Do Palestinian Workers' Remittances from Israel and its Volatility Matter for the Palestinian Economy?

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Abstract: This paper studies the impact of Palestinian workers' remittances from Israel and its volatility on Palestinian economic growth using quarterly data over the period 2000-2016. A joint estimation of a vector error correction and multivariate generalized autoregressive conditional heteroskedasticity models are applied for such purpose. Cointegration tests provide evidence of a long-run positive equilibrium relationship between remittances and output growth. Results also indicate that remittances have influence on both first and second moments of Palestinian GDP. Further, findings suggest that while Palestine GDP has no influence on the first moment of Palestinian workers' remittances from Israel, it can cause an increase in its volatility.

Keywords: Volatility, VECM, MGARCH model, remittances, economic growth, Palestine.

1. INTRODUCTION

Remittances are considered as an important source of income for many countries, especially in developing countries. In 2016, developing countries received about 75% of all remittances and supply roughly 80% of the world's migrant workers. Workers' remittances, in developing countries, are the second largest source of foreign exchange earnings after foreign direct investment (World Bank, 2017).

The economy of Palestine is highly dependent on workers' remittance inflows, particularly from Israel. In 2013, personal remittance inflows to Palestine reached $2.3 billion, of which $1.1 billion were transferred by Palestinians working in Israel, making Palestine the seventh largest recipient of remittances in the world in terms of the percentage of remittances to Gross Domestic Product (GDP), 23% of GDP (Saad, 2015). According to Palestinian Central Bureau of Statistics (PCBS, 2017), in 2016, 14% of Palestinian employees were working in Israel, mainly in construction and agricultural sectors, generating an unprecedented level of remittances flows ($1.4 billion in real values). This is equivalent to 17% of Palestinian real GDP. In spite of the high number of Palestinian labours working in Israel, this number tends to depend largely on the political situation between Palestine and Israel. This paper sheds light on this issue by studying the impact of Palestinian workers' remittances from Israel and its volatility on Palestinian economic growth over the period 2000-2016.

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Empirical studies in the literature argues that the relationship among remittances and economic growth is still ambiguous. Results from previous studies can be categorized into three types: Positive relationship between remittances and economic growth, second negative relationship, and finally, no relationship. More specifically, Giuliano and Ruiz-Arranz (2009) study the links between remittances and economic growth in 100 developing countries and found that remittances boost growth in countries with less developed financial system, Chami *et al*. (2003) reveal that there exists a negative impact of remittances on economic growth, and Barajas *et al*. (2009) find that workers' remittances have no impact on economic growth. Despite the great number of studies conducted to investigate the impact of remittances on economic growth, no published studies have analysed the impact of Palestinian workers' remittances from Israel and its volatility on Palestinian economy, which represents a contribution of this work to the literature. To achieve the paper objective, the following methods are adopted: First, stationary and cointegration are tested; second, a Vector Error Correction Model (VECM) and Multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH) technique are applied. Finally, Volatility Impulse Response Function (VIRF) approach is performed to study the impact of a shock to the Palestinian workers' remittances from Israel on Palestinian economic growth.

This paper is organized as follows. In the second section, we present a brief overview of remittances in Palestine. A literature review of previous research is presented in the third section. The fourth section is devoted to discussing econometric methods. The discussion of the results and the conclusion are presented in the fifth and sixth sections, respectively.

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2. REMITTANCES IN PALESTINE: AN OVERVIEW

The establishment of Israel state in Palestine has made the Palestinian economy an exceptional economy. After the war of 1948, Israel occupied 76.7% of the total area of Palestine and gained control over the rest of Palestinians' land in 1967, namely the West Bank and Gaza Strip in the course of the Six-Day war (Naksah).[1] Israeli policy immediately following the Six-Day war strangled the Palestinian economy and increased its dependence on Israeli economy, i.e. Israel restricted trade within the Palestinian territories and opened its market to Palestinian labour without restrictions. This policy increased the flow of Palestinian workers to Israel and thus made remittances from Israel as a major source of income for Palestinian economy. More specifically, between 1967 and until the early 1990s, more than one-third of the Palestinian labour force was employed in Israel, generating over a quarter of the Palestinian GDP (Farsakh, 1998). The high number of Palestinians working in Israel was mainly due to higher employment opportunities and wages.

