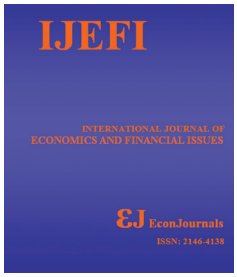

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Migration Remittances Inflows and Macroeconomic Shocks: The Case of Egypt

Aliaa Nabil Khodeir

Department of Economics, Faculty of Business Administation, King Saud University, Saudi Arabia, Department of Economics and Foreign Trade, Faculty of Commerce and Business Administration, Helwan University, Egypt. *Email: aliaanabil2007@yahoo.com

ABSTRACT

This paper explores to what extent Egyptian remittances inflows serve as a hedge against macroeconomic shocks. This is the first study applied on Egypt focusing on both the determinants of remittances and their cyclical behavior at the same time. By estima ting a vector error correction (VEC) model, it was found that remittances inflows were associated significantly with real per capita income, money supply and oil price, in both long and short run. This indicated that remittance flows to Egypt were for investment and not for family support purposes. The analysis of impulse response functions confirmed that remittances inflows were procyclical with output shocks, reducing support for the ability of remittances as a hedge against macroeconomic shocks. This paper suggests that; policy makers should deal cautiously with the different aspects of remittances and its analysis could be applied to other small open economies.

Keywords: Remittances, Business Cycle, Macroeconomic Shocks, Egypt
JEL Classifications: E32, F22, F24, O54

1. INTRODUCTION

In recent years external financial inflows disturbances represented one of the most important challenges faced by Egyptian economy, being a developing country with low domestic savings. This became clear when capital inflows began to fall with the turmoil in the global financial markets. Direct investment inflow (Foreign direct investment [FDI]) decreased from 11578.1 million US$ in 2007 to 6385.6 million US$ in 2010 and in the same years, the official development assistance net (ODA) decreased from 1136.35 million to 592.41million US$. With the onset of the Egyptian revolution in 2011, foreign capital outflows increased, as a result of deterioration of the security situation and this disinvestment reached 482.7 million US$ (UNCTAD statistics).

On the other hand, by examining the structure of external financing, it has been observed that Egypt had an access to large workers' remittances. They increased from 7655.8 million US$ in 2007 to 12453.1 million US$ in 2010 and 14324.3 million US$ in 2011. In 2012, the level of remittances was equivalent to 8% of gross domestic product (GDP) and their contribution to the balance of payments exceeded that of tourism. According to the latest data available, they reached 17468.59 million US$ in 2013 after they were 19236.4 million in 2012 (UNCTAD statistics). The fact that remittances inflows have surpassed both ODA and FDI was confirmed for many of developing countries in recent World Bank reports.

The merit of remittances is that they are not so volatile and this makes economic policy makers more concerned about. The ups and downs of capital flows have severe effects on the economy. Bayangos and Jansen (2009) stated that remittance receipts in the Philippines were less volatile than FDI, portfolio investments and external borrowings. In addition, unlike other capital flows, they were unrequited transfers that do not create obligations in the future (Lueth and Ruiz-Arranz, 2007). Nowadays, increasing attention by policymakers is devoted to labor mobility and their associated remittance flows in economic integration (Barajas et al., 2012).

Accordingly, it is worth to make a search on the inward remittances being a crucial funding source to Egypt. The purpose of this paper is to focus on both short and long run macroeconomic determinants of remittances. Specifically, it is interested in the cyclical behavior

of Egyptian workers' remittances using remittances determinants as shocks to assess the expected response.

The empirical studies on remittances determinants for Egypt and their cyclical property are rare. El-Sakka and Mcnabb (1999) estimated two equations to discover the determining factors of both, remittances and imports financed by them during the period from 1967 to 1991. Using annual data and ordinary least squares (OLS), they found that exchange rate and interest rate differentials were important in attracting remittance flows through official channels. Also, imports financed through remittance earnings had very high income elasticity which suggested that they were durable or luxury goods undertaken by higher income groups.

Bouhga-Hagbe (2006) argued that altruism, as a motive to send money home, would contribute to the stability of these flows. He used cointegration techniques that relate workers' remittances to agricultural GDP, which was used as an indicator of economic "hardship" in the home country. The estimation was made during the period 1975-2002 and based on (the logarithm of) original variables, and thus led directly estimating the long run relation among the variables. The empirical evidence suggested that in the long run, remittances were negatively correlated with agricultural GDP. This finding supported the view that altruism could have an important role in the flow of remittances to Egypt, Jordan, Morocco, Pakistan, and Tunisia.

In a recent study, Sliman and Tahar (2009) analyzed business cycle property of workers' remittances during the period 1975-2006 in Mediterranean Countries (Algeria, Egypt, Morocco, Turkey and Tunisia). Using correlations of the cyclical components with the Band Pass filter**,** they concluded that remittances in Algeria, Egypt and Morocco were countercyclical with respect to home GDP in contrast to Tunisia and Turkey remittances. By estimating a structural vector autoregressive (VAR) model containing host country's gross national product, home country's GDP, remittances, FDI and ODA flows, they demonstrated that fluctuations in host GDP explained a large part of the forecast error variance in the cyclical components of remittances for Tunisia, Algeria, and Morocco. In Egypt, GDP explained a significant portion of the variance of remittances and workers remittances accounted about 43% of the variance of GDP. Shocks of Saudi Arabia and Egypt output had jointly positive and negative impacts. In conclusion, Mediterranean Countries presented some difference concerning cyclical properties of workers' remittances.

