variables serve as tools for capturing the potential causal relationship between imports and remittances. The lagged variable coefficients (α_1, α_2, β_1, β_2) represent the short-term causal relationships between imports and remittances. After controlling for the lagged value of remittances, a significant and positive coefficient for α_2 implies that an increase in imports in the previous period leads to an increase in remittances in the current period. Similarly, a significant and positive coefficient for β_2 indicates that an increase in remittances in the previous period leads to an increase in imports in the current period, after controlling for import lagged value.

We can use a Granger causality test to assess the significance of the causal relationship between imports and remittances. The null hypothesis states that there is no causal relationship between imports and remittances. If the null

hypothesis is rejected, it implies that there is evidence of causality between the two variables. It is important to note, however, that causality does not always imply a causal mechanism, and further investigation is required to identify the underlying mechanisms driving the relationship between imports and remittances.

Unit Root Test

We use unit root test in order to ensure whether all data of the variables are stationary of non-stationary to void of seasonal variation at 1 percent level of significance (Dickey & Fuller, 1979). Integration was differenced until it achieved stationary. In other words, all the variables were used at their levels of stationary. The unit root test is specified as follows.

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \alpha i \, \Sigma \Delta Y_{t-i} + \varepsilon_t$$

Where,

ΔY_{t-i} = Lagged values of the dependent variables

ε_t = error term

Johansen Co-integration Test

We use Johansen co-integration test to determine whether a set of non-stationary time series variables is co-integrated or not. Co-integration is a long-run relationship between two or more time series variables in which the variables move together in the long run despite being unrelated or even negatively correlated in the short run. The Johansen co-integration test is a well-known technique for analyzing the co-integration relationship between multiple time series variables.

Vector Auto-regressive (VAR) Model

If the Johansen co-integration test among variables reveals no co-integration, the Vector Autoregressive (VAR) Guide line advises running an unrestricted VAR model (Johansen, 1988). All variables are treated as dependent variables in this methodology. The VAR model is one of the most efficient, flexible, and straightforward approaches for the investigation of multivariate time series. The forecasting and characterization of the dynamic behavior of economic and financial time series have proved to be particularly successful applications of the VAR model. It frequently provides predictions that are more accurate than those produced by univariate time series models and complicated simultaneous equations models. Forecasts from VAR models can be particularly flexible since they can be made conditional on the probable future courses of certain model variables. Usually, these causal effects are decomposed using forecast error variance decompositions. Consider, for illustration, that the study measured three distinct time series variables, designated by the letters Y_{t1}, Y_{t2}, and Y_{t3}. The following are the details of the VAR (1) vector autoregressive model:

$$Y_{1,t} = C_1 + L_{1,1} Y_{1,t-1} + L_{1,2} Y_{2,t-1} + L_{1,3} Y_{3,t-1} + e_{1,t}$$
$$Y_{2,t} = C_2 + L_{2,1} Y_{1,t-1} + L_{2,2} Y_{2,t-1} + L_{2,3} Y_{3,t-1} + e_{2,t}$$
$$Y_{3,t} = C_3 + L_{3,1} Y_{1,t-1} + L_{3,2} Y_{2,t-1} + L_{3,3} Y_{3,t-1} + e_{3,t}$$

Each variable is a linear function of the lag 1 values for all variables in the set.

Granger Causality

Several tests have been developed later in the literature that relate to the causality test approach. One of the oldest techniques to measure the causal effect from time series observations is Granger causality. Traditionally, calculating VAR model is used to assess causality in the Granger sense (Engle & Granger, 1987).

$$\text{Remittance}_t = \sum_{j=1}^{p} \alpha_j \text{ Remittance}_{t-j} + \sum_{j=1}^{p} \eta_j \text{ Imports}_{t-j} + u_t \ldots\ldots (1)$$

$$\text{Imports}_t = \sum_{j=1}^{p} \gamma_j \text{ Remittance}_{t-j} + \sum_{j=1}^{p} \delta_j \text{ Imports}_{t-j} + u_t \ldots\ldots (2)$$