Since the signing of the 1993 Oslo peace accords, significant changes in the pattern of policy began, i.e. the Israeli policy of border closures intensified and greater restrictions were placed on Palestinian workers wishing to enter Israel (Farsakh, 1998; Farsakh, 2002; Lentin, 2008). As a result, the number of Palestinian workers going to Israel dropped from around 115 thousand in 1992 to less than 36 thousand in 1996. From 1997 and until the second Intifada in 28 September 2000, there was an increase in the Palestinian labour flows to Israeli markets. According to PCBS (2017), the number of Palestinians working in Israel reached its peak of 135.7 thousand workers in the third quarter of 2000, just before the start of the second Intifada, generating around $323 million of remittances (29% of Palestinian GDP of the third quarter).[2] Immediately following the second Intifada, Israel prevented 98.2 thousand Palestinian workers from reaching their former jobs. Specifically, the number of workers decreased from 135.7 thousand in the third quarter of 2000 to 37.5 thousand in the fourth quarter reducing income from remittances to $88.5 million.

By the end of the second Intifada, an increase in the number of workers and thus in the remittance inflows to the Palestinian economy was observed. More specifically, the inflow of Palestinian workers' remittances from Israel increased from $450.18 million in 2005 to $771.38 million in 2010 and to about $1.40 billion in 2016. On the other hand, the real GDP in Palestine increased from $4.80 billion in 2005 to 6.12 billion in 2010 and 8.03 billion in 2016.

From the above information, we can observe that the inflow of remittances tends to depend largely on the political status between Palestine and Israel. It seems also that workers' remittances play an important role in the economy of Palestine. As already mentioned, this paper sheds light on this issue by studying the impact of Palestinian workers' remittances from Israel and its volatility on Palestinian economic growth.

3. LITERATURE REVIEW

Analysing the relationship between remittances and economic growth has gained special importance in the economics literature. Empirical analyses, however, have found that workers' remittances may have different impact on economic growth. More specifically, many empirical studies argue that economic growth is positively associated with remittances, especially in developing countries (Kandil and Metwally, 1990; Jongwanich, 2007; Pradhan *et al*., 2008; Giuliano and Ruiz-Arranz, 2009; Nsiah and Fayissa, 2011; Paul *et al*,. 2011; Shahzad *et al*., 2015; Jouini, 2015; Mayer and Shera, 2017). Some other empirical studies find negative, or insignificant, impact of workers' remittances on economic growth (Chami *et al*., 2003; Waheed and Aleem, 2008; Jawaid and Raza, 2014; Spatafora, 2005; Barajas *et al*., 2009; Abbas *et al*., 2017). More details are presented below.

Kandil and Metwally (1990) investigate the impact of remittances made by Egyptian migrants to their home country on the Egyptian country using standard Keynesian model over the period from 1970 to 1984. Their results suggest that remittances have a strong positive impact on the Egyptian economy. Jongwanich (2007) investigates the impact of remittances on economic growth and poverty in selected Asian and Pacific countries using panel data over the period 1993-2003. His results suggest that remittances have a relatively small positive impact on growth but a significant favourable impact on poverty reduction. Pradhan *et al*. (2008) assess the impact of workers' remittances on economic growth within 39 developing

[1]Readers interested in the Israeli-Palestinian conflict are referred to Hassouneh (2017), Smith (2010).

[2]Unless otherwise indicated, the information presented in this section was obtained from PCBS (2017).

countries using panel data over the period 1980-2004. They estimate a standard growth model using both fixed-effects and random-effects approaches and find that remittances have a positive effect on economic growth. Giuliano and Ruiz-Arranz (2009) study the links between remittances and economic growth in 100 developing countries from years 1975-2002 using Ordinary Least Squares (OLS) and find that remittances can enhance economic growth in less financially developed countries.

