مجلة بحوث الإدارة والاقتصاد

Management & Economics Research Journal
ISSN 2710-8856 (Online)
ISSN 2676-184X (Print)
Vol. 3 No. 2 (2021), pp. 41-62

https://doi.org/10.48100/merj.2021.157

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Workers' Remittances in Yemen: Macroeconomic Determinants and Impact on Economic Growth

Essa A. Alhannom ♦[1], Ghaleb S. Mushabeb [2]

[1] Associate Professor of Economics, Faculty of Administrative Sciences, Ibb University (Yemen)
✉ eysa20@gmail.com

[2] Associate Professor of Economics, Faculty of Administrative Sciences, Ibb University (Yemen)
✉ galrazhi@gmail.com

Received: 01-03-2021 *Accepted: 11-04-2021* *Available online: 12-04-2021* *Published: 01-09-2021*

How to Cite:
Alhannom, E. A., & Mushabeb , G. S. (2021). Workers' Remittances in Yemen: Macroeconomic Determinants and Impact on Economic Growth. *Management & Economics Research Journal*, *3*(2), 41-62. https://doi.org/10.48100/merj.2021.157

Abstract:

This study aims to examine the determinants of workers' remittances and their impact on economic growth in Yemen. Autoregressive Distributed Lag (ARDL) bounds test to co-integration and error correction model (ECM) were applied on data covering the period from 1990 to 2014. According to the model of remittances determinants, workers' remittances in Yemen respond to the macroeconomic conditions of both the home and host countries. It is found that, in the long-run, migrant stock and income level at the host countries are positively and strongly influence remittances level, with a feeble impact of domestic inflation rates. The effect of the home country's income seems to be positive but insignificant in explaining the behaviour of remittances level. The model of economic growth suggests

♦**Corresponding author:** IbbUniversity, Ibb (Yemen).
[✉eysa20@gmail.com]

that, in the long run, the impact of workers' remittances appears to be positive and moderate with positive and stronger influences observed for financial development and official development assistance. Accordingly, it is recommended that a lesser weight should be given to remittances in the strategic planning process, taking into consideration the increasing potentials of the conditions in the neighbouring host countries to be changed. In addition, using remittances as a means of economic growth can be enhanced by encouraging migrants to direct their savings towards productive investment activities, and via formal channels.
Keywords: Remittances, Economic Growth, Time Series Analysis.
JEL Codes: F24, O47, C22

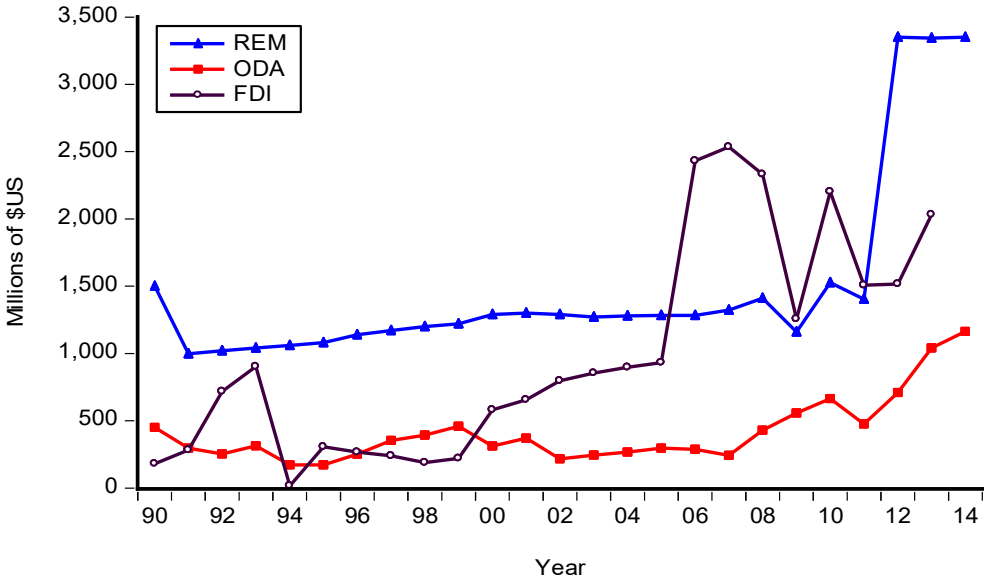
1. Introduction

Migrants' remittances are considered an important source of international financial flows to the recipient countries for alleviating poverty, through financing consumption and improving the living standards of households, and promoting economic growth, via filling domestic saving-investment gapes. Consequently, remittances turn out to be a key subject in the growth and development studies of the labour exporting countries. According to the World Bank estimates (2020b), workers' remittances reached US$ 463.6 billion in 2010 and increased to US$ 579.9 billion and US$ 613.5 billion in 2014 and 2017 respectively. This importance comes to be clearer if we refer to other forms of international financial flows such as official development assistance (ODA) which is estimated to be US$ 128.6 billion, US$ 161.5 billion, and US$ 165 billion for 2010, 2014, and 2017 respectively (World Bank, 2020a).

Yemen is one of the low-income countries, where opportunities for achieving acceptable livelihood and other economic ambitions are very hard. Accordingly, the outflow of hundreds of thousands of Yemeni labourers is motivated by economic considerations (better work opportunities and wages). The majority of Yemeni migrants head to the neighbouring oil-exporting countries, particularly Saudi Arabia as a key host country. According to the World bank (2020b) migration and remittances data, Saudi and Emirates were the destinations of 84.12% and 73.2% of total Yemeni expatriate labourers in 2010 and 2017 respectively, and the USA was the third destination receiving about 5% in the same years respectively.

