American Arab Journal for Business, Economics, and Finance; Vol. 1, No. 1; December 2020
ISSN 2837-0066 E-ISSN 2837-0074
Published by American Arab Research Institute (AARI)

Testing the Relation between Workers' Remittances and Economic Growth in Egypt

Abdelmonem Lotfy Mohamed Kamal (ALM Kamal)[1 2]

[1]Associate Professor of Financial Economics and Public Finance, Department of Finance and Investment, Faculty of Business, Economics, Information Technology, Misr University for Science and Technology (MUST), Giza, Egypt;

[2]Associate Professor of Financial Economics and Public Finance, Department of Islamic Economics, Faculty Of Shariah, Islamic University of Madinah, Al Madinah Al Monawara, Kingdom of Saudi Arabia.

Correspondence: Abdelmonem Lotfy Mohamed, Faculty of Business, Economics, Information Technology, Misr University for Science and Technology (MUST), Giza, Egypt.

Tel: +20-12-7662-9000. E-mail: abdelmonem.lotfy@must.edu.eg

Received: October 10, 2020 Accepted: November 23, 2020 Online Published: December 25, 2020

doi:10.5539/ijef.v6n7p URL: http://dx.doi.org/10.5539/ijef.v6n7p

Abstract

This study tests the relationship between two variables; the workers' remittances' growth rates and GDP growth rates in Egypt in a trial to find a causal relationship between these two variables in the Egyptian Economy through the period 1990 until 2020. The study finds that Egypt's economic growth rate over the period 1990 until 2020 is significantly positively impacted by the Egyptian Workers' Remittances. The study used Co-integration, Engle – Granger test, Vector Error Correction Model (VECM) and OLS econometric methodology to conduct the long run and short run estimated relationships between these two variables. The World Bank data base for Egypt for these two variables is used, with constant 2017 US dollar basis, to estimate the relationships.

In the long-run, the study estimates that one percent increase in Workers' Remittances growth rate causes GDP growth rate to increase by around 0.018 percent. This relationship can be presented through the following equation;

GDP Growth Rate = 5.51 + 0.018 Workers' Remittances Growth Rate + Error Term

Finally, it is better to the Egyptian government to facilitate the emigration of Egyptian labor force and the workers' remittances transfer to the Egyptian Economy in order to boost economic growth and enhance standards of livings for the Egyptian people.

Keywords: Workers' Remittances, GDP growth rate, Egypt, Co-integration, and VECM.

Introduction:

The role of the workers' remittances in promoting economic growth has been largely studied through a number of research papers. Theoretical as well as applied researchers have showed that workers' remittances has its effects on economic growth since it is defined as the third pillar of economic development whereas their volume is the second to foreign direct investment (Abou Elseoud, 2014). On this regard, examining the relationship between economic growth and workers' remittances has become a crucial issue during the last thirty years.

During the period 1990 until 2020, the Egyptian economy and its workers' remittance have witnessed crucial developments and fluctuations. The Egyptian Government stopped employing workers in the public sector and government institutions. Therefore, Egyptian workers tend heavily to travel abroad in order to find suitable jobs. Those immigrant workers performed huge amounts of money transfers to their families in Egypt, especially during the periods of crises. Consequently, it becomes convincing to examine the relationship between workers' remittance and economic performance in the Egyptian economy.

In Egypt, it is clearly noted that the political and economic conditions have widely changed during the last thirty years which sharply affected the overall economy and the performance of the Egyptian savings in a volatile manner. Moreover, Egyptian Workers' Remittances witnessed volatility and sharp increase through this era. Egyptian workers' remittances flows increased from $4.05 billion in 1990 to $7.9 billion in 2011 and to reach its highest and historical record to become $26.8 billion in June 2019. Finally, it reached $29.6 billion in June 2020.

It is noted that a very limited number of research papers dealt with this topic in case of Egyptian economy. Therefore, the literature of this topic is in need to more research to be conducted within this context. Several gaps are existed in the literature of this topic for the Egyptian case such as describing and analyzing development happened in the workers' remittance during the period 1990 until 2020. In addition, testing the impact of workers' remittance on GDP growth rate in Egypt through this period of time is also missed. Of course, the door is open towards this research paper to provide a crucial contribution on this topic in Egypt.