These previous studies had some limitations. The first study was concerned with limited factors which determine remittances using OLS method that ignored the issues of endogeneity and stationarity. The other two studies analyzed the cyclical property of remittances by concentrating on output shock only.

This study tried to overcome the limitations of previous studies. It estimated a vector error correction (VEC) model and the impulse functions for Egypt remittances receipts using annual data from 1980 to 2012. Its main issue was to estimate the response of remittances to a number of macroeconomic variables, namely per capita growth domestic product (GDPP) as a representative of home business cycle, oil price as an indicator of host income, money supply as an indicator of financial development, exchange rate(ER) as an indicator of domestic currency value, and lastly the total reserves as a reflection of economic-political stability in home country. The choice of reserves as a rough indicator of stability at home country was due to their high sensitivity to the instability recently witnessed in Egypt revolution. It is worth mentioning that total reserves dropped to 15046.31 million and 11758.3 million US$ in 2011 and 2012 respectively after it had reached 33742.83 million US$ in 2010 (UNCTAD statistics). Also, Egypt came in the front countries which had serious decline in reserves in 2011, followed by Yemen and Tunisia (Arab labour Organization, 2012**)**.

This study contributes to the current literature in several ways. First, this is the first study applied on Egypt focusing on the determinants of remittances and considering their cyclical behavior analysis. Second, it added the total reserves as a new rough indicator of stability at home country. Third, the VEC model of this study is distinguished of the econometric models of previous studies by its ability to reflect not only the long run but also the short run causality. Fourth, it uses the generalized impulse response functions (GIRF) to avoid the problem of ordering the variables, in addition to the Cholesky impulse response functions (CIRF). Fifth, it contains various forms of shocks represented by the shocks of oil, money supply, reserves, ER and output shock.

The paper proceeds as follows. Section 2 presents a review of literature on remittances. Section 3 addresses some facts on Egyptian workers remittances. Section 4 deals with data and non-stationarity. Section 5 contains the empirical model. Section 6 delivers the concluding remarks.

2. PREVIOUS STUDIES

Remittances determination had depended upon two kinds of motives of a worker's decision to remit to home country; altruistic and investment motives. The first was related the extent of interest in migrant relative welfare and could be represented by micro or social determinants (for example: Gender, age, marital status, skill levels, wage levels etc.). The second was related the extent of interest to invest and could be represented by macroeconomic determinants. Remittances would be expected to be countercyclical if altruistic motives dominated the migrant's decision, while procyclical if investment motives dominated. The cyclical property had a lot of implications on the remittances stabilizing role as a shock- absorber (Sayan, 2006; Bayangos and Jansen, 2009; Sliman and Tahar, 2009; Frankel, 2009).

Regarding remittances determinants at the level of a single state using time series data, different macroeconomic policy failures were tested in the study of El-Sakka (2007) for Jordan including ER misalignment, interest rate differentials, inconsistent monetary policy, and inconsistent fiscal policy delegated by budget deficit. By applying the cointegration test, it was found that Jordanian emigrants were sensitive to macroeconomic policy. For Sri Lanka,

Lueth and Ruiz-Arranz (2007) estimated a VEC model using quarterly data from 1996 till 2004 to determine the response of remittance receipts to macroeconomic shocks. The main focus was on the response of remittances to a number of macroeconomic variables, namely: Real GDP, consumer price index (CPI), ER, interest rate, and oil price. They found that remittances were positively correlated with oil price, but behaved procyclical, and declined when the Sri Lankan currency weakened. Accordingly, Sri Lankan remittances seemed to be lower than the hedge against shocks than commonly believed.

Using a novel dataset of bilateral remittance flows, Lueth and Ruiz-Arranz (2008) explored the determinants of workers remittances for some recipient and sending countries, during the period 1980-2004. By using pooled regression, it was found that some of the variables commonly used in gravity equations were very powerful in explaining remittance flows. Also, the evidence on the motives to remit was mixed, but the altruism motive might be less than commonly believed. To encourage remittances and maximize their economic impact, policies should be directed at reducing transaction costs, promoting financial sector development, and improving the business climate. Frankel (2009) study used the dataset of Lueth and Ruiz-Arranz, and its econometric results confirmed the smoothing hypothesis, that remittances were countercyclical with respect to worker's income in home country, while procyclical with respect to his income in host country.

By focusing on bilateral data of the Turkish and Mexican economies, Durdu and Sayan (2008) used a dynamic stochastic general equilibrium model with sudden stops. The results indicated that remittances sent home by Turkish workers abroad moved in the same direction as the business cycles in Turkey, whereas remittance receipts of Mexico were countercyclical. In a recent study, Borja (2013) examined the properties and the cyclical nature of remittances in El Salvador and Dominican Republic, two countries with large per capita remittance value. CIRF were estimated by restricted and unrestricted VAR models to assess the effects that domestic GDP, US GDP and coffee prices had on remittances. The dataset used quarterly values and a countercyclical relationship between remittances and domestic output was found, supporting the altruistic motive to remit.