The analysis by Nsiah and Fayissa (2011) investigates the relationship between economic growth and remittances through panel data of 64 different countries of African, Asian, and Latin American-Caribbean during the 1987-2007 period. They use a panel unit root and panel cointegration tests that capture the exact relationship between remittances and economic growth. Their findings suggest a positive relationship between remittances and output growth. Paul *et al*. (2011) examine the causal relationship between remittances and output in Bangladesh using an Autoregressive Distributed Lag (ARDL) method over the period 1976-2010. Findings indicate that an increase in output growth can positively affect remittances. Recently, Jouini (2015) analyses the relationship between remittances and economic growth of Tunisian economy over the period of 1970-2010. In doing so, he uses ARDL approach. His results indicate that, although short-run linkages exist, no long-run relationships between remittances and economic growth exist. More recently, Mayer and Shera (2017) study the relationship between economic growth and remittances using panel data set of six high remittances receiving countries, Albania, Bulgaria, Macedonia, Moldova, Romania and Bosnia Herzegovina from 1999-2013. Their findings also suggest a positive relationship among the two variables.

While the above literatures suggest a positive relationship among economic growth and remittances, some empirical studies provide evidence that remittances have a negative impact, or no effect, on economic growth. Chami *et al*. (2003) examine the effects of worker remittances on an economy growth of 113 countries over the period of 1970 to 1998 using multiple regression analysis. They emphasize the presence of moral hazard effect of remittances, which affects negatively the economic growth. The study by Waheed and Aleem (2008) investigates the impact of workers' remittances on economic growth in Pakistan using time series data from 1981 to 2006. Their findings suggest a significant negative relationship between workers' remittances and economic growth in the long run. Jawaid and Raza (2014) analyse the effect of workers' remittances and its volatility on economic growth of five South Asian countries by employing long time series data from 1975 to 2009. Cointegration test suggests a positive long run relationship between remittances and economic growth in India, Bangladesh, Sri Lanka and Nepal, but a negative relationship in Pakistan. Results also suggest that the volatility of workers' remittances has a negative effect on four economic growth countries, Pakistan, Indian, Bangladesh and Sri Lanka, and no impact in Nepal. Spatafora (2005) estimates a panel regression, of 87 countries during the period 1980-2003, to analyse the relationship between remittances and output growth and find no direct link between both variables. In the same context, Barajas *et al*. (2009) use a panel data on 84 countries during 1970-2004 and find that workers' remittances have no impact on economic growth. Recently, Abbas *et al*. (2017) study the impact of macroeconomic variables on remittances to Pakistan using Generalized Methods of Moments (GMM) over the period 1972-2012. Their findings suggest that inflation and government debt have negative influence on remittance inflow. The study by Haddad and Choukir (2017) investigates the short- and long-run relationship between remittance outflows and GDP, investment, and inflation in Saudi Arabia during 1970–2014. The estimated Johansen's (1988) test as well as the impulse response functions suggest the existence of one cointegration relationship between variables and that the remittances shocks have negative effects on economic growth, respectively.

Although a great number of studies have been made available recently, the literature that empirically assesses the relationships between economic growth and remittances in Palestine is relatively poor. Two notable studies on this topic are reviewed below. Astrup and Dessus (2005) develop a dynamic general equilibrium model to estimate the impact of restricted access to the Israeli labour market on the Palestinian export performance and, in turn, on economic growth. Their results suggest that exporting Palestinian labours to Israel tends to reduce strongly the capacity of the Palestinian industry to export goods. Results also indicate that the closure of the Israeli labor market negatively affects the Palestinian economy. The analysis by Saad (2015) investigates the effects of personal remittance inflows on key macroeconomic variables (private consumption, gross domestic

investment, imports and output growth) during the period 1995-2013. To do so, he uses a Keynesian-type econometric model. His results show that remittance inflows to the Palestinian economy significantly affected the macroeconomic variables and markedly contributed to the economic growth.