This topic is considered so demanding for further research, especially in the aftermath of two revolutions with all its impacted fluctuations on the economic performance in general and on the

workers' remittance in specific. This suggests the importance of examining the relationship between economic growth and workers' remittances in Egypt based on the economic fluctuations that the economy is facing which represents the core motive behind this research.

Research Importance:

During the period 1990 until 2020, the Egyptian economy and its workers' remittance have witnessed crucial developments and fluctuations. The Egyptian Government stopped employing workers in the public sector and government institutions. Therefore, Egyptian workers tend heavily to travel abroad in order to find suitable jobs. Those immigrant workers performed huge amounts of money transfers to their families in Egypt, especially during the periods of crises.

Consequently, it becomes convincing to examine the relationship between workers' remittance and economic performance in the Egyptian economy. Of course, the door is open towards this research paper to provide a crucial contribution on this topic in Egypt. On this regard, examining the relationship between economic growth and workers' remittances has become a crucial issue during the last thirty years.

Research Objectives:

The paper aims to investigate the impact of workers' remittance on Economic growth in Egypt using annual data for the period from 1990 to 2020. In addition, the paper tries to check the relevance of the empirical outcomes to the theoretical assumptions of a causal relationship between workers' remittance development and economic growth. Moreover, it will provide policy recommendations to the Egyptian policymakers for more development in both workers' remittance and policies related to economic growth.

Research Questions:

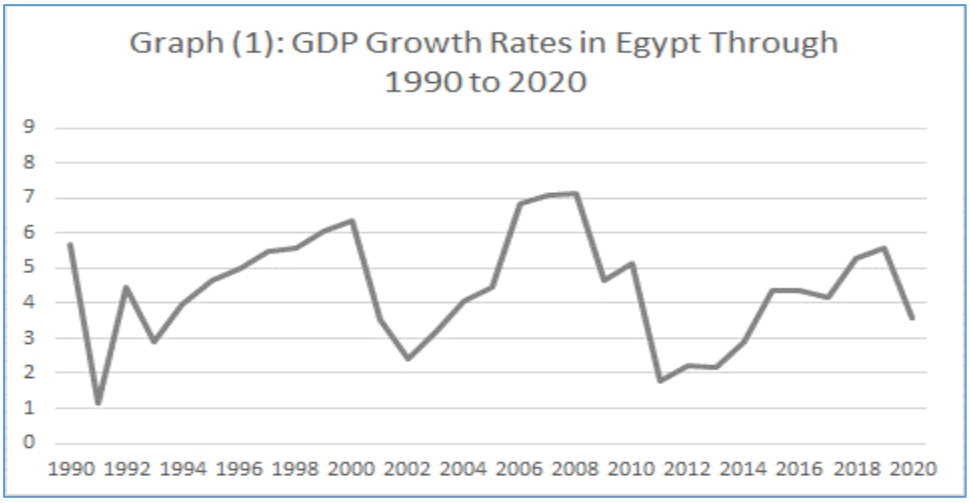
The paper is targeting to ask important questions related to the causal relationship between workers' remittance and economic growth in the Egyptian Economy during the period 1990 to 2020. The research will answer the following main questions;

What is the causal relationship between workers' remittance and economic growth in the Egyptian economy during the period 1990 to 2020? What are the main developments in the Egyptian workers' remittance sector appeared during the period 1990 to 2020? What are the main policy

recommendation that can be submitted to the Egyptian officials to achieve more benefits from this causal relationship?

Discovering the Relationship in Egypt:

According to the economic performance, it is noted that the economic growth in the Egyptian Economy passed through the coming three stages that can be shown in the following graph (1)[1]:



Source: World Bank Data Base

Phase 1: The Period 1990 to 2010: High and Speed economic growth rates:

Two economic measures have been crucial to Egypt's economic progress throughout this time period. First, the government increased the contribution of the private sector to the economy and the market-oriented economic system, allowing the private sector to play a larger role and partially liberalizing the trade sector and the exchange rate regime. Second, a sharp rise in unexpected profits from the privatization program, the travel and tourism sector, and proceeds from Foreign Direct Investment (FDI) increased the country's income. Naturally, the quick increase in tourism profits and worker remittances from outside Egypt allowed the Egyptian government to build up foreign reserves of US dollars, which reached over 36 billion US dollars in 2010.