At regional level, the paper of Veeramoothoo et al. (2009) developed a stepwise regression model to explore how changes in macroeconomic factors affected the magnitude of workers' remittances in Latin American and Caribbean countries. Population, land area, and net migration were found to be significant at the 1% level of significance, while age dependency ratio, rate of unemployment and labor force were marginally significant at the 20% level. Recently, Yuni et al. (2013) carried out an investigation on the determinants of Remittance across 21 African countries with a time frame from 1980 to 2011. The study used the generalized method of moments estimation in a dynamic panel and found that remittance receipt of the previous year, broad money growth, taxes, inflation, lending rate and age dependency ratio were significant determinants of remittances, while GDP per capita and real effective ER were not.

3. REMITTANCES ASPECTS IN EGYPT

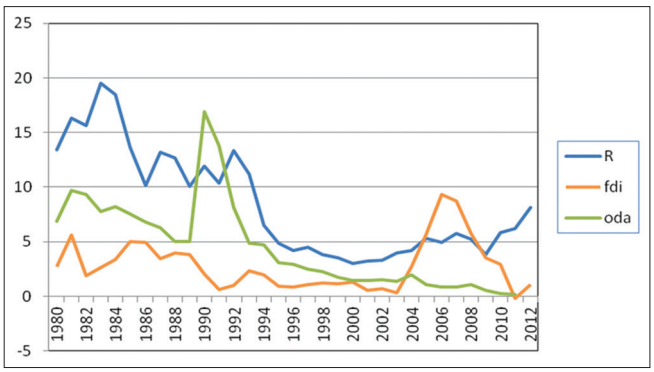
Egypt is considered one of the top emigrating countries; in 2005 it ranked 12th in the world in terms of number of emigrants. Regarding the classification of migration into temporary and permanent, emigration flowed out of Egypt has been classified as temporary, directed towards Arab countries and especially gulf cooperation council (GCC) countries, and permanent directed towards European Union and North American countries. Flows of temporary migrants, more than 2 millions, to neighboring Arab countries surpassed those of permanent ones. Regarding the distribution of Egyptian migrants by occupation and country, the GCC countries and Libya attracted the highly skilled workers. Economic factors were the main emigration causes, including issues of poverty attenuation, combating unemployment, enjoying higher returns for education, and achieving higher living standards (Ghoneim, 2010).

Remittances reached 2.696 billion US$ in 1980, and increased to nearly 20 billion US$ in 2012. They increased at an average annual rate of 9.4% over the last 33 years. In the first half of 1980s (Figure 1), remittances (R) had an upward trend until reached 20% of GDP with the GCC countries liberal policies towards migrants. In the second half of the 1980s, the Egyptian remittances decreased to be around 10% of GDP, when the oil price dropped in 1986. The downward trend continued during 1990s as a result of the GCC countries policy of replacing the foreign labor with national labor forces, replacement of Egyptian labor with Asian labor in GCC countries, and the collapse of the East Asian financial markets. Remittances began to increase in 2000s with the boom of oil prices. Regarding the world financial crisis, Remittances did not face any decrease in 2008 but experienced a slight decrease in 2009 (Glytsos, 2002; Ghoneim, 2010; Sliman and Tahar, 2009). Accordingly, the fluctuations of oil price and the substitution policies constitute the main factors of Egyptian remittances trend.

Also, it is obvious that remittances exceed both FDI and ODA inflows during the period under investigation except in 1990/1991 and 2006/2007. So, they constituted the largest source of external financing.

Figure 2 shows that the Egyptian remittance receipts were less volatile than ODA, FDI. The standard deviation of remittances

Figure 1: Sources of foreign exchange inflows as a percent of gross domestic product during (1980-2012)



Source: Author calculation depending on UNCTAD statistics

amounts to 60% of the mean, compared with 64% for ODA, and 142% of FDI. Economic policy makers will be concerned about these fluctuations and have to understand the determinants of the inflows patterns.

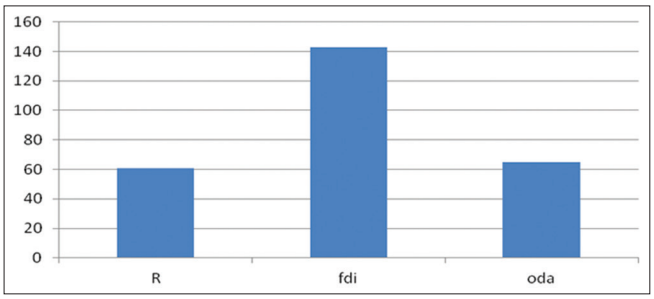
The demographic aspect of remittances also ensures the importance of oil price in remittances determination. According to the latest available bilateral data from the World Bank in 2012, The Saudi Arabia ranked top among the countries from which Egyptians send their remittances, as it contributed with 28% of Egypt's total remittances, followed by Jordan with 19%, Kuwait with 11%, Libya with 10%, United of Arab Emirates with 5%, Qatar with 3%, Oman with 1% and Bahrain with 1% (Figure 3). So, remittances main bulk continued to come from oil exporter countries.

Regarding investigating the cyclical behavior of inward remittances, both of real remittances and GDPP (in US$ and deflated by US CPI have been de-trended by the Hodrick - Prescott filter during the period 1980-2012. After the cyclical components have been estimated, correlation between the cyclical components of remittances and those of Egypt real GDPP has been counted. The results showed a correlation of almost 20% in the investigated period; meaning that remittances to Egypt seemed to be procyclical with its economic activity.