Recently, Yemen depends on migrants' remittances as a major source of international financial flows and foreign exchanges. According to the size of remittances received in 2019, Yemen ranks first among the 29

low-income countries and twenty-fifth among the 135 low and middle-income countries (World Bank, 2020c). With official estimates of more than 1.2 million Yemeni workers abroad, remittances increased from US$ 1.53 billion in 2010 to US$ 3.343 billion and US$ 3.77 billion in 2014 and 2017 respectively (World Bank, 2020a). As a percentage of GDP, remittances constitute 13%, on average, between 1990 and 2014, whereas foreign direct investment (FDA) and ODA inflows averaged 6.24% and 3.4% respectively for the same period of time. Figure 1 shows the trends of remittances, FD, and ODA inflows during this period, where remittances appear to be bigger than FDI and ODA inflows in most years. Additionally, taking into account the fact that the majority of FDI inflows during this period was provisional[1], and the volatile nature of ODA inflows, remittances become the most important source of foreign finance. The jump of remittances in 2012 and beyond, resulted from the improvement measures in the estimation and coverage of remittances' data, which was implemented by the central bank of Yemen (United Nations Economic and Social Commission for West Asia [ESCWA], 2014, p.11). Therefore, workers' remittances in Yemen have been underestimated before 2012, and even after 2012 since remittances transferred through informal channels and remittances in the form of goods are still not included. Workers' remittances play another essential role in alleviating the current account's deficit of the balance of payments, as the trade, services, and investment income balances are in permanent deficits.



[1] Most FDI inflows were those of international oil companies for oil exploration purpose.

Figure 1. The trend of Remittances, ODA, and FDI inflows in Yemen 1990-2014
Source: World Bank, WDI online Data Bank (2020a).

The growing size and socio-economic effects of workers' remittances in Yemen, and the controversial views in the literature about remittances' determinants and developmental effects, raise two key questions which constitute the problem of this study. What are the important macroeconomic factors affecting remittances inflows to Yemen, and what is the nature of the remittances' impact on economic growth?

To the best of our knowledge, no previous separate econometric study has been undertaken to examine the macroeconomic aspects of Yemeni migrants' remittances. The study of MIM and Ali (2012) inspects the effect of remittances on economic growth in 15 MENA countries, including Yemen, for the period 1980-2009, using panel data analysis techniques. Workers' remittances effect appeared to be positive and insignificant according to OLS and fixed effect techniques whilst, System Generalized Method of Moment (SGMM) analysis provides evidence for a positive and significant, but relatively weak, impact. This weak impact of workers' remittances is interpreted, according to their analysis of the relationships between remittances and both investment and consumption, as a result of directing most remittances towards consumption.

The current study aims at investigating the determinant factors behind workers' remittances and the impact of remittances on economic growth in Yemen, using annual time series data for the period 1990-2014. In achieving this aim, ARDL bounds testing approach to co-integration of Pesaran and Shin (1996) and Pesaran, Shin, and Smith (2001), and ECM will be applied. The ARDL bounds test is an advanced technique and the most appropriate for the data of Yemen, as it is believed to be valid and appropriate for small size samples and can be applied irrespective of the degree of integration of the independent variables (Narayan, 2004).

The rest of this study proceeds as follows: section two gives a review of theoretical and empirical literature dealing with workers' remittances determinants and their impact on economic growth. Econometric methodology and data used are the subjects of section three, whereas section four presents the empirical analysis. Conclusions and policy implications are in section five.

2. Literature Review

2.1 Determinants of Remittances

The literature of workers' remittances determinants takes either microeconomic or macroeconomic approaches. Microeconomic works on factors affecting the decision of a migrant to remit and thus the size of his remittances, depending on socio-demographic characteristics of migrants and their families, have been the focus of most literature. Under this line of literature three motives for remitting to home country are identified: altruistic, self-interest, and contractual reasons (see Lucas & Stark, 1985; Glytsos, 1988; Agarwal & Horowitz, 2002). However, the works of macroeconomic determinants of remittances, which are still developing, address the aggregate level of remittances and therefore the economic conditions of both the home and host countries. From the home country's perspective, the economic activity level, proxied by GDP or real per capita GDP, migrant stock, exchange rate variations, interest rates, domestic inflation rates, financial development, considered as important driving macroeconomic forces of remittances. Nevertheless, macroeconomic factors at the host countries include, but are not limited to, economic activity level, unemployment rates, wages level, interest rates, exchange rates. A higher level of economic activity in the host country means a higher demand for the migrant labour force and higher earnings and thus increasing remittances and vice-versa. This tendency is confirmed by many studies such as those of Elbadawi and Rocha (1992), Aydas, Neyapti, and Metin-Ozcan (2005), Silva and Huang (2006), Adenutsi (2014), and McCracken, Carlyn, and Stack (2017).

