Workers' Remittance and Their Effect on the Economic Growth using HarrodDomer Concept: an Empirical Analysis of Bangladesh

MdKamrul Hasan Maruf[1], Md. Moniruzzaman Muzib[2]

[1]*Lecturer, Department of Economics, MawlanaBhashani Science and Technology University, Tangail-1902, Bangladesh*

[2]*Assistant Professor (correspondent author), Department of Economics, MawlanaBhashani Science and Technology University, Tangail-1902, Bangladesh*

Abstract

Expatriate workers remittance payments are increasingly becoming a significant source of major international financial resources for many developing countries like Bangladesh. This paper investigates the causal link between remittances and economic growth in Bangladesh for the long run by using available annual data (1981-2014). From HarrodDomer model we know that economic growth can be increased by increasing domestic saving resources. To justify the impact of remittance on domestic saving we here use fixed capital formation as domestic saving and estimates the long run relationship between fixed capital formation and remittance. Interestingly we find a positive relationship between fixed capital formation and remittance which implies that remittance payments from migrant workers has positive impact on domestic saving and it can supplement domestic investment funds to enhance the capacity of the economy to grow.

Keyword:*Remittance, domestic savings, capital formation and economic growth*

I. INTRODUCTION

Bangladesh has been a significant source of migrant workers for the labor shortage suffering countries. Remittances from the migrant workers' have become a great source of export income for Bangladesh. Migrant workers remittances have played an important role to ameliorate economic development for Bangladesh. In this paper we try to examine the impact of remittance income on economic growth in Bangladesh. In the last 30 years, remittance income in Bangladesh has increased significantly with some minor fluctuations. Increases in remittance flows have greatly assisted Bangladesh to pay the import bills. Developing countries like Bangladesh need the scarce foreign exchange to pay for its import requirements and it is the prerequisite of their earlier stage of development .There are two significant factors behind the inestimable increase in remittance payments over this period. First one, in the last 20 years immigration between developing and developed countries has increased exponentially (World Bank, 2007) and the other, for technological improvements transaction costs have declined which have allowed for faster, lower cost mechanisms for the international transfer of payments between individuals (Guiliano& Ruiz-Arranz, 2006).

As the remittance income is increasing, the mongers in developed economics have come forward to examining its impact on economic growth in both the emcee countries and the migrant workers countries. Some opposing views have been emerged because of its impact on economic growth in developing countries – some contend that remittances have a positive impact on economic growth while others argue for the opposite view. The intention of this paper is to peruse the impact of worker remittances on the economy of Bangladesh by using HarrodDommar model framework. Over time the migrate workers number has increased materially. That's why remittance income has become a turning source of foreign exchange earnings for Bangladesh. In this manner, Bangladesh offers an eminent opportunity to examine the kinship between remittance income and economic growth. We can use the findings of this study for important policy implications not only for Bangladesh but also for other remittance income dependent developing countries.

We mentioned above that remittances flourish economic growth is an important topic of disputation amongst the economists. Those economists who do not admit remittances can contribution on economic growth prescribe their expenditure on picturesque consumption and believe savings are being used on consumption rather than productive assets accumulation (Rahman et al., 2006). Others who argue for the positive influence of remittances on growth emphasis on the multiplier effects of consumption (Stahl and Arnold, 1986), upliftment of the financial institutions that operate remittance payments (Aggarwal et al. 2006), and where micro-financing is not widely available the role of remittances as an alternative to debt helps to subside credit constraints in countries (Guilamo and Ruiz-

Arranz, 2006). The classical contending camps of development economists may be separated into these arguments. The top-down approach of poverty alleviation believers give first attention to the development of institutions while those who argue for a bottom-up approach suggest lifted out the individual first from the poverty trap.

There are remarkable studies to root out the contribution of remittances on economic growth and poverty alleviation. Aggarwal et al. (2006) find remittances have a positive effect on bank deposits and credit to GDP on his conducted study in which he used 99 countries over the period 1975-2003 data. Then, the contriver flung down the positive effect on development by spanning this study showing the positive familiarity between these two variables and economic growth**.**Pradhan et al. (2008) find out a small and positive impact of remittances on economic growth by using cross sectional data of 36 countries. Taylor (1992) and Faini (2001) also find a positive impact of remittances on economic growth.