4. DATA AND NON-STATIONARITY

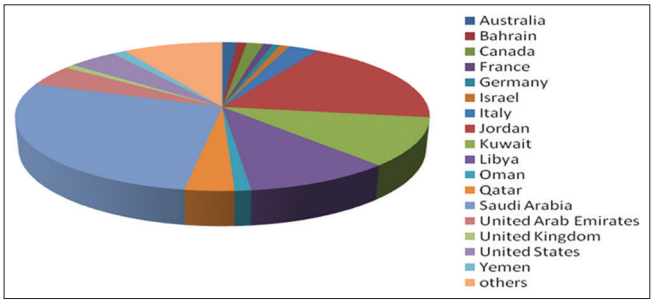
Availability of data is a major problem for economic modeling in Egypt. For this reason the current model was restricted to some variables for which homogeneous and long sufficient information has been found. The model focused on a number of main macroeconomic variables, often used in the literature

Figure 2: Volatility of selected sources of foreign exchange inflows during (1980-2012)



Source: Author's calculation depending on UNCTAD statistics

Figure 3: Distribution of Egyptian remittances by main source in 2012



Source: Author calculation depending on World Bank

as remittances determinants. The descriptive statistics of these variables were shown in Table 1. The independent variables representing the home country included per capita income, total reserves, money supply and ER. The independent variable representing the economic activity of many host countries was oil price. The study used annual data from 1980 to 2012 from UNCTAD statistics and World Bank development indicators.

Six variables were included: (1) R, the value of remittances inflows expressed as a ratio of the home country GDP (remittances are the sum of workers' remittances, compensation of employees and migrants' transfers); (2) GDPP, the per capita of the home country real GDP in US$, is calculated as the nominal value divided by CPI of United States (2000=100); (3) RES, the home country real total reserves including gold in US$ at constant prices (2000); (4) MS, the value of broad money as a ratio of the home country GDP; (5) ER, the nominal exchange rate of Egyptian pound against US$; and (6) OIL, the free market crude petroleum price index (2000=100).

The model proposed to be used for Egypt began by assuming that the decision to remit was a fairly complicated one. It depended not only on variables set related to both host and home countries but also on remittances purpose. The expected relationship between the variables and remittances inflows will be affected by purpose of transferring, whether for altruism or for investment. Based on the previous studies (Bouhga-Hagbe, 2006; El-Sakka, 2007; Lueth and Ruiz-Arranz, 2007; Mohaddes and Raissi, 2011; Abdih et al., 2012), the following relations can be described:

The indicator of the level of income in home country (GDPP) was assumed to negatively affect remittances inflow, if remittances were mainly for family support. However, if remittances were for investment purposes, a positive relationship between income level and remittances inflows would be expected. Similarly, the indicator of financial development level in home country (MS) could have either positive or negative impact on remittances inflows. This could also be applied when considering the impact of reserves (RES) as an important indicator of economic-political stability.

The level of the ER matters because remitters take into account the value of the domestic currency when they remit. If goods in the home country become less expensive with the depreciation of the currency, one does not need to transfer as much money as before to buy a given amount of goods. On the other hand, a depreciation of home country's currency can also make its migrants wealthier as it increases their purchasing power in their home country. Therefore, this could give them incentives to transfer more money to buy more goods in home country. Also, a depreciation of the domestic currency can increase the remittances ratio as it represents a reduction of the remittance cost. Therefore, depending on how remittances were measured and migrants motivations, the effect of the ER on remittances were unclear.

The level of income in host countries represented by oil price (OIL) is expected to have a positive impact on remittances flows, reflecting the fact that most overseas Egyptian workers were

Table 1: Descriptive statistics of the variables

Statistics	R	GDPP	RES	MS	OIL	ER	REMIT
Mean	8.494201	1191.678	11912.82	85.04389	129.4197	3.290816	5373.317
Median	6.195043	1090.307	12838.58	85.61522	95.58333	3.388750	4574.882
Maximum	19.53187	2350.237	26646.96	97.34642	372.1083	6.196242	15386.92
Minimum	2.980656	551.7971	1358.662	62.82112	46.34167	0.700001	2769.655
SD	4.902797	473.9602	8491.763	8.212758	96.17615	2.044350	2622.998
Observations	33	33	33	33	33	33	2.054084

Source: Author's calculation, SD: Standard deviation

Table 2: Augmented Dickey fuller test results

	Level			First differences		
	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None
R	−1.39 (0)	−1.46 (0)	−1.09 (0)	−5.53 (0)	−5.65 (0)	−5.53 (0)
GDPP	−0.26 (1)	−3.76 (3)	2.23 (1)	−4.60 (0)	−4.35 (0)	−3.69 (0)
RES	−1.85 (1)	−1.98 (1)	−0.53 (0)	−3.60 (5)	−3.64 (5)	−3.92 (0)
MS	−2.51 (2)	−2.45 (2)	−0.51 (1)	−4.75 (0)	−4.66 (0)	−4.86 (0)
OIL	0.39 (0)	−1.21 (0)	2.18 (2)	−6.52 (0)	−6.30 (1)	−6.30 (0)
ER	−0.90 (1)	−3.36 (1)	0.66 (1)	−3.51 (0)	−3.45 (0)	−3.16 (0)
	Critical values			Critical values		
1%	−3.65	−4.27	−2.63	−3.66	−4.28	−2.64
5%	−2.95	−3.55	−1.95	−2.96	−3.56	−1.95
10%	−2.61	−3.21	−1.61	−2.61	−3.21	−1.61

Source: Author's calculation. Values in brackets refer to the lag periods selected by using Schawarz' criterion

employed in Arabian Gulf States. However, it is important to take into consideration the role of competition circumstances and migrant incentives.