In the labour exporting country, it is believed that an improvement in economic activity level will be reflected in a higher income and living standards of households and thus the needed money to be remitted is likely to decrease and vice-versa (Swamy, 1981). This refers to the counter-cyclical characteristic of remittances with respect to GDP of the home country, which is evidenced by El-Sakka and McNabb (1999), Yang and Choi (2007), Singh, Haacker, Lee, and Goff (2011), Moussir and Tabit (2016), and Hor and Pheang (2017). On the other hand, better economic activity at the country of origin increases the returns on real and financial investment and will likely result in more remittances, which points to the pro-cyclical nature of remittances concerning the GDP of the home country. Higgins, Hysenbegasi, and Pozo (2004), Aydaş et al. (2005), Gupta (2005), Freund and Spatafora (2008), Adenutsi (2014), McCracken et al. (2017), and Yoshino, Farhad, Taghizadeh-Hesary, and Miyu (2019) observe a

positive and significant effect of home country's GDP on the level of remittances inflows.

The stock of migrants abroad is another factor recognized in the literature as a determinant of remittances level. It is expected that the more the migrant stock of a country abroad, the higher the level of inward remittances would be. The works of Lianos (1997), Lueth and Ruiz-Arranz (2006), Freund and Spatafora (2008), Singh et al.(2011), Bettin, Presbitero, and Spatafora (2014), and Moussir and Tabit (2016), found evidence on this positive association between migrant stock and remittances level.

Domestic inflation in the labour-exporting country can affect the volume of remittances in both directions. The increase in domestic inflation rates lowers the real income and thus maintaining purchasing power and consumption levels of households in the home country entails remittances to rise. Lianos (1997), Elsakka and Mcnabb (1999), Lueth and Ruiz-Arranz (2007), Begum and Sutradhar (2012), Adenutsi (2014), and Prasad and Trivedi (2015), show that remittances vary positively with inflation rates at the country of origin. By contrast, an increase in domestic inflation can be seen as an indicator of economic and political instability and hence suggests a decrease in remittances (see, for example, Katseli and Glytsos, 1986; Elbadawi & Rocha, 1992; Aydas et al., 2005; Ezeoha, 2013). This literature review of remittances determinants reveals that the evidence is still far from being conclusive, which highlights the need for more examination.

2.2 Impact of Remittances on Economic Growth

Despite the presence of a large amount of literature regarding the impact of remittances inflows on the economic growth of the recipient countries, it is still surrounded by ambiguity and has no definite answer (Barajas, Chami, Fullenkamp, Gapen, & Montiel, 2009). Theoretically, remittances alleviate poverty via increasing households' income and living standards (see Ratha, 2013; Daway-Ducanes, 2015), while, they can positively, negatively, or neutrally influence economic growth depending on their use and the channels through which they are allocated. Remittances may enhance growth if they are invested in human capital development, via financing the education and training activities (see Edwards and Ureta,2003), and the accumulation of physical capital (see Glytos, 2002; Lucas, 2005), and enabling households and entrepreneurs to overcome credit constraints (Mesnard, 2001). Other literature adds evidence on several indirect positive effects of remittances on economic growth, such as their resultant financial development (see Giuliano & Ruiz-Arranz, 2009), and

the reduction of output volatility (see Kroft & Lloyd-Ellis, 2002; Fajnzylber & Lo´pez, 2008; Chami, Hakura, and Montiel, 2009). The neutral or weak influence of remittances on economic growth assumption denotes the situation where the altruistic motive dominates the nature of remittances to most developing and least-developed receiving countries. In other words, the majority of these remittances are used to finance the consumption of food, housing, land, and luxuries (see, for example, Rempel and Lobdell, 1978; Adelman & Taylor, 1990; Glytsos, 1993). The pessimistic view of the growth effect of workers' remittances departs from the moral hazard problem and the so-called Dutch Disease hypothesis. The moral hazard effect indicates the circumstance where remittances receivers in the home country may reduce their labour participation and efforts and accordingly, affect undesirably economic growth (Chami, Fullenkamp, & Jahjah, 2003). Dutch Disease hypothesis points to the possibility of appreciation of the real exchange rate of the recipient country's currency, as remittances increase, and therefore harmfully affecting tradable exports and economic growth(see Amuedo-Dorantes and Pozo, 2004; Lartey, Mandelman, & Acosta, 2012; Rabbi, Chowdhury, & Hasan, 2013).

3. Econometric Methodology and Data

Two models will be estimated, equation (1) for determinants of remittances and equation (2) for the impact of remittances on economic growth. The specification of remittances determinates model is given as follows:

$$\ln REM_t = \beta_0 + \beta_1 \ln YD_t + \beta_2 \ln YF_t + \beta_3 \ln MST_t + \beta_4 INF_t + \varepsilon_t \,, \quad (1)$$

Where *REM* denotes remittances level, YD represents home country's income, YF is the host country's income, MST stands for migrant stock abroad, INF is the home country's inflation rates, ε is disturbance term, and ln is the natural logarithm. The nexus between remittances and economic growth is modelled as follows:

$$\mathrm{YG_t} = \alpha_0 + \alpha_1 \mathrm{CAP_t} + \alpha_2 \mathrm{REM1_t} + \alpha_3 \mathrm{ODA_t} + \alpha_4 \mathrm{FD_t} + \alpha_5 \mathrm{OP_t} + \mathrm{u_t} \,, \quad (2)$$

Where YG represents real GDP growth, CAP stands for capital formation as a percentage to GDP, REM1 denotes personal remittances inflows to GDP, ODA is official development assistance expressed as a percentage of GDP, FD denotes financial development, OP refers to openness degree, and u is the error term. As already mentioned in the

literature review, the expected sign of REM1 could be either positive or negative whereas, the prior expectations of economic theory to the effects of CAP, ODA, FD, and OP on economic growth are positive.