From the above studies it is clear that to find out the question answer whether remittances are a statistically significant factor in determining economic growth is ours main objective of this paper. The null hypothesis should be a statement of correlation between remittance and economic growth. Another vital question should be formed whether economic growth causes remittances or visa-versa. We rarely notice quantitative analysis on the causality between remittances and economic growth has been conducted. To fill up this gap we conduct this study. This study mainly based on the growth theory of HarrodDomar. The HarrodDomar economic growth model avouches the importance of saving as key determinant of growth. This model helps to explain how growth has occurred and how it may occur in the future. According to this model the growth of an economy is positively related to its saving ratio. This implies that the higher saving rate allows for more investment in physical capital which can increase the production of goods and services and that leads to economic growth. So, for economic growth we have to keep importance on saving accumulation.

With this aim in mind, the main objective of this paper is to employ the Granger Causality Framework in order to investigate the directional linkage between economic growth and remittances in the context of Bangladesh. Here we use HarrodDomar concept which focuses on domestic saving for economic growth. In this paper, fixed capital formation is used as the proxy of domestic saving and tries to estimate the correlation between fixed capital formation and remittance for short run and long run. If remittance has positive relation with fixed capital formation then it can say that remittance has positive influence on domestic savings which leads a significant economic growth according to HarrodDomar model.

II. LITERATURE REVIEW:

By increasing household incomes remittances become a powerful anti-poverty force for the developing countries. Evidence around the globe reveals that the remittance receiving households are financially better off across multiple dimensions relative the similar households that do not receive remittance. Since remittance income helps to bring household out of poverty, its beneficiaries can assert less time and energy scrambling for their basic sustenance and more free to engage in pursuits that collective stimulate sustainable economic growth in the sending community and country. The overall national economy may also benefit from the increased investment that remittances facilitate. The worthiness of remittance flows might accelerate increasing level of income for the poor as well as the growth of the economy as whole.

Adolfo, Chami, Fullenkamp, Gapen and Montiel (2009) in their paper, "Do workers' remittances promote economic growth" studied growth effects of remittances by taking data of 84 countries and annual observations from 1970 to 2004 period. They applied remittance and growth theory to find the effect of remittance. The concluded remittance has positive effect capital accumulation, labor force and TFP.

Nisha and Fayissa(2008) explored the relationship between remittance and economic growth using 64 different countries of Asian, African and Latin American panel data from 1987 to 2007. In this study they used panel unit root and panel co-integration test to measure the familiarity among these two variables. Positive relationship among remittance and economic growth throughout the whole group was the outcome of their investigation.

Using Solow growth model Rao and Hasan illustrated the effects of remittances on economic growth. This research found the positive impact on economic swelling. In developing countries remittances provide the catalyzer for financial market as well as monetary policy development. Guilano and Arranz study found that remittances promote the credit constraints on the impecunious, flourish the capital allocation and in this way accelerate economic growth.

Giuliano and Ruiz-Arranz used a sample of 73 countries during periods of 1975 to 2002 where to

smooth out the cyclical, they used five years average of all variables. This study conducted OLS as well as fixed effects panel estimates and to account possible endogeneity used system generalized method of moments (SGMM) procedure. Positive impact of remittance on economic growth was the conclusion of their study.

Chukwuma (2009) in his paper "Remittances for Growth: A Two Fold Analysis of Feedback between Remittances, Financial Flows and the Real Economy in Nigeria" studied the effect of remittance on economic growth for Nigeria. He used yearly data from 1996 to 2006 collected from Central Bank of Nigeria. He used Aggregated demand, Aggregated supply, Balance of payment, Money and prices as his tool. He found remittance do have effect on the growth of the Nigerian economy.

Ahortor and Adenutsi (2009) in their study "The Impact of Remittances on Economic Growth in Small-Open Developing Economics" found remittances have a positive marginal effect on SSA and LAC countries. They took data from World Bank at a range of 1980 to 2008. They formulated model based on Arellano and Bond (1991) Arellano and Bravo (1995), Blundel and Bond (1998).

Amavilah (2008) conducted a study of "Domestic resources, governance, global links, and the economic performance of Sub-Saharan Africa". He established an analytical framework to evaluate economic performance. He concluded remittance have effect on countries of Africa.

Ronnie, (2008) in the paper, "Remittances and Their Effect on the Level of Investment in Barbados" used yearly data from 1980 to 2007 to conduct his experiment. He tested the relationship between private investment and remittances using Stock and Watson (1993) Dynamic Ordinary Least Squares (DOLS) and he used empirical model as the point of departure is due to Acosta and Loza (2004) and Boamah (2007). His study confirms that remittance have positive impact on privet real investments.