Results and Discussion

Trend of Remittances and Imports in Nepal

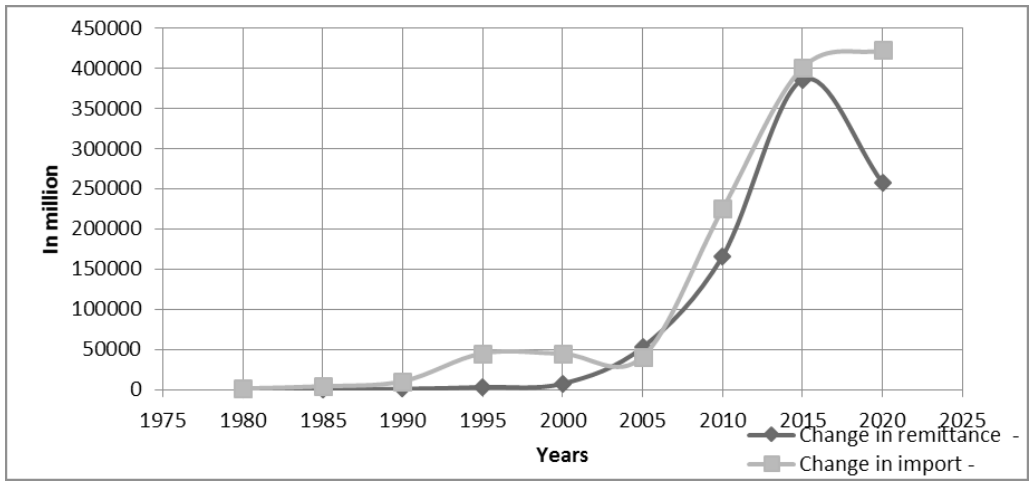
Generally speaking, it appears that Nepal has become more reliant on both remittances and imports in recent decades. The increase in remittances is most likely due to an increase in Nepalese citizens working abroad and sending money home, whereas the increase in imports could be due to many factors including increased demand for foreign goods and a growing economy. The trend of remittance and imports of Nepal with every five year gap can be shown with the help of given Table 1, Figures 2, and Figure 3.

Table 1: Trend of Remittances and Imports in Nepal

Years	Remittance	Change in Remittance		Imports	Change in Imports	
		In Units	In Percent		In Units	In Percent
1975	204.3	-	-	1,814.6	-	-
1980	357.3	153.0	74.89	3480.1	1665.5	91.78
1985	690.7	333.4	93.31	7,742.1	4262.1	122.46
1990	1774.9	1084.2	156.97	18,324.9	10582.8	136.69
1995	5063.6	3288.7	185.28	63,679.5	45354.6	247.5
2000	12662.3	7598.7	150.06	108,504.9	44825.4	70.39
2005	65541.2	52878.9	417.60	149,473.6	40968.7	37.75
2010	231725.3	166184.1	253.55	374,335.2	224861.6	150.43
2015	617278.8	385553.5	166.38	774,684.2	400349.0	106.94
2020	875027.0	257748.2	31.53	1,196,799.1	422114.9	50.48

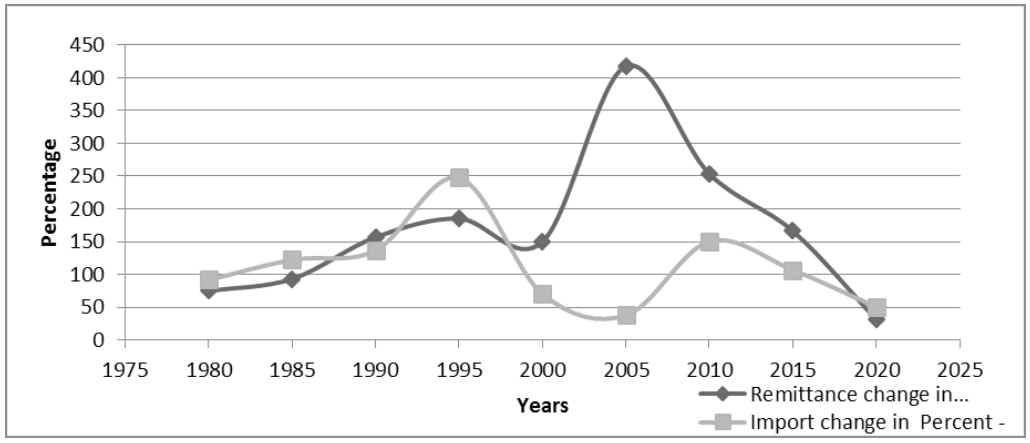
Source: Author's computation.