The application of the ARDL bounds testing approach to co-integration and ECM in estimating the long-run relationships and short-run dynamics of equation (1) is conducted in stages and the same stages will be repeated to estimate the impact of remittances on economic growth according to equation (2). Therefore, stages of implementing ARDL bounds testing and ECM will be introduced only for equation (1). At the first stage, the existence of long-run co-integration between workers' remittances and their determinants is tested by estimating a conditional ARDL representation of equation (1) as follows:

$$\Delta \ln REM_t = \infty_0 + \sum_{i=1}^{n} \infty_1 \Delta \ln REM_{t-i} + \sum_{i=0}^{n} \infty_2 \Delta \ln YD_{t-i} + \sum_{i=0}^{n} \infty_3 \Delta \ln YF_{t-i} + \sum_{i=0}^{n} \infty_4 \Delta \ln MST_{t-i} + \sum_{i=0}^{n} \infty_5 \Delta INF_{t-i} + \infty_6 \ln REM_{t-1} + \infty_7 \ln YD_{t-1} + \infty_8 \ln YF_{t-1} + \infty_9 \ln MST_{t-1} + \infty_{10} INF_{t-1} + e_t , \quad (3)$$

Where Δ represents the first difference operator and $\boldsymbol{n}$ refers to the maximum lag length. $\boldsymbol{\infty_1}$,$\boldsymbol{\infty_2}$, $\boldsymbol{\infty_3}$, $\boldsymbol{\infty_4}$, and $\boldsymbol{\infty_5}$, symbolize the short-run coefficients whereas,$\boldsymbol{\infty_6}$, $\boldsymbol{\infty_7}$, $\boldsymbol{\infty_8}$,$\boldsymbol{\infty_9}$, and $\boldsymbol{\infty_{10}}$are the coefficients of the long-run. A significance test of no co-integration between REM, YD, YF, MST, and INF is applied with the null hypothesis ($\boldsymbol{H_0}: \boldsymbol{\infty_6 = \infty_7 = \infty_8 = \infty_9 = \infty_{10} = 0}$) as against the alternative hypothesis ($\mathbf{H_1}: \boldsymbol{\infty_6 \neq \infty_7 \neq \infty_8 \neq \infty_9 \neq \infty_{10} \neq 0}$). The Wald test (F statistics) constitutes the core of the bounds test procedure. With two bounds of critical values, if the computed F statistic, at a certain level of significance, is bigger than the upper critical bound value, the null hypothesis of no co-integration is rejected. However, the null hypothesis of no co-integration is accepted, if the computed F statistics is smaller than the lower critical bound value. The result is regarded as inconclusive if the computed F statistics falls between the upper and lower bound values. Once a long-run relationship is proved, the parameters of the long-run can be estimated employing the following model:

$$\ln REM_t = b_0 + b_1 \ln REM_{t-1} + b_2 \ln YD_{t-1} + b_3 \ln YF_{t-1} + b_4 \ln MST_{t-1} + b_5 INF_{t-1} \quad (4)$$

The estimation of the short-run dynamics, via the error correction representation of the long-run model, is the second step. The error correction model is formulated as follows:

$$\Delta \text{Ln } REM_t = \delta_0 + \sum_{i=1}^{n} \delta_1 \Delta \text{ln } REM_{t-i} + \sum_{i=0}^{n} \delta_2 \Delta \text{Ln } YD_{t-i} + \sum_{i=0}^{n} \delta_3 \Delta \text{Ln } YF_{t-i} + \sum_{i=0}^{n} \delta_4 \Delta \text{Ln } MST_{t-i} + \sum_{i=0}^{n} \delta_5 \Delta \text{Ln } INF_{t-i} + \mu ECM_{t-1} + \varepsilon_t \quad (5)$$

Where $\boldsymbol{\mu}$ represents the coefficient of the adjustment speed and ***ECM*** is the error correction term obtained from equation (4)(estimation residuals).

The third stage is to verify the goodness of the selected ARDL model, by conducting diagnostic tests to ensure that the model is free of the key problems of regression analysis. As well, the structural stability of parameters of the remittances determinants model will be tested using the CUSUM (cumulated sum of recursive residuals) and CUSUMSQ (cumulated sum of squares of recursive residuals) suggested by Brown, Durbin, and Evans (1975).

The data used are time series for the period 1990-2014. The variables used in this study are defined as follows: REM is real personal remittances in $US million (2010=100). YD is the real GDP of Yemen in $US million (2010=100) as a proxy to the home country's income. YF is the real GDP of Saudi Arabia in $US million (2010=100), as a proxy to the host countries' income[2]. MST is the migrant stock of Yemeni workers abroad proxied by the unemployment rates in Yemen, due to the unavailability of migrant stock data[3]. INF is domestic inflation rates based on GDP deflator (2010=100). YG is the real GDP growth rate (2010=100). CAP is capital formation to GDP and REM1 is personal remittances inflows to GDP. ODA is official development assistance to gross national income (GNI). FD is financial development calculated as the ratio of banks credit provided to the private sector to GDP. OP is the openness degree calculated as the ratio of the total value of exports and imports of goods and services to GDP. While data of CAP, REM1, and OP are taken from United Nations Conference for Trade and Development (UNCTAD) Statistics online, the data of other variables were collected from World Development Indicators Data Bank. Eviews 9 software used in various stages of econometric analysis.