Taking into account the methodological approach followed in this paper, it was essential to start by testing the stationarity of variables. The study used the augmented Dickey fuller test, one of the most common unit root tests. The null hypothesis tested is that the investigated variable had a unit root against the alternative that it did not have. At the level, statistical values of variables were less than their critical values. So, the null hypothesis of a unit root could not be rejected, while at the first differences, the statistical values became more than the critical values at the 5% significance. It meant that the alternative hypothesis could be accepted. The results were shown in Table 2. The data series were found to be non-stationary in levels and stationary in the first differences. Hence, all series were integrated of order one. The stationary time series of variables were shown in Figure 4.

5. THE EMPIRICAL MODEL

The empirical framework is concerned with VEC model and response functions for Egypt remittance receipts. It aimed to investigate the macroeconomic determinants of remittances in short and long term and to analyze the cyclicity of remittances to the shocks in interested macroeconomic variables.

This model implied three main steps: First, testing for the existence of a cointegration vector to recognize whether remittances were affected by interested variables in long run. Second, estimating the vector of error correction to test whether remittances were affected by interested variables in short run. Third, deriving the impulse response functions to determine the extent of remittances response to shocks in interested variables.

The functional formula of the model can be summarized as follows:

$$R = f(GDPP, RES, MS, ER, OIL)$$

The cointegration analysis had been conducted using the Johansen approach (Johansen and Juselius, 1990). This test was suitable for the model as it included more than two variables. Results of the Johansen test for determining the number of cointegrating vectors were presented in Table 3. The current work used one lag to preserve sufficient degrees of freedom. The probability values of both the Trace test and Maximum Eigenvalue test referred to the existence of three cointegrating vectors at the 5% level. The results confirmed the existence of a stable, long run equilibrium relationship.

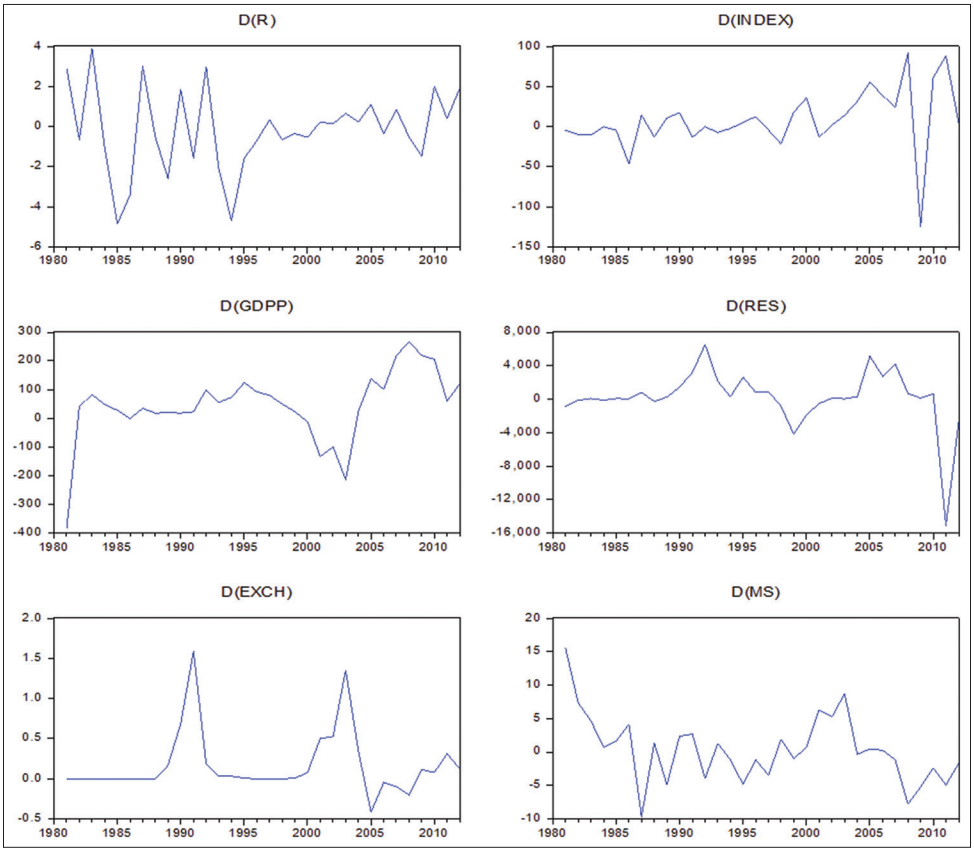
In the long run, remittances moved with the other macroeconomic variables based on the following cointegrating relationship (standard error in parentheses):

$$R = 0.042779\ GDPP - 0.000117\ RES + 0.836782\ MS - 0.122436\ OIL - 1.802356\ ER$$

(0.00255) (0.00015) (0.08041) (0.00635) (0.50626)

The equation indicated that in the long run, remittances associated with independent variables. The value of GDPP coefficient was positive and significant at the 5% level, meaning that remittances inflows increase by 0.04 as the per capita income increase by one. This indicated that the majority of remittances flows to Egypt were for investment and not for family support purposes. Income level rising in home country reflected increasing economic activity levels and hence, higher return rates on investments at home. Also, remittances inflows were significantly correlated with the indicator of banking development. Remittances inflows increased by 0.8 when money supply increased by one.