Figure 2: Trend of Change in Remittances and Imports in Nepal (in millions)



Source: Table 1.

Figure 3: Trend of Percent Change in Remittances and Imports in Nepal



Source: Table 1.

Remittances have been steadily increasing over time, as shown in the table, with only minor fluctuations. From 1980 to 1990, remittances increased gradually. The slow increase in remittances in Nepal from 1980 to 1990 can be attributed to the fact that labors were unfamiliar with migration in foreign countries. The rapid increase in remittances between 1995 and 2010 can be attributed to the Maoist insurgency, which resulted in a significant increase in the number of Nepalese citizens working abroad, particularly in countries such as Saudi Arabia, Qatar, and the United Arab Emirates. Similarly, the Nepalese

government enacted policies that made it easier for Nepalese citizens to work abroad and send money home.

From 2010 to 2020, remittances increased at a slower but still noticeable rate, with a slight decrease in 2015. Arabian countries' policies can be attributed to a slower but still noticeable increase in remittances from 2010 to 2020. Some countries, such as Saudi Arabia and Qatar, enacted policies that made it more difficult for Nepalese citizens to work in their countries. Another reason could be that the global economy was slowing at the time, resulting in fewer job opportunities for Nepalese citizens living abroad. Similarly, the earthquake caused a slight decrease in remittances in 2015. The earthquake damaged infrastructure and disrupted economic activity in the country, which may have resulted in a decrease in the number of Nepalese citizens working abroad and sending money home.

Similarly, Imports have also been steadily increasing over time, with only minor fluctuations. Imports increased at a slower pace than remittances from 1980 to 1990. The change in units in remittance and imports show that the change in remittance units represents the amount of money that people send back to their country from abroad. It is a crucial economic indicator that can shed light on the economic conditions in both the sending and receiving countries. An increase in remittance flows can indicate a number of positive economic factors, such as an increase in the number of people working abroad and sending money home, which can indicate a healthy labor market in the sending country. Individuals are able to save more money as the amount of money sent back home increases. Changes in remittance flows can also have far-reaching economic consequences, such as affecting the balance of payments, exchange rates, and overall economic growth.

Similarly, the change in percent of both remittance and imports show that there have been significant fluctuations in the amount of remittance received in Nepal over the years. There have been years of high growth, such as in 2005 when there was a 417.6 percent increase in remittance compared to the previous year and years of low growth, such as in 2020, when there was a 31.53 percent increase in remittance compared to the previous year.

In 2005, there could have been a boom in the host countries' construction or manufacturing sectors, leading to an increase in demand for migrant workers and higher wages, resulting in higher remittances. The low growth in remittances in 2020, on the other hand, can be attributed to a variety of factors. The COVID-19 pandemic caused widespread lockdowns and economic disruptions in many countries, affecting Nepali migrant workers' income and employment opportunities. Many workers were laid off or had their hours reduced, resulting in lower remittances being sent home. Furthermore, restrictions on international travel and movement made it difficult for workers to send money home, contributing to lower remittance growth in 2020.

Stationary Test

A stationary test is a statistical test that determines whether or not a time series of data is stationary. A stationary time series has statistical properties that remain constant over time, such as mean, variance, and covariance. Because many statistical models assume that time series are stationary, stationarity is an important concept in time series analysis. If the time series is not stationary, these models may be inappropriate, and the results may be misleading. A stationary test can help determine whether or not a time series is stationary. It indicates whether the time series' statistical properties contain any trends, seasonality, or other non-stationary patterns. Stationary tests are required because many statistical models require stationary time series data, and non-stationary data can lead to incorrect conclusions and predictions. As a result, before applying any statistical models, it is critical to determine whether a time series is stationary or not.