Ledesma, Miguel and Piracha (2004) in their study paper "International migration and the role of remittances in Eastern Europe" used data from European Union for the period of of 1990 to 1999. Using extended the model of Aghion and Blanchard (1994) by Mancellari (1996) they have concluded that remittances may have a significant consequence of European Union countries economy.

Bhaskara and Hassan published a paper on 2011, "A panel data analysis of the growth effects of remittances." In the paper they have Constructed a model similar to "Solow model" by Mankiw, Romer and Weil (1991, MRW hereafter) and used 5 year average growth rate as data. They showed that remittance do not have any significant direct growth effects on an economy.

Chami, Fullenkamp, and Jahjah (2003) in paper "Are immigrant remittances flow a source of capital for development?" established a framework for analyzing remittances including workers effort and wages influences on economic growth. Data they have used is yearly data of 1970-1998 of 180countries member of World Bank. They have concluded that negative relationship with remittance and economic growth.

III. THEORETICAL FRAMEWORK:

The Harrod–Domar model of economic growth is an early post Keynesian model. This model is widely used to expound an economy's growth rate in terms of the level of saving and productivity of capital. Let Y represent output, which equals income, and let K equal the capital stock. S is total domestic saving, s is the savings rate, and I is investment. δ stands for the rate of depreciation of the capital stock. Then, Y=f(K) that means Output is a function of capital stock and f(0)=0 which implies that Capital is necessary for output. National incomeΔYdepends linearly on changes in capital stock$\Delta K$and that investment or changes in capital stock is financed out of domestic savings S in the closed economy version of the model i.e.ΔK = S.The model says that domestic savings S itself depend on national income Y, i.e. S = sY, where s is the saving ratio of income:

$\Delta Y = b\Delta K$……..(1)

$K = S = sY$……..(2)

Substituting (2) into (1), we have

$\Delta Y/Y = sb$……..(3)

Harrod-Domar explained that equilibrium economic growth is determined by the product of savings ratio s and annual investment returns. This means that economic growth will proceed at the rate at which society can mobilize domestic savings resources coupled with the productivity of investment. Realizing that the major constraint on the part of developing economies is the shortage of capital, the Harrod-Domar model prescribed the open extension where investment can be finances both by the domestic and the foreign capital flow (emphasis on remittance). Then the model may be written as:

$\Delta Y = b\Delta K$……(4)
$\Delta K = S + F$ ……(5)
Substituting (4) into (5) and dividing through Y, we have

$\Delta Y/Y = b\{(S/Y) + (F/Y)\}$……(6)
$\Delta Y/Y = b\{s + f\}$……..(7)

This implies that if f >0, economic growth can be increased beyond what domestic savings resources will allow.
In order words remittance inflow can supplement domestic investment funds to enhance the capacity of the economy to grow.

Model and Data:

The model is constructed as follows:

$$\mathbf{lnFCF}_t = B_1 + B_2 \mathbf{ln}FCF_{t-1} + B_3 \mathbf{lnPGDP} + B_4 \mathbf{lnREM}_t + B_5 \mathbf{lnFDI}_t + U_t$$

Where,
FDI: Foreign Direct Investment (constant in 2010 USD)
PGDP: Per Capital Gross Domestic Product (constant in 2010 USD)
REM: Remittance Inflow (constant in 2010 USD)
FCF: Fixed Capital Formation (constant in 2010 USD)
The annual time series data from 1981 to 2014 on FDI, PGDP, REM and FCF are collected from the databank of World Bank. The data on FDI, REM was found in current US dollars and is converted to constant 2010 US dollars after calculating the GDP deflator where the base year is 2010.

A. Econometric Characteristics of Data

In time series econometrics the long run relationship among the variables depends on whether the variables are stationary or not. If the variables are nonstationary then the regression results represents a spurious relation among the variable. If the variables are nonstationary then the variables should be either trend stationary or difference stationary. If trend stationary then we can make it stationary by distending and a difference stationary process needs to be differenced until they are stationary.