Figure 4: Time series of variables in the first differences



Source: Author calculation

Table 3: Johansen cointegration test results

Hypothesized number of CE (s)	Eigenvalue	Trace statistic	P	Max-Eigen statistic	P
r=0	0.936798	188.1524	0.0000	85.60380	0.0000
r≤1	0.809668	102.5486	0.0000	51.42858	0.0002
r≤2	0.639543	51.12001	0.0239	31.63188	0.0142
r≤3	0.301419	19.48814	0.4583	11.11982	0.6354
r≤4	0.228377	8.368321	0.4269	8.037030	0.3750
r≤5	0.010630	0.331291	0.5649	0.331291	0.5649

Source: Author's calculation. Trend assumption: Linear deterministic trend

Concerning ER, the results showed that there was a significant negative relationship between its level of and remittances inflow. This could be due to the existence of ER pass-through phenomenon in Egyptian economy (Khodeir, 2012). The depreciation of home currency will lead to higher import costs, therefore, the domestic price level will Increase. Under these circumstances, Migrants as investors will decrease their remittances to home country to avoid inflation.

Despite the significant influence of oil prices on remittances inflow, the coefficient sign was unexpected. This contradiction could be explained by the gap between the migrant income and the decision to remit. Meaning that, oil price rise could lead to an increase in migrant income, but with time, the expected rise in production costs with its negative implications on the Egyptian economy, being a country suffering from a lack of energy resources will reduce what is transferred from its migrants having investment motives. This is particularly important in Egypt, since one of its future challenges is to satisfy the increasing domestic demand for oil while the production is falling. Total oil consumption grew by an annual average of 3% over that past decade to 755,000 bbl/d in 2012. Egypt's oil consumption has surpassed production since 2010 (U.S. Energy Information Administration, 2013). The percent of oil imports (both petroleum crude oils or bitumen and bituminous minerals) of total imports increased from 6 in 2009 to 14.3 in 2012 (UNCTAD Statistics).

There was no significant relationship between remittances and reserves. This meant that Egyptian migrants might not care about this variable for a long time. The effect of reserves seemed temporarily on the decision of migrants and this is what will be checked when conducting analysis in the short term.

As the variables were cointegrated, the VEC model could be developed. This model can check the existence of causality between variables. The estimated results for remittances as dependent variable were shown in Table 4. The coefficient of error correction model was negative and significant. It represented the speed of adjustment for any disequilibrium towards long run

equilibrium state. In the model, the speed of adjustment was about 88%, so it was relatively rapid.

The model was significant at the 1% level according to the probability of F test. It had a high explanation power since the independent variables could explain about 83 % of remittances changes. There was neither serial correlation nor heteroskedasticity problem, regarding LM and Breusch-Pagan-Godfrey tests respectively. The Jarque-Bera test did not reject the hypothesis of normality of residuals.