Table 2: Unit Root Tests

Variables	ADF test statistic, P-value	
	Level	First Difference
ln REM	0.77	0.00
ln IMP	0.93	0.00

Source: Author's computation.

Variables are not stationary at level as p-value is 0.77 which is more than 5 percent. But the both variables are stationary at first difference. So, co-integration test can be run.

Table 3: Lag Selection

Lag	log L	LR	FPE	AIC	SC	HQ
0	- 119.4782	NA	1.115	5.785	5.867	5.815
1	41.8192	299.552*	0.000623*	- 1.706*	- 1.458*	- 1.615*
2	44.3196	4.406	0.000670	- 1.634	- 1.221	- 1.483
3	47.1191	4.666	0.000713	- 1.578	- 0.998	- 1.365
4	52.9675	9.190	0.000657	- 1.665	- 0.920	- 1.393
5	55.1504	3.222	0.000725	- 1.579	- 0.668	- 1.245

Source: Author's computation.

Note: LR: Sequential modified LR test statistic; **FPE:** Final prediction error criterion; **AIC:** Akaike information criterion; **SC:** Schwarz criterion; **HQ:** Hannan–Quinn information criterion.

As shown in the table 3, asterisk is marked on 1 lag of all criteria. It means that all lag selection criteria suggest to be selected one lag.

Johansen Co-integration Test:

A statistical method for determining the presence and number of co-integrating vectors in a multivariate time series is the Johansen co-integration test. Co-integration is a concept in time series analysis that describes the relationship between non-stationary variables that have a long-term equilibrium. The Johansen co-integration test is used to determine whether two or more non-stationary variables have a long-run relationship. This is significant because two variables may be co-integrated and have a long-term equilibrium relationship even if they are not directly related in the short term. The first step in performing the Johansen co-integration test is to determine the order of integration of each variable in the time series using unit root tests like the Augmented Dickey-Fuller (ADF) or Phillips-Perron (PP). The variables in the time series are then used to estimate a VAR model, and the co-integrating vectors are identified using the MLE or LRT method. The Johansen co-integration test determines the long-run equilibrium relationship of variables in a time series. It indicates whether the variables have a stable long-run relationship and, if so, how many co-integrating vectors exist.

Table 3: Johansen Co-integration Test

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized		**Trace**	**0.05**	
No. of CE (s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None	0.081	4.44	15.49	0.86
At most 1	0.016	0.69	3.84	0.40

Source: Author's computation.

As shown in the table 3, there is no co-integration as p-value is more than 5 percent. As per guide line more than 5 percent means null hypothesis is accepted. Here, null hypothesis is that there is no co-integration.

VAR Model for Remittance and Imports

Vector Auto-regression (VAR) model is a time series analysis statistical model that models the joint behavior of multiple time series. Each variable in a time series is modeled as a linear function of its own past values and the past values of all other variables in the system in a VAR model. The VAR model depicts the dynamic interdependence of variables in a time series, as well as how changes in one variable affect the others over time. It can be used to forecast and analyze the behavior of complex systems with multiple interdependent variables. The first step in running a VAR model is determining the order of the VAR model, which refers to the number of lagged values of each variable to include in the model. Information criteria such as the Akaike information criterion (AIC) or

the Bayesian information criterion can be used to determine this (BIC). After determining the order of the VAR model, the next step is to estimate the model's coefficients using least squares estimation methods (LSE). The estimated coefficients represent the dynamic relationships between the system's variables.

a) VAR Model for log Remittance (REM)

$$\ln REM = 0.89*\ln REM(-1) + 0.14*\ln IMP(-1) - 0.45$$

Table 4: Efficiency of Individual Variables

ln REM = C(1)*ln REM (-1) + C(2)*ln IMP(-1) + C (3)				
Variables	**Coefficients**	**Std. Error**	**t-Statistic**	**Prob.**
lnREM (-1)	0.89	0.054	16.4	0.00
lnIMP (-1)	0.14	0.07	1.94	0.05
Constant term	- 0.45	0.35	- 1.28	0.20

Source: Author's computation.