[2] Saudi Arabia is considered as a representative host country as it constitutes the biggest employer of Yemeni expatriate laborers. Saudi Arabia, employed 79% and 62% of total Yemeni workers abroad in 2010 and 2013 respectively (World bank, 2020b).

[3] The stock of Yemeni workers abroad is supposed to be the direct result of the situation of employment levels, and thus unemployment rates, at the home country.

4. Empirical Analysis

4.1 Workers' Remittances Determinants

To start the bounds test, the univariate properties of the variables' time series must be tested to find their degree of integration and make sure they are not I(2). To do so, both Augmented Dickey-Fuller (ADF) (Dicky & Fuller, 1981) and Phillips-Perron (PP) (Phillips & Perron, 1988) tests of the unit root are conducted.

Table 1. Unit Root Tests for Stationarity for Remittances Determinants Model

Variable	ADF Test			PP test		
	intercept	Intercept & trend	non	intercept	Intercept & trend	non
lnREM	-0.26	-1.74	3.95	-0.28	-1.92	3.79
dlnREM	-5*	-4.87*	-1.49	-4.99*	-4.86*	-3.09*
lnYD	-2.6	-0.89	4.39	-5.11*	-0.29	-4.39*
dlnYD	-1.38	-6.19*	-1.38	-4.82*	-12.25*	-3.70*
lnYF	0.09	-1.41	3.73	0.11	-1.41	3.81
dlnYF	-5.09*	-5.47*	-3.89*	-5.09*	-8.17*	-3.89
lnMST	1.02	-0.14	1.65	0.47	-0.73	2.46
dlnMST	-2.90***	-3.11	-2.30**	-2.95***	-3.1	-2.30**
INF	-3.77*	-4.72*	-1.32	-4.08*	-8.24*	-2.10**
dINF	-4.56*	-4.59*	-4.68*	-12.5*	-12.19*	-13.70*

*, **, *** indicate 1%, 5%, and 10% significance level, respectively.

Source: Prepared by the authors based on EVIEWS 9 output.

Table 1 displays that, except for the INF variable which is I(0), all other variables of the remittances determinants model are not I(0) and are I(1). These results enable us to implement the bounds test and ECM to the remittances determinants model.

Table 2. Bounds Tests for Remittances Determinants Model

Computed F statistic	16.3
Criticalbound values at 5%	Lower = 2.85 upper = 4.049
Criticalbound values at 1%	Lower = 3.817 upper = 5.122
K (number of regressors)	4

Critical values are from Pesaran et al.(2001), p.300.

Source: Prepared by the authors based on EVIEWS 9 output.

Concerning the bounds test of co-integration, the computed F statistic shown in Table 2 is 16.3, which is higher than the upper bound critical values at both the 5% and 1% significance levels. As a result, a long-run relationship between REM and its determinants YD, YF, MST, and INF is evidenced, and the long-run elasticities of equation (4) can be estimated.

The long-run model of the remittances determinants ARDL (1,2,0,2,2) in Table 3 was selected automatically according to AIC with 2 as a maximum lag due to the small size of the available sample. Elasticities and coefficients of the long-run reveal that except for the elasticity of YD which is positive and insignificant, all other elasticities and the coefficient of INF are positive and significant. A one per cent increase in host countries' income YF, migrant stock MST, and domestic inflation rates INF causes inward remittances to Yemen to rise by 1.62%, 3.9%, and 0.02% respectively in the long run. The positive but insignificant effect of YD is in line with the results of Lianos (1997), and Agarwal and Horowitz (2002). The strong influence of YF refers to the critical role played by host countries' income in explaining variations in workers' remittances in Yemen, which is consistent with the conclusions ofElbadawi and Rocha (1992), Silva and Huang (2006), Aydas et al. (2005), Adenutsi (2014), McCracken et al. (2017). The strongest influence on workers' remittances comes from MST at a 1% significance level, which goes in line with the findings of Lianos (1997), Lueth and Ruiz-Arranz (2006), Freund and Spatafora (2008) Singh et al.(2011), Bettin et al.(2014), and Moussir and Tabit (2016). Table 3 shows that a positive, albeit weak, effect comes from domestic inflation on remittances level and thus adds evidence to those of Lianos (1997), Elsakka and Mcnabb(1999), Lueth and Ruiz-Arranz (2007), Begum and Sutradhar (2012), Adenutsi (2014), and Prasad and Trivedi (2015).

Table 3. Long and short-run coefficients of Remittances Determinants Model

Long-run coefficients of ARDL(1,2,0,2,2) Model (dependent variable ln*REM*)			
Independent Variables	Coefficient	t-statistic	prob
lnYD	0.91	1.67	0.1250
lnYF	1.62	2.44	0.0347
lnMST	3.92	5.65	0.0002
INF	0.02	3.00	0.0132
INPT	-53.32	-12.65	0.0000
ECM representation of ARDL(1,2,0,2,2) (dependent variable dln*REM)*			
dlnYD	-0.11	-0.19	0.8502
dlnYD(-1)	-3.24	-6.35	0.0001
dlnYF	0.66	2.70	0.0222
dlnMST	2.80	1.77	0.1064
dLMST(-1)	-4.04	-2.26	0.0471
dINF	0.01	4.23	0.0017
dINF(-1)	-0.00	-2.14	0.0576
ECM_{t-1}	-0.41	-4.53	0.0011
R. squared (0.998) S.E of Regression (0.067) F. statistic 474(0.000))			
Diagnostic Tests	Autocorrelation (Breusch-Godfrey Serial Correlation LM Test) F=0.67[0.53] Chi-Square = 3.16[0.21] Functional form misspecification (Ramsey RESET) F=1.58[0.24] Non -Normality (Jarque-Bera Test) 2.35[0.31] Heteroscedacticity (Breusch-Pagan-Godfrey test) F=1.40[0.30] Chi-Square = 13.3[0.27]		

Source: Prepared by the authors based on EVIEWS 9 output.