In spite of previous attempts to characterize Palestinian economic response to workers' remittance inflows, no previous analysis has directly investigated the effect of remittances from Israel on Palestinian GDP growth, a country that contributes of more than 50% of the total personal remittances in Palestine. Another contribution of this work to the existing literature is the use of VECM-MGARCH technique.

4. ECONOMETRIC METHODS

As well known, the analysis of economic time series data raises a number of unique inference issues. Based on previous research results, we expect our series data to have stochastic trends. Engle and Granger (1987) explain that co-movements among non-stationary variables may be stationary. Co-movement is known in the econometrics literature through the concept of cointegration. The cointegration relationship among the two series using the Palestinian economic growth as the normalization variable, can be expressed as follows:

$$GDP_t - \beta_1 PWR_t = e_t \tag{1}$$

where GDP_t and PWR_t denote the GDP in Palestine and the inflow of Palestinian workers' remittances from Israel at time *t*, respectively and e_t represents the deviation from the equilibrium relationship, i.e., the error correction term. According to Engle and Granger (1987), if the two series are found to be cointegrated then a long-run equilibrium relationship exists and the short and long-run dynamics of the data can be represented through a VECM:[3]

$$\begin{aligned}\Delta GDP_t &= \alpha_1 + \lambda_{GDP} e_{t-1} + \sum_{i=1}^{n} \alpha_{11}(i)\Delta GDP_{t-i} + \sum_{i=1}^{n} \alpha_{12}(i)\Delta PWR_{t-i} + u_{1,t} \\ \Delta PWR_t &= \alpha_2 + \lambda_{PWR} e_{t-1} + \sum_{i=1}^{n} \alpha_{21}(i)\Delta GDP_{t-i} + \sum_{i=1}^{n} \alpha_{22}(i)\Delta PWR_{t-i} + u_{2,t}\end{aligned} \tag{2}$$

where Δ is a first difference operator; $u_{1,t}$ and $u_{2,t}$ are random error terms; e_{t-1} ($GDP_t - \beta_1 PWR_t$) is the one period lagged deviation from the long-run equilibrium relationship, α_1, α_2, $\alpha_{11}(i)$, $\alpha_{12}(i)$, $\alpha_{21}(i)$ and $\alpha_{22}(i)$ are all short-run dynamics parameters and λ_{GDP} and λ_{PWR} are known as the speed of adjustment parameters and measure the response of the dependent variables to deviations from the long-run equilibrium relationship. The long-run equilibrium relationship among the two series exists if one or both of the error correction parameters are statistically different from zero.

Previous studies note that time series data are often characterized by the phenomenon of volatility (Serra *et al*., 2011; Hassouneh *et al*., 2017). To investigate volatility spillovers among Palestinian workers' remittances from Israel and economic growth in Palestine, a multivariate Baba–Engle–Kraft–Kroner (BEKK) model is applied to represent the conditional covariance model (Engle and Kroner 1995):

$$H_t = CC' + A' u_{t-1} u'_{t-1} A + B' H_{t-1} B \tag{3}$$

where A, B and *C* are a 2 × 2 parameter matrices, being *C* lower triangular matrix. u_{t-1} is a vector of error terms and H_t is the conditional variance-covariance matrix in t. The elements of A and B matrices measure the effects of past market shocks and the influence of past volatility on current volatility, respectively. The BEKK model is considered covariance stationary if and only if the eigenvalues of $A \otimes A + B \otimes B$, where $\otimes$ denotes the Kronecker product of two matrices, are less than 1 in modulus. The conditional variance equation for each series data can be expressed as follows:

$$\begin{aligned}h_{11,t} &= c_{11}^2 + c_{21}^2 + a_{11}^2 u_{1,t-1}^2 + 2a_{11}a_{21}u_{1,t-1}u_{2,t-1} + a_{21}^2 u_{2,t-1}^2 \\ &+ b_{11}^2 h_{11,t-1} + b_{21}^2 h_{22,t-1} + 2b_{11}b_{21}h_{12,t-1} \\ h_{22,t} &= c_{22}^2 + a_{12}^2 u_{1,t-1}^2 + 2a_{12}a_{22}u_{1,t-1}u_{2,t-1} + a_{22}^2 u_{2,t-1}^2 + b_{12}^2 h_{11,t-1} \\ &+ 2b_{12}b_{22}h_{12,t-1} + b_{22}^2 h_{22,t-1}\end{aligned} \tag{4}$$