As shown in the table 4, C (1) represents remittance which is efficient as its p-value is less than 5 percent. Similarly C (2) represents import which is also efficient as its p-value is near 5 percent. As per guide line, majority of variables must be efficient for fitted model. So, this model can be said to be good model.

b) VAR Model for log Imports (IMP)

$$\ln IMP = 0.003*\ln REM(-1) + 0.98*\ln IMP(-1) + 0.23$$

Granger Causality

Granger causality is a statistical model that seeks to identify causal relationships between two time series. Clive Granger, an economist, created it in the 1960s. Granger causality examines whether the past values of one time series can be used to predict the future values of another time series. If the past values of one series are discovered to be useful in predicting the future values of another, we say that the first series Granger-causes the second.

Table 5: Causality Test

Null Hypothesis:	**Observation**	**F-Statistic**	**Prob.**
ln REM does not Granger cause ln IMP	46	0.01	0.90
ln IMP does not Granger cause ln REM		3.77	0.05

Source: Author's computation.

As shown in the table 5, remittance does not affect imports as p-value is more than 5 percent. As per guide line when p-value is more than 5 percent, null hypothesis is accepted. Here, null hypothesis is 'remittance does not granger cause import'. Similarly, here null hypothesis 'import does not granger cause remittance' is rejected as p-value is nearly 5 percent. It means import affects remittances.

Diagnostic Checking

In econometric analysis, diagnostic checking, which includes tests for heteroskedasticity, serial correlation, and residual normality, is required to assess the validity of model assumptions and the accuracy of model predictions. These tests are important because if model assumptions are not met, the model may produce unreliable results and analysis conclusions may be incorrect.

Heteroskedasticity, for example, refers to the situation in which the variance of the error term in a regression model varies across different independent variable values. This violates the assumption of homoskedasticity, which states that the variance of the error term is constant across all independent variable values. Heteroskedasticity leads to biased and inefficient parameter estimates, which leads to incorrect conclusions about variable relationships. As a result, testing for heteroskedasticity is critical to ensuring that the model's predictions are accurate.

When an error term in a regression model is correlated with its own lagged values, this is known as serial correlation. This goes against the assumption of independent and identically distributed (IID) errors, which holds that error terms are unrelated to one another. Autocorrelation can cause parameter estimates to be biased and inefficient, as well as incorrect hypothesis tests and confidence intervals. As a result, testing for serial correlation is critical to ensuring that the model's predictions are correct.

The assumption of residual normality, on the other hand, is that the error term in a regression model is normally distributed with a mean of zero and a constant variance. Deviations from this assumption can indicate that the model is incorrectly specified or that the data contains outliers or influential observations. Testing for residual normality is necessary to ensure that model predictions are reliable and that analysis conclusions are valid.

Dependent Variable: Log Remittance (ln REM)

Table 6: Heteroskedasticity, Serial correlation, and Residual Normality Test

Test	Null Hypothesis	Name of Test	P-value
Heteroskedasticity Test	There is no heteroscedasticity	Breusch -Pagan -Godfrey	0.33
Serial Correlation	There is no serial correlation	Breusch-Godfrey	0.35
Residual Normality Test	Residual is normally distributed	Jarque –Bera	0.00

Source: Author's computation.

This model is the remittance as dependent variable. As shown in the table 6, p-value of heteroskedasticity test is more than 5 percent. So null hypothesis 'There is no heteroscedasticity' is accepted which is good sign for the best model.

Similarly p-value of Serial correlation test is also more than 5 percent. As per guide line null hypothesis 'there is no serial correlation' is accepted which is good for model fitted. Next test is whether residual is normally distributed or not. Here p-value is less than 5 percent so null hypothesis "residual is normally distributed" is rejected which is not good for fitted model.

Dependent Variable: Log Imports (ln IMP)

Table 7: Heteroskedasticity, Serial Correlation, and Residual Normality Test

Test	Null Hypothesis	Name of Test	P-value
Heteroskedasticity Test	There is no heteroscedasticity	Breusch -Pagan -Godfrey	0.14
Serial Correlation	There is no serial correlation	Breusch-Godfrey	0.90
Residual Normality Test	Residual is normally distributed	Jarque –Bera	0.09

Source: Author's computation.