The ECM results of the short-run elasticities, to a large extent, confirm those of the long-run, except that of MST which its impact appears to be insignificant. ECM_{t-1} is significant at 1% level and has the appropriate (negative) sign approving the already concluded long-run relationship between real workers' remittances level and its determinants in Yemen. The value of ECM_{t-1}coefficient (-0.41) denotes a moderate speed of adjustment (41% a year) of remittances level to changes in the independent variables before approaching its equilibrium value.

The last stage of the analysis of the remittances determinants model is to assure the goodness and stability of the basic model that gives us the

long and short runs relationships. The statistical information at the end of Table 3 points out that our model is strong and free of major regression problems. The tests of the stability of the model's parameters are presented in Figures 2 and 3. The graphical presentations of both CUSUM and CUSUMSQ tests disclose that our model is stable and correctly specified.

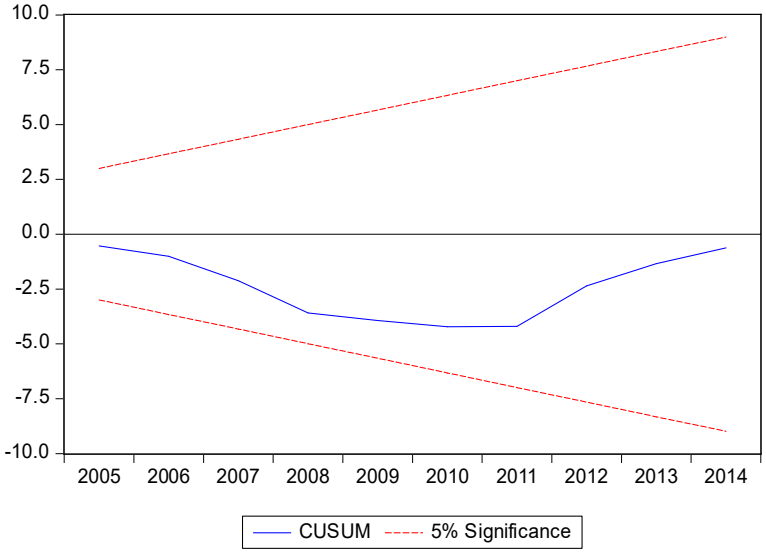


Figure 2. Plot of CUSUM
Source: Authors' own work based on EVIEWS 9 output.

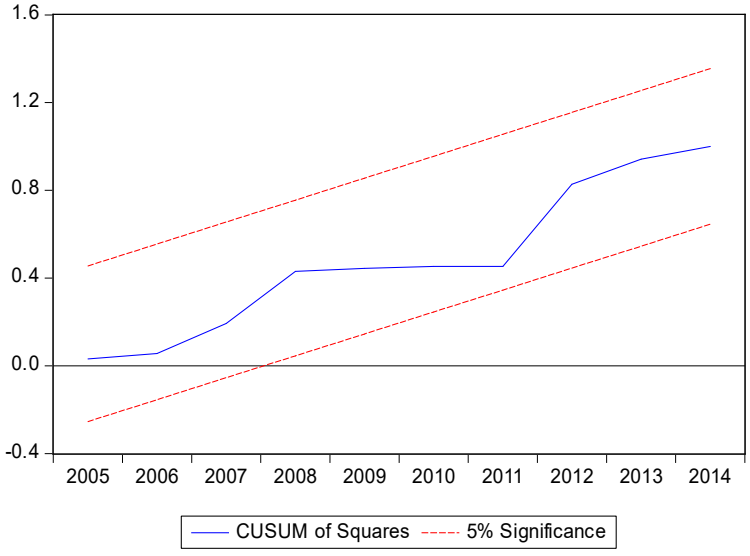


Figure 3. Plot of CUSUMSQ
Source: Authors' own work based on EVIEWS 9 output.

4.2 Impact of Remittances on Economic Growth

To start with the economic growth model, both ADF and PP tests of stationarity were conducted. Table 4 shows that, except FD variable which is not I(0) and I(1), all other variables of the economic growth model are stationary in level. As a result, the bounds test can be conducted.