In this paper, the following estimation strategies have been used. First, standard unit root and cointegration tests are conducted in order to determine whether the series are stationary and whether they are cointegrated, respectively. Second, a conditional mean approach (VECM) and covariance model (BEKK) are applied using standard maximum likelihood techniques.

To better understand the effect of remittance inflows on the Palestinian economy, the VIRF approach developed by Hafner and Herwartz (2006) is performed. VIRF provides an effective way to

[3]The linear VECM is commonly utilized to fit the data within different economic markets (see, for example, Fannoun and Hassouneh, 2019; Ferrucci *et al*. 2012).

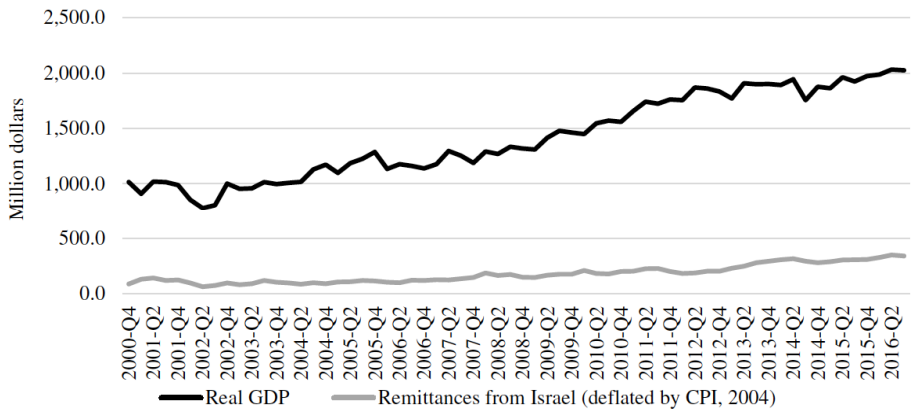

Figure 1: Quarterly time series data.

Table 1: Unit Root Test Results for the Time Series Used

Variables	ADF test statistics		KPSS test statistics		PP test statistics	
	Level	First difference	Level	First difference	Level	First difference
GDP	-0.302	-9.513	2.158	0.072	-0.106	-16.320
PWR	-0.939	-8.537	0.960	0.039	-0.843	-8.718
5% critical value	-2.910	-2.909	0.463	0.463	-2.910	-2.909
10% critical value	-2.592	-2.592	0.347	0.347	-2.592	-2.592

Note: Each test uses an intercept and no trend. The series are in logarithm form. GDP and PWR stand for Gross Domestic Product and Palestinian Workers' Remittances from Israel, respectively.

investigate the impact of independent shocks on volatility through time. The VIRF can be defined as follows:

$$V_h(\xi_t) = E\left[vech(H_t)\middle|\xi_t, \psi_{t-1}\right] - E\left[vech(H_t)\middle|\psi_{t-1}\right] \quad (5)$$

where ξ_t is the shock hitting the entire system at time t, ψ_{t-1} represents the observed history up to $t-1$ and $V_h(\xi_t)$ is an N dimensional vector.

5. RESULTS

Our empirical model utilizes two series of quarterly real GDP and the inflow of Palestinian workers' remittances from Israel covering the period from the fourth quarter 2000 to the third quarter 2016, yielding a total of 64 observations. The two series are obtained from PCBS (2017) and expressed in million Dollars. Remittances to Palestine from Israel are deflated by consumer price index, using 2004 as the base year. The data used in this paper are presented in Figure **1**. The average quarterly real GDP over the period studied equals $1.42 billion with a standard deviation of $378.85, while the average quarterly Palestinian workers' remittances from Israel equals $177.24 million with a standard deviation of $79.01.