This model is the import as dependent variable. As shown in the table, p-value of heteroskedasticity test is more than 5 percent. So, null hypothesis (there is no heteroscedasticity) is accepted which is good sign for the best model. Similarly p-value of Serial correlation test is also more than 5 percent. As per guide line null hypothesis (there is no serial correlation) is accepted which is good for model fitted. Next test is whether residual is normally distributed or not. Here, p-value is more than 5 percent so null hypothesis "residual is normally distributed" is accepted which is good for fitted model. Here all the tests support the model. So, it can be safely concluded that model is good fitted.

Variance Decomposition Test: Cholesky Ordering

In multivariate analysis, the basic statistical technique of variance decomposition is used to find structures in a large number of variables that can be simplified. Factor analysis, for instance, are tools that are frequently used. For example, economic forecasting has made substantial use of factor analytical techniques. The terms 'variance decomposition' and 'forecast error variance decomposition' are more specifically used in macroeconomic analysis to refer to a particular method for evaluating the relationships between variables given by vector autoregressive (VAR) models. Sims (1980) promoted these models as potential replacements for traditional simultaneous equations models, and then many economists and econometricians have adopted them.

Table 8: Variance Decomposition of Remittance (REM)

Variance Decomposition of ln REM			
Periods	**S.E.**	**ln REM**	**ln IMP**
1	0.21	100.00	0.00
2	0.29	99.72	0.27
3	0.34	99.08	0.91
4	0.38	98.09	1.90
5	0.41	96.75	3.24
6	0.43	95.12	4.87
7	0.45	93.22	6.77
8	0.47	91.10	8.89
9	0.49	88.80	11.19
10	0.50	86.38	13.61

Source: Author's computation.

Here, real remittance is target. In the short run, shock to remittance contribute out of 100 percent 99.08 percent variation of the fluctuation which is said to be own shock. Shock to imports is 0.91 percent fluctuation in remittance. Thus, total fluctuation will be 100 percent. In long run, 86.38 percent can contribute to remittance itself which is known own shock. Similarly, shock in other variables imports can cause 13.61 percent variation of the fluctuation remittance in long run. Here, 10^{th} period is considered to be long run.

Table 9: Variance Decomposition of Imports (IMP)

Variance Decomposition of ln			
Periods	**S.E.**	**ln REM**	**ln IMP**
1	0.10	0.08	99.92
2	0.14	0.09	99.90
3	0.17	0.11	99.88
4	0.20	0.14	99.85
5	0.22	0.16	99.83
6	0.24	0.18	99.81
7	0.26	0.20	99.79
8	0.28	0.22	99.77
9	0.30	0.24	99.75
10	0.31	0.26	99.73

Source: Author's computation.

Here, import is target. In the short run, shock to import contribute 99.88 percent variation of the fluctuation which is said to be own shock. Shock to remittance is 7.90 percent fluctuation in import. Thus, total fluctuation will be 100 percent. In long run, 99.73 percent can contribute to import itself which is known own shock. Similarly, shock in other variables remittance can cause 0.26

percent variation of the fluctuation in import in long run. Here 10th period is considered to be long run.

Conclusion

As a matter of fact no one country gets developed through remittance. However we have to try optimum utilization of remittance. At the same time it is also considered that how to generate employment in our own country so that man power that has to exodus for their livelihood can be reduced and their labour can be utilized for our own country developed. In order for Nepal to achieve rapid economic growth, it must reduce its dependence on imports. High imports have accounted for a large portion of remittance income, which can be used to a large extent for productive purposes. It should be used to increase the level of domestic production by making proper use of resources. It is also important to pay special attention to the establishment of import substitution industry. At the same time, it is necessary to attract a lot of remittances. However, it shows that the volume of increasing remittance of Nepal should be mobilized in productive sectors or establishment of import substitution industry to reduce import dependency by the increasing remittance. The policy recommendation is that the authorities should intensify efforts on the export base of the economy. The monetary authorities should implement necessary policy to cool the pressure arising from conspicuous spending of remittances.

Reference:

Adams, R., & Page, J. (2003). The impact of international migration and remittances on poverty. *Policy Research Working Paper No. 2761*. Washington D.C.: World Bank.