Table 4: VEC estimates for remittances

Cointegrating equation	Cointegrating equation 1	Cointegrating equation 2	Cointegrating equation 3			
R (−1)	1.000000	0.000000	0.000000			
GDPP (−1)	0.000000	1.000000	0.000000			
RES (−1)	0.000000	0.000000	1.000000			
MS (−1)	0.987238	−11.90736	−547.9627			
	(0.15115)	(5.40425)	(135.661)			
	[6.53132]	[−2.20333]	[−4.03921]			
OIL (−1)	−0.205020	3.689640	171.2902			
	(0.02199)	(0.78607)	(19.7325)			
	[−9.32493]	[4.69376]	[8.68061]			
ER (−1)	3.250539	−113.2084	−4661.310			
	(0.56710)	(20.2755)	(508.969)			
	[5.73188]	[−5.58350]	[−9.15834]			
C	−79.35540	−221.9385	29513.92			
Error correction	**D (R)**	**D (GDPP)**	**D (RES)**	**D (MS)**	**D (OIL)**	**D (ER)**
Cointegrating equation 1	−0.879632	16.02011	−375.6718	−0.885505	11.98230	−0.121033
	(0.26655)	(12.6971)	(201.178)	(0.79680)	(8.09929)	(0.08863)
	[−3.30011]	[1.26171]	[−1.86736]	[−1.11132]	[1.47943]	[−1.36557]
Cointegrating equation 2	−0.000111	0.132378	−8.814448	−0.014824	0.595595	−0.002133
	(0.00605)	(0.28810)	(4.56478)	(0.01808)	(0.18378)	(0.00201)
	[−0.01831]	[0.45948]	[−1.93097]	[−0.81993]	[3.24089]	[−1.06054]
Cointegrating equation 3	−0.000925	0.011659	−0.317030	−0.000296	−0.009602	−4.27E-05
	(0.00022)	(0.01030)	(0.16326)	(0.00065)	(0.00657)	(7.2E-05)
	[−4.27837]	[1.13156]	[−1.94192]	[−0.45836]	[−1.46087]	[−0.59343]
D (R[−1])	0.196326	−3.816630	−26.84285	0.382089	1.990501	0.047324
	(0.14634)	(6.97087)	(110.449)	(0.43745)	(4.44660)	(0.04866)
	[1.34160]	[−0.54751]	[−0.24303]	[0.87344]	[0.44765]	[0.97255]
D (R[−2])	−0.168368	−8.682048	−39.83050	0.684519	−0.578813	−0.006072
	(0.14238)	(6.78243)	(107.463)	(0.42563)	(4.32640)	(0.04734)
	[−1.18252]	[−1.28008]	[−0.37064]	[1.60825]	[−0.13379]	[−0.12826]
D (GDPP[−1])	0.024595	0.827276	17.71402	−0.039030	0.412195	−0.001577
	(0.00745)	(0.35500)	(5.62468)	(0.02228)	(0.22645)	(0.00248)
	[3.30030]	[2.33038]	[3.14934]	[−1.75198]	[1.82028]	[−0.63651]
D (GDPP[−2])	0.001062	−0.416898	6.391483	0.015132	−0.374369	0.001147
	(0.00683)	(0.32542)	(5.15611)	(0.02042)	(0.20758)	(0.00227)
	[0.15544]	[−1.28110]	[1.23959]	[0.74098]	[−1.80348]	[0.50495]
D (RES[−1])	0.000497	−0.012603	0.079241	0.000669	0.008287	4.86E-05
	(0.00018)	(0.00842)	(0.13338)	(0.00053)	(0.00537)	(5.9E-05)
	[2.81272]	[−1.49712]	[0.59408]	[1.26706]	[1.54326]	[0.82779]
D (RES[−2])	0.000602	0.010753	0.200985	−0.000477	0.004497	8.20E-06
	(0.00021)	(0.01008)	(0.15965)	(0.00063)	(0.00643)	(7.0E-05)
	[2.84475]	[1.06719]	[1.25890]	[−0.75513]	[0.69962]	[0.11657]
D (MS[−1])	0.260286	−3.499778	−87.11575	−0.129266	0.509462	0.028497
	(0.10961)	(5.22126)	(82.7274)	(0.32766)	(3.33055)	(0.03645)
	[2.37470]	[−0.67029]	[−1.05305]	[−0.39452]	[0.15297]	[0.78187]
D (MS[−2])	0.251129	0.107761	153.1726	0.198137	2.561275	−0.034274
	(0.09422)	(4.48806)	(71.1103)	(0.28165)	(2.86286)	(0.03133)
	[2.66546]	[0.02401]	[2.15401]	[0.70349]	[0.89466]	[−1.09403]
D (OIL[−1])	−0.037327	0.888276	6.768489	−0.053991	0.769003	−0.005508
	(0.01584)	(0.75466)	(11.9571)	(0.04736)	(0.48139)	(0.00527)
	[−2.35616]	[1.17705]	[0.56606]	[−1.14005]	[1.59748]	[−1.04554]
D (OIL[−2])	−0.017013	1.410060	60.25865	−0.027941	0.622314	−0.006058
	(0.01339)	(0.63796)	(10.1081)	(0.04004)	(0.40695)	(0.00445)
	[−1.27037]	[2.21025]	[5.96141]	[−0.69791]	[1.52923]	[−1.36033]
D (ER[−1])	0.528554	116.0350	1545.150	−4.939402	21.82747	0.088358
	(0.98162)	(46.7604)	(740.889)	(2.93444)	(29.8277)	(0.32641)

(Cond...)

Table 4: ***(continued)***

Error correction	D (R)	D (GDPP)	D (RES)	D (MS)	D (OIL)	D (ER)
	[0.53845]	[2.48148]	[2.08554]	[−1.68325]	[0.73179]	[0.27070]
D (ER[−2])	−1.812959	−37.23024	65.40063	2.055070	−73.44876	0.018908
	(1.16767)	(55.6230)	(881.309)	(3.49060)	(35.4810)	(0.38827)
	[−1.55263]	[−0.66933]	[0.07421]	[0.58874]	[−2.07009]	[0.04870]
C	−1.824606	−7.579610	−1960.054	2.624672	−7.594720	0.292095
	(0.56797)	(27.0555)	(428.677)	(1.69786)	(17.2583)	(0.18886)
	[−3.21253]	[−0.28015]	[−4.57233]	[1.54587]	[−0.44006]	[1.54662]
R^2	0.826964	0.833028	0.967554	0.614008	0.562367	0.518429
Adjusted R^2	0.641568	0.654129	0.932791	0.200446	0.093475	0.002459
Sum square residual	21.48438	48751.77	12238802	191.9916	19836.85	2.375509
SE equation	1.238789	59.01076	934.9867	3.703199	37.64197	0.411921
F-statistic	4.460534	4.656420	27.83274	1.484680	1.199354	1.004766
Log likelihood	−37.56009	−153.4676	−236.3520	−70.41197	−139.9796	−4.528370
Akaike AIC	3.570673	11.29784	16.82347	5.760798	10.39864	1.368558
Schwarz SC	4.317978	12.04515	17.57077	6.508103	11.14595	2.115863
Mean dependent	−0.250520	58.58283	246.8540	−0.384517	8.696944	0.178535
SD dependent	2.069161	100.3400	3606.553	4.141456	39.53507	0.412429
Determinant residual covariance (dof adjusted)		1.56E+11				
Determinant residual covariance		1.61E+09				
Log likelihood		−573.3997				
AIC		45.82664				
SC		51.15119				

Source: Author's calculation. Standard errors in ( ), t-statistics in [ ], AIC: Akaike information criterion, SC: Schwarz criterion, VEC: Vector error correction

By using Wald test to diagnosis the short run coefficients, it has been shown that each of the explaining variables, except ER, had a significant influence on remittances in the short run at 5% level. Also, the type of influence was compatible with that in the long run. This indicated, as mentioned earlier, that the majority of remittance flows to Egypt were for investment and not for family support purposes. The insignificance of ER reflected that its effect needs longer time to take place. The appearance of a positive significant impact of reserves on remittances insured that any changes in reserves in short run might lead to a temporary effect on remittances. This result is of great importance regarding Egypt's revolution shock and its implications.