Logarithmic transformations of the data series are used in the empirical implementation. In order to test the unit root property of the real GDP and Palestinian workers' remittances from Israel, augmented Dickey and Fuller (1979), Phillips and Perron (1988) and KPSS (Kwiatkowski *et al*., 1992) tests were applied. While, results confirm the presence of a unit root in all logarithmic series, first differences suggest that the null hypothesis of non-stationarity can be rejected at the 5% significance level for the two series (see Table **1**).

Following the unit root test, Engle and Granger (1987) cointergration procedure is applied. In doing so, the equilibrium relationship is normalized by the Palestinian economic growth and OLS are used to obtain estimates of the cointegrating parameters (see Table **2**). Then and in order to determine if the two variables are actually cointegrated, the deviations from the long-run equilibrium relationship are tested, see Table **3**.[4] Results show that residuals of long-run relationship are stationary and thus the economic

[4]It is worth noting that cointegration test is also conducted using the method developed by Johansen (1988). Result suggests that the hypothesis of no cointegration can be rejected at the 5% significance level. In this paper, we select Engle and Granger (1987) test which is consistent with the recommendation by Enders (1995, p.385) in the presence of a single cointegration vector.

growth and workers' remittances are cointegrated and long-run equilibrium relationship between both series exists. More specifically, cointegration test result suggests that there is a long-run positive relationship among the series studied. A 10% increase in the Palestinian workers' remittance inflows from Israel will be followed by an increase in economic growth (1.5%). These results are expected and consistent with previous studies which find that remittance inflows to Palestinian economy affect the output growth (Saad, 2015; Astrup and Dessus, 2005). Once it's concluded that both series are cointegrated, a VECM-MGARCH is estimated. Results are presented in Table **4**.[5]

Table 2: OLS Estimates of the Cointegrating Relationship

Variable	Estimate	Standard Error
Intercept	6.117**	0.217
PWR_t	0.150**	0.049

Note: ** denotes statistical significance at the 5 per cent significance level.

Table 3: Engle and Granger Test for Cointegration

	Test statistic (lag)	5% critical value
DF test	-4.312 (0)	-3.370

Notes: critical values are derived from Engle and Yoo (1987).

To interpret the results, the conditional mean model (equation 2) that studies the first moment of the Palestinian GDP and remittance inflows from Israel is first explained. The error-correction parameter estimates suggest that, while the Palestinian GDP adjust to restore the long-run equilibrium when it is broken, the remittance inflows do not (Table **4**). In other words, findings provide evidence that there exists unidirectional long-run causality running from remittance inflows to Palestinian GDP. This means that an increase in the number of Palestinians working in Israel directly affects economic growth in Palestine. Results also show that short-run changes in Palestinian workers' remittances have a positive impact on short-run changes in GDP. The statistical significant of the estimated coefficients (both short-run and long-run parameters) are consistent with the presence of strong Granger-causality running from remittance inflows to Palestinian economic growth. These findings are consistent with the Palestinian environment where the number of Palestinian workers inside Israel has more than doubled in the past 10 years. The number of Palestinians working in Israel increased from about 50 thousand in 2006 to about 120 thousand in 2016, generated an unprecedented level of remittances flows ($1.4 billion in real values), which is equivalent to 17% of Palestinian real GDP in 2016.

While, remittances are considered as an important source of income for many developing countries, remittances in Palestine is quite different as the number of Palestinians working in Israel tends to depend largely on the political environment between Palestine and Israel. More specifically, while working in Israel can be considered as one of the options to reduce unemployment and thereby increase economic growth in Palestine, this option should be treated as a temporary option since it is highly related to political issues. The deterioration of the political conditions will imposed strict restrictions on Palestinian workers, leaving a large number of Palestinian families with no source of income and thus causing considerable damage to the already weakened Palestinian economy. In this context, Palestinian policy makers should create favorable conditions to orientate Palestinian workers' remittances from Israel to productive investment and thereby creating new jobs and build a more stable economy.