Table 4. Unit Root Tests for Stationarity for Economic Growth Model

Variable	ADF Test			PP test		
	Intercept	Intercept & trend	non	intercept	Intercept & trend	non
YG	-4.82*	-6.30*	-1.43	-4.82*	-13.92*	-2.96*
dYG	-4.99*	-4.66*	-4.60*	-19.90*	-18.80*	-16.30*
CAP	-3.48**	-3.22	-0.09	-4.49*	-3.90**	0.34
dCAP	-3.13**	-3.39***	-3.3*	-6.47*	-7.60*	-6.65*
REM1	-4.79*	-3.55***	-4.03*	-4.66*	-3.44***	-3.99*
dREM1	-7.75*	-8.76*	-7.75*	-7.84*	-10.23*	-7.40*
ODA	-2.70***	-2.79	-2**	-2.70***	-2.95	-2**
dODA	-5.88*	-5.76*	-5.98*	-5.88*	-5.76*	-6.17*
FD	-1.49	-1.71	-0.22	-1.49	-1.83	-0.22
dFD	-4.45*	-3.22	-4.45*	-4.33*	-4.21**	-4.45*
OP	-3.46**	-3.70**	-1.40	-3.40**	-3.54***	-1.34
dOP	-5.52*	-5.64*	-5.34*	-10*	-12.26*	-8.38*

*, **, *** indicate 1%, 5%, and 10% significance level, respectively.

Source: Prepared by the authors based on EVIEWS 9 output.

Table 5 shows that F statistics is 5.26 and higher than the upper bound values at both 5% and 1% levels of significance. As a result, the long-run relationships between economic growth and its determinants, including workers' remittances, is proved.

Table 5: Bounds Tests for Economic Growth Model

Computed F statistic	5.26
Criticalbound values at 5%	Lower = 2.649 upper = 3.805
Criticalbound values at 1%	Lower = 3.516 upper = 4.781
K (number of regressors)	5

Critical values are from Pesaran et al.(2001), p.300.

Source: Prepared by the authors based on EVIEWS 9 output.

This bounds test result, which is extracted from a conditional ARDL model of equation (2), enables us to estimate the associated long-run and ECM representations of the model as it has done with the remittances determinants model. Table 6 shows that ARDL (2,1,2,2,2,2) model was selected based on AIC with 2 as a maximum lag was chosen. The long-run coefficients of economic growth determinants, shown in Table 6, appear to be positive and significant at a 1% significance level. The coefficient of REM1 is 0.43 which points to a moderate impact compared to those of ODA and FD. This may indicate that inward remittances in Yemen are largely directed to the consumption of necessities and real estate and a little part is allocated to investment purposes. A stronger association was observed between ODA and economic growth which might be traced back to the domination of investment spending in allocating the financial resources of ODA. Table 6 also displays that FD has the strongest influence on economic growth which may be attributed to the fact that the time period of 1990-2014 witnessed an increase in the number of banks and diversification of their activities, and the financial system has undergone a reform program. In contrast, Table 6 shows that the openness degree effect is weak which can be interpreted by the weak structure of foreign trade in Yemen. On the one hand, the demand for imports increases rapidly owing to the weak productive base and the high growth rate of population, and imports are dominated by necessities on the other. Moreover, crude oil constitutes about 90% of exports, which may weaken the effect of exports on economic growth.

Table 6. Long and short-run coefficients of Economic Growth Model

Long-run coefficients of ARDL(2,1,2,2,2,2) Model (dependent variable YG)			
Independent Variables	Coefficient	t-statistic	Prob
CAP	0.52	5.21	0.0070
REM1	0.426	8.37	0.0010
ODA	1.31	9.97	0.0006
FD	2.48	11.44	0.0003
OP	0.397	6.38	0.0030
INPT	-41.36	-8.70	0.0010
ECM representation of ARDL(2,1,2,2,2,2) (dependent variable dYG)			
dYG(-1)	1.51	10.91	0.0004
dCAP	0.55	2.66	0.0566
dREM1	2.10	4.98	0.0076
dREM1(-1)	-1.22	-3.98	0.0164
dODA	-1.49	-1.91	0.1293
dODA(-1)	-1.96	-4.29	0.0127
dFD	2.20	5.79	0.0044
dFD(-1)	-3.99	-4.91	0.0080
dOP	0.12	0.92	0.4087
dOP(-1)	-0.98	-6.38	0.0031
ECM_{t-1}	-3.45	-15.74	0.0001
R. squared (0.989) S.E of Regression (0.91) F. statistic 23.88(0.0036))			
Diagnostic Tests	Autocorrelation (Breusch-Godfrey Serial Correlation LM Test) F=1.32[0.42] Functional form (Ramsey RESET) F=3.12[0.23] Normality (Jarque-Bera Test) 0.314[0.85] Heteroscedacticity (Breusch-Pagan-Godfrey test) F=0..59[0.79] Chi-Square = 14.8[0.54]		

Source: Prepared by the authors based on EVIEWS 9 output.

The results of the ECM representation of the selected model ARDL(2,1,2,2,2,2) refers to a greater positive impact of REM1 on economic growth in the short run, and a negative and significant effect for lagged REM1. The influence of capital formation CAP in the short run is very close to that of the long run. Whilst ODA impact in the short run turned out to be negative and insignificant, FD plays a positive and strong effect close to that of the long run. Openness degree seems to have a trivial insignificant

association with economic growth in the short run. ECM_{t-1} appears to be statically significant at a 1% level and has a negative sign, which confirms the already reached conclusion that a long-run relationship between economic growth and its determinants, including workers' remittances, exists. Besides, the value of ECM_{t-1} coefficient (-3.45) is high, indicating a high speed of adjustment (345% a year) of economic growth to variations in the independent variables before approaching its equilibrium value.

It is evident from Table 5 that our model is good and free of key regression problems. Moreover, figures 4 and 5 of both the CUSUM and CUSUMSQ tests demonstrate the stability of the parameters of the economic growth model.