Finally, after estimating the VEC model, the study turned to apply two types of impulse response functions. The CIRF, used by Lueth and Ruiz-Arranz (2007) and the GIRF. In the current work CIRF, the variables were ordered as listed in VEC model. According to Pesaran and Shin (1997) and Ben-Kaabia et al. (2002) the GIRF was preferred that it did not require orthogonalization of shocks and is invariant to the ordering of the variables in the VAR. For Kim (2012) it was extreme because it yielded a set of response functions that were based on extreme identifying assumptions that contradicted each other. The results for the two types of remittances impulse responses were presented in Figure 5.

In general, the shape and the size of the two impulse responses are quite different, except for the output shock. Comparing between them illustrated substantial differences in the remittances response to the shocks of oil price, reserves, money supply, and ER. This might lay doubts on what could be deduced. As the response of remittances to these kinds of shocks was ambiguous, it could be ignored.

Regarding the output shock, the response of remittances to a shock in home income was positive at each time responsive period. One standard deviation shock to GDPP each year led to a continuous increase in remittances during 10 years, ranged between 0.8% in the first year and 6% in the last year in GIRF or between 0.6% in the second year and 5.1% in the last year in CIRF. The response of remittances to home income was positive according to the two types of IRF, but faster in GIRF than in CIRF. This kind of response reflects the importance of the investment motives. This procyclicity of remittances raises doubts of being a safeguard against output shocks in Egypt. In other words, it implies that remittance flows may not be as important to smooth shocks in Egypt as commonly believed.

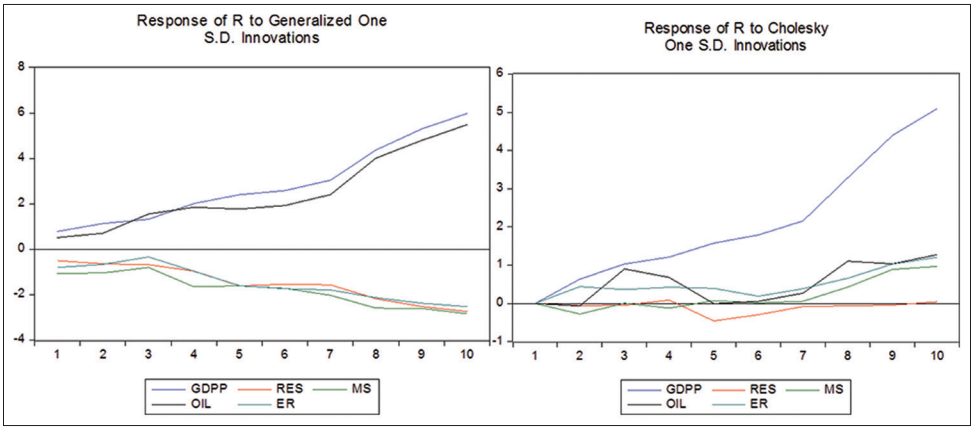
6. CONCLUDING REMARKS

This paper aimed to explore to what extent migrants remittances had supported Egypt against economic shocks and whether likely to do so in the future. To achieve that, different macroeconomic variables were included. The variables were home income, oil price, money supply, reserves, and ER. It used VEC model and two types of impulse response functions to analyze short and long term implications.

The results identified three cointegrating relations amongst the considered variables. In both the long and short run, remittances inflows were significantly associated with real per capita income, money supply, and oil price. Reserves had a positive effect on remittances only in the short run, while ER negatively affected remittances only in the long run.

The study found that Egyptian migrants were sensitive to macroeconomic variables of home and host countries. Remittances inflows increased with the rise of home income levels, the increase of money supply as a reflection of financial development, the rise of reserves as an indicator of home stability, the decrease of oil price,

Figure 5: Impulse response functions of remittances



Source: Author's calculation

and the appreciation of domestic currency. These results provided evidence showed more impact of investment over altruism motive of Egyptian migrants to remit.

Regarding the econometric results, remittances inflows seemed to be procyclical in Egypt, undermining their usefulness as shock absorber. This confirms that remittance flows to Egypt were for investment and not for altruism purposes. The procyclicity of remittances raised doubts of being a safeguard against output shocks in Egypt.

The following policy recommendations are drawn from the results above:

- Decision makers should not depend on remittances as a direct policy to absorb the output shocks.
- It is important to continue facilitating remittances inflows as an important external financial source, especially with the descriptive evidence about their advantage, that they are less volatile than FDI flows and ODA, but without treating them as a substitute for structural reform policies, such as diversification of the export base.
- There is a need to a specific institutional framework governing remittances to be directed to deal with the lack of encouraging investment policies that could attract the majority of remittances to small and medium-sized enterprises instead of unproductive investments in real estate.
- The current work can be extended to investigate the effects of different regional and international shocks, as well as to be applied on the case of other labour exporting countries that receive large remittances inflows.

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