After explaining the conditional mean model, the conditional variance model results are discussed. The multivariate portmanteau test statistic (Hosking, 1981) is applied on standardized residuals to test that there are no residual autocorrelations. Results suggest that the model is correctly specified. Moreover, the covariance stationarity condition is checked and results show that all eigenvalues are less than 1 in modulus (see Table **4**). As is well known, the BEKK-MGARCH parameter estimates cannot be directly interpreted. Hence, inferences are derived and interpreted from the nonlinear parameter functions in the conditional variance equations (see Table **5**).

Results show that the current volatility of Palestinian GDP (h_{11t}) is related to its past volatility (h_{11t-1}) and the volatility of Palestinian workers' remittances (h_{22t-1}). In other words, higher levels of volatility in the past are associated to higher current volatility. Findings further suggests that economic growth volatility in Palestine is directly influenced by shocks originating in the

[5]Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC) are used to determine the optimal number of lags to be used in the conditional mean model. Results suggest using one lag. Moreover, LM test for autocorrelation is applied and suggest no serial correlation among residuals.

Table 4: Real GDP and Remittance Inflows MGARCH Model: Mean and Variance Equations

VECM parameters: $\begin{pmatrix}\Delta GDP_t\\ \Delta PWR_t\end{pmatrix}=\begin{pmatrix}\alpha_1\\ \alpha_2\end{pmatrix}+\begin{pmatrix}\gamma_{GDP}\\ \gamma_{PWR}\end{pmatrix}e_{t-1}+\begin{pmatrix}\alpha_{11} & \alpha_{12}\\ \alpha_{21} & \alpha_{22}\end{pmatrix}\begin{pmatrix}\Delta GDP_{t-1}\\ \Delta PWR_{t-1}\end{pmatrix}+\begin{pmatrix}u_{1,t}\\ u_{2,t}\end{pmatrix}$		
	Real GDP equation	Remittances equation
Constant	0.010** (0.005)	0.022** (0.010)
ΔGDP_{t-1}	-0.106 (0.104)	-0.132 (0.216)
ΔPWR_{t-1}	0.092** (0.049)	-0.134 (0.128)
e_{t-1}	-0.301** (0.102)	0.070 (0.178)
GARCH model parameters: $C=\begin{pmatrix}c_{11} & 0\\ c_{21} & c_{22}\end{pmatrix}$, $A=\begin{pmatrix}a_{11} & a_{12}\\ a_{21} & a_{22}\end{pmatrix}$, and $B=\begin{pmatrix}b_{11} & b_{12}\\ b_{21} & b_{22}\end{pmatrix}$		
	$i=1$	$i=2$
c_{1i}	0.010 (0.007) [a]	
c_{2i}	-0.024 (0.015)	-0.000 (0.025)
a_{1i}	-0.083 (0.138)	1.245** (0.337)
a_{2i}	0.208** (0.054)	0.028 (0.107)
b_{1i}	0.923** (0.075)	0.694** (0.213)
b_{2i}	-0.083** (0.042)	0.606** (0.012)
Eigenvalues of $A\otimes A+B\otimes B$	0.961 0.668 0.356 0.356	
Hosking's Multivariate Q statistic		0.710

[a]Number in parentheses are standard errors. *(**) denotes statistical significance at the 10(5) per cent level.

Table 5: Conditional Variance Equations

h_{11t} =	6.739e-04**	6.857 e-03 $u^2_{1,t-1}$	-0.034 $u_{1,t-1}u_{2,t-1}$	0.043** $u^2_{2,t-1}$	0.8519** $h_{11,t-1}$
	6.933e-03** $h_{22,t-1}$	-0.154* $h_{12,t-1}$			
h_{22t} =	6.8391e-14	1.551* $u^2_{1,t-1}$	0.069 $u_{1,t-1}u_{2,t-1}$	7.7173e-04 $u^2_{2,t-1}$	0.482** $h_{11,t-1}$
	0.367** $h_{22,t-1}$	0.841** $h_{12,t-1}$			