Adnan, Q. M., & Boubaker, H. B. H. (2011). Exports, imports and economic growth: An empirical analysis of Tunisia. *IUP Journal of Monetary Economics*, 9 (1).

Ahmed, R., Vishnu, P., & Ahmad, N. (2014). Causal relationship between worker's remittances and imports in Pakistan. *European Journal of Scientific Research*, 120 (1), 177-188.

Anyanwu, C., & Erhijakpor, E. (2010). Do international remittances affect poverty in Africa? *African Development Review*, 22 (1), 51–91.

Azad A. K. (2005). *Migrant workers remittances: A source of finance for micro-enterprise development in Bangladesh.* World Bank, 103-118.

Barua, S., Majumder, M. A., & Aktharuzzaman M., (2007). Determinants of workers' remittances in Bangladesh: An empirical study. *Working Paper Series: WP 0713,* Policy Analysis Unit (PAU), Bangladesh Bank, Dhaka, Bangladesh.

Bhatta, G. R. (2013). Remittance and trade deficit nexus in Nepal: A VECM approach. *NRB Economic Review*, 37.

CBS (2011), *National Life Standard Survey-2010/2011: Third Round*. Press release of dissemination of brief outcome of third survey, Central Bureau of Statistics, page No. 3.

Chen, J. (2021, Oct 31st). *Dutch disease*. Retrieved (2022, June 15th), from https://www.investopedia.com/terms/d/dutchdisease.asp.

Cohen, J. H. (2005). Remittance outcomes and migration: Theoretical contests, real opportunities. *Studies in comparative international development*, 40(1), 88-112.

Connell, J., & Conway, D. (2000). Migration and remittances in Island microstates: A comparative perspective on the South Pacific and the Caribbean, *International Journal of Urban and Regional Research*, 24, 52–78.

Cooray, A. (2012). The impact of migrant remittances on economic growth: Evidence from South Asia, *African Development Review*, 20(5), 985–98.

Dahal, P. (2014). The impact of remittances on economic growth in Nepal: An analysis of a significant basis of development. *Asia Pacific Journal of Public Administration*, 36 (4), 261-282. DOI: https://doi.org/10.1080/23276665.2014.975908

Dhungel, K. R. (2016). Does remittance stimulate import? Empirical evidence from Nepal. *The Indian Economic Journal*, 63(4), 762-776.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of estimator for autoregressive time series with a unit root, *Journal of American Statistical Association,* 74(366), 427-431.

Durand J., & Massey D. (1992). Mexican migration to the United States: A critical review. *Latin America Research Review*, 27 (2): 3-42.

Engle, R. F., & Granger, C. (1987). Co-Integration and error correction: Representation, estimation, and testing. *Econometrica,* 55 (2), 251-276.

Glytsos N. P. (2005). The contribution of remittances to growth. *Journal of Economic Studies*, 32 (6): 468-396.

Gujrati, D. (1995). *Basic econometrics,* 3rd Edition, McGraw-Hill

Johansen, S. (1988, June-September). Statistical analysis of co-integration vectors. *Journal of Economic Dynamics and Control,* 12(2-3), 231-254.

Khan, M., Khattak N. R., Bakhtiar, Y., Nawab, B., Rahim, T., & Ali, A. (2007). Remittances as a determinant of import function: An empirical evidence from Pakistan. *Sarhad Journal of Agriculture,* 23 (4): 1187-1189.

Kindleberger C. T. (1965). Emigration and economic growth. *Banco Nasionsle Del Lavoro Quarterly Review,* 75: 235-254.

MoF (2022). *Microeconomic Dashboard*. Ministry of Finance. https://data.mof.gov.np/data.aspx# /2022/05/12

Muktadir-Al-Mukit, D., Shafiullah, A. Z. M., & Sajib, A. H. (2013). Determination of causality between remittance and import: Evidence from Bangladesh. *International Journal of Business and Social Research (IJBSR)*, 3 (3), 55-62.

Pesaran, M., Shin, Y., & Smith, R. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, 289–326.

Ratha, D. (2015). Remittances by migrants will slow but remain large in 2015: Big potential for leveraging remittances for development financing. *The World Bank,* 1st Dec, 2016.