Now we will examine the stationary test of the five variables (LFCF,$LFCF_{t-1}$, LPGDP, LREMITTANCE , LFDI) by using F test, Dickey Fuller test, Augmented Dickey Fuller test and Phillips Perron Test of unit root.
The popular unit root test is DF and ADF test. The DF test is based on the following equation
$\Delta y_t = \alpha + (\delta\text{-}1)y_{t-1} + \rho T + u_t$, with joint restriction δ=1 and ρ=0 …….. (1)
Here,
Δy_t= the first difference form of the variables
T= time trend
u_t= error term

Hypothesis is,
H_0=(δ-1) =0, y_t= is non stationary
H_A= (δ-1) < 0, y_t= is stationary

The ADF test is a modification of the DF test which based on the following equation,
$\Delta y_t = \alpha + (\delta\text{-}1)y_{t-1} + \rho T + \emptyset\Delta y_{t-1} + u_t$…… (2)

In the case of the DF test, the t-ratio on (ρ-1) provides the ADF test statistic. Both the estimated t-ratios for the DF and ADF tests are non-standard requiring more demanding critical values to compare to infer about the stationarity of the variables. Therefore, we have to use the critical values provided by Dickey and Fuller.

Phillips Perron (1988) test for unit root generalizes the results of equation 2 incase when the error term $v_t$is serially correlated and possibly heteroskedastic as well, i.e.

$v_t =$ $\eta(L)\epsilon_t =$ Σ $\eta\epsilon_{t-j}$

Table 1: DF, ADF and Phillips Perron Test for unit root

Variables	DF	ADF	Phillips Perron Test
LFCF	-1.361	-1.664	-1.583
ΔLFCF	-4.407	-4.447	-6.719
LFCF(T-1)	-3.186	-3.275	-5.922
ΔLCF(T-1)	-4.373	-6.718	-12.312
LPGDP	-0.362	-0.037	-0.450
ΔLGDP	-3.823	-3.839	-4.88
LREMITTANCE	-2.099	-2.370	-1.513
ΔLREMITTANCE	-3.921	-5.468	-5.251
LFDI	-2.010	-2.978	-2.780
ΔLFDI	-5.513	-5.682	-7.946

Note: Δ is used to refer to the first difference of the variables. To test DF and ADF, for the level form of the variables I take intercept and trend and for the difference form of the variables I take only intercept term. The 95% critical values for DF is -3.303(with intercept and trend), for ADF -3.564 (with intercept and trend) and for Phillips Perron test -3.568 (with intercept and trend)

Table 1 represents that for the level variables, the absolute values of the DF and ADF, Phillip Perron test statistics are less than the critical values, implying that the variables are non-stationary on their level. On the other hand, both DF and ADF, Phillip Perron test statistics for all the variables on their first differences implies stationarity. Therefore, from the DF and ADF, Phillip Perron tests of unitroot, we can conclude that the variables LFCF, $LFCF_{t-1}$, LPGDP, LREMITTANCE , LFDI are I (1).

B. Econometric Estimation

As we saw that all the variables are nonstationary in their level from so now, to find out a valid long run relationship among them the variables we need to apply co-integration techniques .Here I used two types of co-integration estimation procedure to find out the valid long run relationship. These are the Engle Granger Procedure and the Johansen procedure.

C. The Engle Granger Procedure

When two or more time series are individually integrated and some linear combination of them has a lower order of integration, then the series are said to be co-integrated. Engle and Granger showed that in an exceptional case the linear combination of two I (d) variables can found to be integrated of a lower order than d. That means, if two time series $Y_t$and $x_t$are co-integrated; a linear combination of them must be stationary.

In other words, y_t - ɳx_t= v_t, where $v_t$is stationary.

In this situation, the common stochastic trends of the variables will be canceled out and OLS estimates will give valid long run relationships removing the spurious regression possibility and the variables are said to be co-integrated.

Here in our study all the variables are I(1). Then the estimated Engle Granger first step is

LFCF= 7.897 +0.06097$LFCF_{T-1}$+0.3489 LREMTTANCE +0.02667 LFDI + 0.9504 LPGDP ……. (3)

P value: (0.000) (0.058) (0.000) (0.000) (0.008)
Adjusted R^2=0.948

Here we do not provide the standard error of the estimated coefficient as they do not provide the basis for valid inference the variables being ~I (1). The standard method of testing the residual obtained from the equitation (3)for order of integration is to apply ADF test in the form:

ΔE_t= (ρ-1)E_{t-1} -δΔE_{t-1}+v_t ….. (4)

and to test the t ratio for the coefficient (ρ-1) with critical values provided byMckinnon(1991). The estimated equation is,

ΔE_t= -0.62 E_{t-1} +1.64 ΔE_{t-1}+ v_t
t ratio: (-3.98) (0.98)

Here, critical value is -3.52 at 5% level of significant and the calculated t ratio is -3.98, Absolute value of calculated t is greater than the absolute value of critical value which implies that we can reject the null hypothesis of no integration. So the variables are co-integrated that means the long run relationship among the variables are valid.