*(**) denotes statistical significance at the 10(5) per cent level.

h_{11} = Palestinian real GDP variance, h_{22} = Palestinian workers' remittances from Israel variance, u_1 = GDP market shocks, u_2 = Remittances market shocks.

remittance inflows from Israeli market ($u^2_{2,t-1}$). The volatility in Palestinian workers' remittances (h_{22t}) is positively affected by its own lagged volatility and the volatility of Palestinian GDP. Results also indicate that past shocks in Palestinian GDP ($u^2_{1,t-1}$) directly affect the current instability in the Palestinian workers' remittances from Israel. The volatility spillover relationships suggested by the above results are not surprising and are due to the dependency of Palestinian economy on the Israeli economy.

According to Hafner and Herwartz (2006), VIRF depends on the history of the series. Since the workers' remittance variable is seen to be exogenous with respect to the error correction term as well as the short-run dynamic parameters, only the VIRF showing the Palestinian economic growth adjustment to a shock

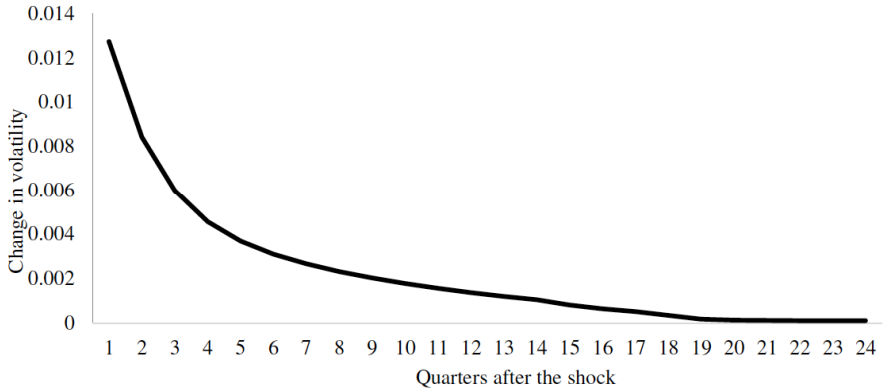

Figure 2: Economic growth volatility impulse response function.

occurring at the first quarter 2014, just before the second war of Gaza, is presented. VIRF suggests that Palestinian GDP volatility increases after the shock and this volatility tends to disappear after about 19 quarters (see Figure **2**).

6. CONCLUSION

The Israeli labour market is considered as an important employment outlet for the Palestinian labour force. The number of Palestinians working in Israel tends to depend largely on the political environment between Palestine and Israel. This paper aims to shed light on this issue by studying the impact of Palestinian workers' remittances from Israel and its volatility on Palestinian economic growth using quarterly data over the period 2000-2016. To do so, Engle and Granger test of cointegration as well as VECM-MGARCH are applied. The cointegration analysis suggests a long-run positive relationship between Palestinian workers' remittances and economic growth in Palestine. The estimated VECM-MGARCH model suggests that, while Palestinian economic growth responds to deviations from the long-run equilibrium relationship, remittance inflows from Israel do not adjust. Results further show that past volatility in both Palestinian GDP and remittances induce current volatility in Palestinian economic growth. Also, past shocks in remittances are found to destabilize Palestinian GDP. Additionally, higher volatility in the Palestinian GDP can cause an increase in the volatility of remittances.

These results are found to provide important implications for Palestinian market. More specifically, Palestinian economy is considered sensitive to remittance inflows from Israel, which in turn is highly associated with the political situations between Palestine and Israel. Thus, Palestinian economy and due to the ongoing political tensions is substantially vulnerable to economic shocks. The structural dependence of a significant portion of the Palestinian labour force on access to jobs in Israel poses major policy challenges of building an independent economy for a non-independent state. This requires, from Palestinian policy makers, careful consideration to find different means of income that reduce Palestinian economic dependency on Israel and thereby maintain the stability of economy in Palestine.

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