Sah, B. N. (2019). Remittance and economic development of Nepal. *Patan Pragya*, *5* (1), 196-208.

Salim, R. A. (1992). Overseas remittances in Bangladesh: Importance, potentialities and policy options, *The Jahangirnagar Review*, Part-II, Social Science: 13 & 14, The Jahangirnagar University, Dhaka.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica*, 48, 1- 48.

Tung, L. T. (2018). Impact of remittance inflows on trade balance in developing countries. *Economics & Sociology*, 11 (4), 80-95.

Uprety, D. P. (2017). The impact of remittances on economic development in Nepal. *Journal of Development Innovations*, 1 (1), 114-134.

Vacaflores, D., Kishan R., & Trinidad J. (2012). Remittances, international reserves, and exchange rate regimes, *Working Paper Series*, Department of Finance and Economics, Texas State University, Texas.

World Bank (2015). Monthly and Quarterly Remittances Flows to Selected Countries. Washington, DC: World Bank.

Zaman, K. U., & Lmrani, N. A. (2005). Workers' remittances and import demand in Pakistan, *The Philippine Review of Economics*, 13 (2), 27-137.

Appendix I: Remittances and Imports in Nepal

Years	Remittance	Log (REM)	Imports	Log (IMP)
1975	204.3	2.3103	1,814.6	3.2588
1976	231.3	2.3642	1,981.7	3.2970
1977	268.3	2.4286	2,008.0	3.3028
1978	219.4	2.3412	2,469.6	3.3926
1979	303.1	2.4816	2,884.7	3.4601
1980	357.3	2.5530	3,480.1	3.5416
1981	484.2	2.6850	4,428.2	3.6462
1982	427.1	2.6305	4,930.3	3.6929
1983	549.7	2.7401	6,314.0	3.8003
1984	614.1	2.7882	6,514.3	3.8139
1985	690.7	2.8393	7,742.1	3.8889
1986	809.1	2.9080	9,341.2	3.9704
1987	1292.6	3.1115	10,905.2	4.0376
1988	1608.4	3.2064	13,869.6	4.1421
1989	1628.6	3.2118	16,263.7	4.2112
1990	1774.9	3.2492	18,324.9	4.2630
1991	2128.3	3.3280	23,226.5	4.3660
1992	2316.5	3.3648	31,940.0	4.5043
1993	2994.3	3.4763	39,205.6	4.5933
1994	3469.1	3.5402	51,570.8	4.7124
1995	5063.6	3.7045	63,679.5	4.8040
1996	4283.6	3.6318	74,454.5	4.8719
1997	5595.0	3.7478	93,553.4	4.9711
1998	6987.8	3.8443	89,002.0	4.9494
1999	10314.6	4.0134	87,525.3	4.9421
2000	12662.3	4.1025	108,504.9	5.0354
2001	47216.1	4.6741	115,687.2	5.0633
2002	47536.3	4.6770	107,389.0	5.0310
2003	54203.3	4.7340	124,352.1	5.0947
2004	58587.6	4.7678	136,277.1	5.1344
2005	65541.2	4.8165	149,473.6	5.1746
2006	97688.5	4.98984	173,780.3	5.2400
2007	100144.8	5.00063	194,694.6	5.2894
2008	142682.7	5.1544	221,937.7	5.3462
2009	209698.5	5.3216	284,469.6	5.4540
2010	231725.3	5.3650	374,335.2	5.5733
2011	253551.6	5.4041	396,175.5	5.5979
2012	359554.4	5.5558	461,667.7	5.6643
2013	434581.7	5.63807	556,740.3	5.7457
2014	543294.1	5.73503	714,365.8	5.8539
2015	617278.8	5.7905	774,684.2	5.8891
2016	665064.3	5.8229	773,599.1	5.8885
2017	695452.4	5.84227	990,113.2	5.9959
2018	755058.6	5.8780	1,245,103.2	6.0952
2019	879271.4	5.9441	1,418,535.3	6.1518
2020	875027.0	5.9420	1,196,799.1	6.0780

Source: MoF, 2021.