D. The Johansen Procedure

We use Johansen procedure to find out multiple co-integratingvectors. For this process the Vector of Auto-regression (VAR) is in the following form,

ΔX_t=α +$\sum_{i=1}^{\rho-1}$ π ΔX_{t-1} + π X_{t-p} + $\cup_t$

Here X_t= is column vector of n endogenous variables
Π is n by matrices and $\cup_t$ is error term.

The impact matrix π captures all long run relationship between the variables. All the variables in X are stationary when the matrix π has full column rank and the system is a traditional first differenced VAR involving no long run relation when the matrix π has zero rank. When the rank is intermediate or 0< rank (π)= r< n, there exist r co-integrating vectors that make the liner combination of X_t becomes stationary or co-integrated.

Johensen provides two tests for co-integration; these are Trace test and the Maximal Eigen value test.

Trace test				
Null	Alternative	Statistics	95% Critical Value	Conclusion
r =0 r <=1 r <=2 r <=3	r>=1 r>=2 r>=3 r=4	88.08 40.73 27.69 11.43	64.52 47.21 29.68 15.41	One Co-integration vector
Maximum Eigenvalue Test				
r =0 r <=1 r <=2 r <=3	r>=1 r>=2 r>=3 r=4	37.35 23.04 16.25 11.33	33.46 27.07 20.97 14.07	One Co-integration vector

The result that we find in the above table is that the null hypothesis of no co-integration is strongly rejected in both the testes and in both case we find a single co-integration vector at 95% confidence interval.

IV. CONCLUSION

In this paper we try to estimate the impact of remittance on economic growth in the context of Bangladesh using HarrodDomar concept which focuses on domestic saving for economic growth. Here, we used fixed capital formation as the proxy of domestic saving. So we mainly try to find out the relationship between fixed capital formation and remittance using co-integration techniques. And we find that improvement of remittance has significant impact on fixed capital formation in the long run. Here we notice that remittance has positive influence on domestic savings which leads a significant economic growth according to HarrodDomar model. The analysis reflects that if remittance increases by 1% then fixed capital formation increases by 0.116%.

REFERENCES

[1] Agu, Chukwuma. "Remittances for growth: a twofold analysis of feedback between remittances, financial flows and the real economy in Nigeria." Paper for Presentation at the African Econometric Society Conference (Abuja. 2009.

[2] Ahortor, C. R. K. "Adenutsi, DE (2009) The Impact of Remittances on Economic Growth in Small-Open Developing Economics." Journal of Applied Sciences 9.18: 3275-3286.

[3] Amavilah, Voxi Heinrich S. "Domestic resources, governance, global links, and the economic performance of Sub-Saharan Africa." (2008).

[4] Anyanwu, John C., and Andrew EO Erhijakpor. "Do international remittances affect poverty in Africa?." African Development Review 22.1 (2010): 51-91.

[5] Barajas, Adolfo, et al. "Do workers' remittances promote economic growth?." (2009).

[6] Chami, Ralph, Connel, Fullenkamp, and Samir Jahjah. "Are immigrant remittance flows a source of capital for development?." (2003).

[7] Glytsos, Nicholas P. Dynamic effects of migrant remittances on growth: an econometric model with an application to Mediterranean countries. No. 74. Centre of Planning and Economic Research, 2002.

[8] Griffith, Ronnie, et al. "Remittances and Their Effect on the Level of Investment in Barbados." Journal of Public Sector Policy Analysis 2 (2008).

[9] León-Ledesma, Miguel, and MatloobPiracha. "International migration and the role of remittances in Eastern Europe." International Migration 42.4 (2004): 65-83.

[10] Rao, B. Bhaskara, and GaziMainul Hassan. "A panel data analysis of the growth effects of remittances." Economic modelling 28.1 (2011): 701-709.

[11] Fajnzylber, Pablo, and J. HumbertoLópez. "The development impact of remittances in Latin America." Remittances and Development (2008): 1.

[12] Pradhan, Gyan, MuktiUpadhyay, and Kamal Upadhyaya. "Remittances and economic growth in developing countries." The European journal of development research 20.3 (2008): 497-506

[13] Catrinescu, Natalia, et al. "Remittances, institutions, and economic growth." World Development 37.1 (2009): 81-92