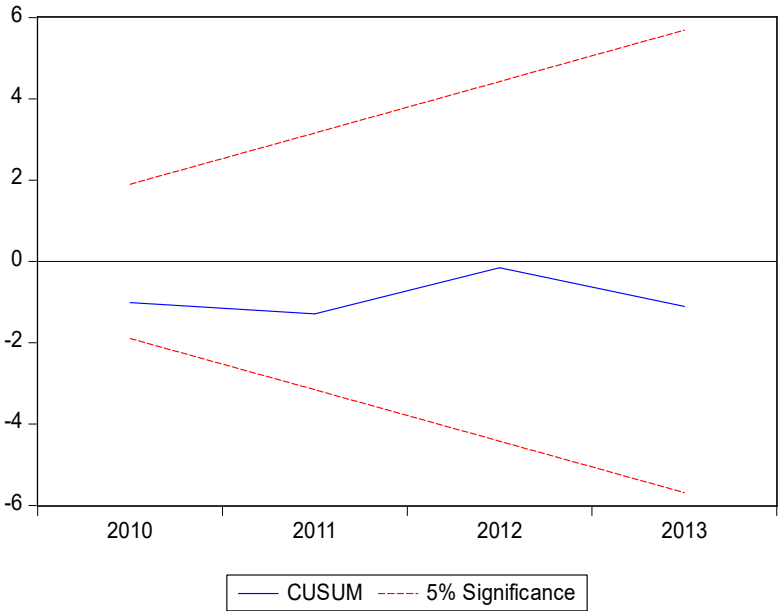


Figure 4. Plot of CUSUM
Source: Authors' own work based on EVIEWS 9 output.

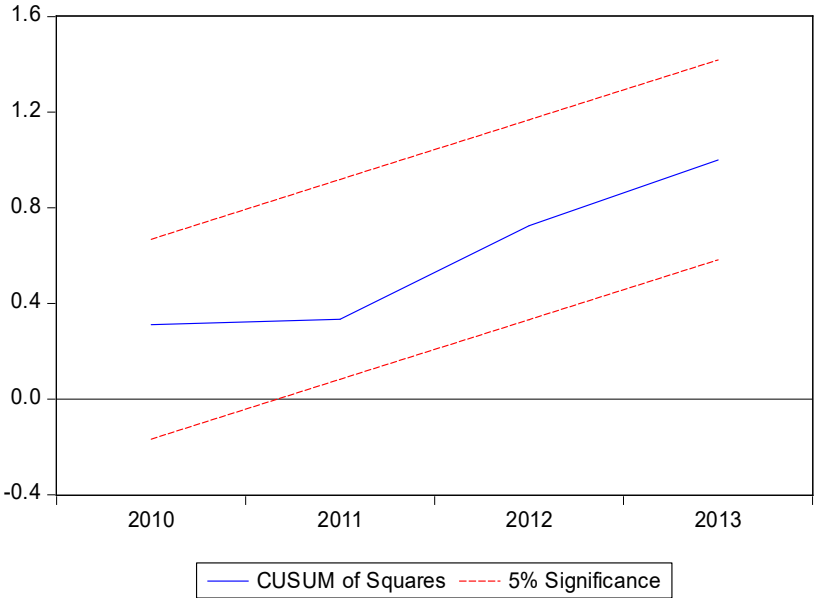


Figure 5. Plot of CUSUMSQ
Source: Authors' own work based on EVIEWS 9 output.

5. Conclusions and Policy implications

This study was motivated by the need to explore the macroeconomic aspects of workers' remittances flows to Yemen, especially their determinants and impact on economic growth. ARDL bounds test to co-integration and ECM were applied on data covering the period from 1990 to 2014. Workers' remittances in Yemen appear to be influenced by the macroeconomic conditions of both the home and host countries. It is found that there is a long-run relationship between workers' remittances and their determinants (YD, YF, MST, and INF). Migrant stock abroad and income level at the host countries were found to be positively, strongly and significantly correlated with remittances level, with a feeble impact of domestic inflation rates. The significant impact of the host countries' income reaffirms the volatile nature of workers' remittances as a source of development finance. We did not find the home country's income to be significant in explaining the behaviour of remittances level. The short-run dynamics' results support these influences of the long-run, except that of MST which is observed to be insignificant. The policy implication of these results is that raising the remittances level of Yemeni expatriates depends essentially on increasing the stock of migrants abroad which, on the one

hand, is faced with constraints and have negative economic and social effects on the other. Furthermore, a lesser weight should be given to remittances in the strategic planning process, taking into consideration the increasing potentials of the conditions in the neighbouring host countries to be changed.

With reference to the impact of remittances on economic growth, a long-run relationship between economic growth on the one hand and remittances and other determinants (CAP, ODA, FD, OP) on the other was demonstrated. Workers' remittances REM1and the control variables demonstrated to be positively connected with economic growth at a 1% level of significance. However, the impact of remittances appears to be moderate (0.43) with stronger influences observed for FD and ODA (2.43, and 1.31 respectively). In the short run, workers' remittances impact was found to be strong while that of FD turned out to be negative and insignificant. The policy implication of these findings is that using remittances as a means of economic growth can be enhanced via encouraging migrants to direct a larger portion of their savings to productive investment activities. In addition, as the financial development proved to be a strong factor impacting economic growth, encouraging migrants to transfer and channel their remittances through banks would be of great benefit to Yemen's economy.

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