Consequently, this large international reserves enabled the Egyptian Central Bank to control the exchange rate market. Large windfall revenues did, however, contribute to the GDP's quick

[1] World Bank, Data Base for Egypt in the link:
https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=EG

growth, but they also had a negative impact on the Egyptian Public Budget, where the government's current expenses, which are primarily made up of wages, subsidies, and interest payments, increased even more quickly than its receipts. This caused a persistent increased budget deficit in the Egyptian Budget. The increased and continuous Egyptian Budget Deficit accompanied by the Dutch disease effect caused crucial rises in inflation rates to reach around 12% in 2010 (Khan and Miller, 2016).

As a result, Nazef Government's reform program that started 2004 was created with the goal of transforming Egypt's economy into one that was more market-oriented and driven by the private sector. This was done through extending financial reforms, streamlining rules for business and investment, decreasing tariffs, and privatizing state-owned firms. Egypt's economic growth increased as a result, from 4.5 percent in 2005 to 7.2 percent in 2008. This outcome was much better than the Middle East and North Africa's (MENA) overall growth over the same time period.

Consequently, the Egyptian government was able to create around 2.5 million job opportunities through the period 2005 until 2010. Therefore, unemployment rate declined from 11.5 percent in 2005 to 9.2 percent in 2010[2]. However, unemployment remained high since there exists a fundamental skills mismatch between those who suffer from unemployment and the shills required by the private sector businesses.

Small and medium sized businesses (SMEs), who are primarily responsible for creating jobs, are subject to a variety of financial access constraints and are constrained by laws governing both their establishment and growth. As a result, a sizable portion of the Egyptian population did not gain more economically from the higher growth rates. As a result, a sizable portion of Egyptian youth were compelled to leave the country or labour in the nation's expanding informal and unregulated sectors. Notwithstanding this improvement in the macroeconomic environment from 2005 to 2010, the key structural imbalances in the Egyptian economy had still not been addressed by the end of 2010. They included continuing high rates of teenage unemployment, the concentration of power and capitalism, inadequate infrastructural services, a sizable and ineffective bureaucracy, and growing income and wealth disparities. Last but not least, the upheaval in the public sphere in January 2011 was logical.

[2] The Financial Monthly, the Egyptian Ministry of Finance, January 2011.

Phase 2: 2011 – 2014: Low economic growth rates: The Era of Two Revolutions:

In the aftermath of the collapse of Mubarak regime, the macroeconomic situation has sharply deteriorated. So, economic growth rate averaged around 2.3 percent per year. Moreover, by the end of 2014 the unemployment rate climbed to reach around 12.9 percent[3].

The Egyptian Economy in the Aftermath of January Revolution:

On 11th of February 2011, a transitional government was appointed that ignored the main economic problems. Moreover, it made a number of populist policies in order to control the public and its revolution. Therefore, the transitional government spent more public funds on subsidies and government salaries. Therefore, the fiscal deficit reached around 8.6 percent of gross domestic product (GDP). Consequently, inflation climbed to become two digits to reach 13 percent. Moreover, the external current account deficit climbed to become around $5 billion. In addition, policy makers continued with the same mistake by keeping the value of the Egyptian pound constant against international currencies, especially the US dollar. As a result, the Central Bank of Egypt lost around $20 billion of its international reserves during the era February 2011 and May 2012. Consequently, the tremendous deterioration of international reserves caused the sovereign credit rating of the Egyptian Economy to be downgraded by Moody's Investors Service, Fitch Ratings, and Standard & Poor's.

The Second Transitional Government:

By the end of August 2013, a new Egyptian government took place that achieved some enhancement in the economic situation. The receipt of foreign aid amounted to $12 billion from some Arab Gulf countries has significantly lowered the pressure on the Egyptian balance of payments and exchange rate (Khan and Miller, 2016).

However, in March 2014, this transitional government ended its mission and resigned. Unfortunately, there was no progress with regard to the promised and expected economic recovery. The only positive sign for this government was attracting inflow of funds from the Gulf countries which provided the Egyptian Economy with the budgetary resources that were used in implementing expansionary fiscal policies needed to push economic growth.

[3] The Financial Monthly, the Egyptian Ministry of Finance, January 2015.

Unfortunately, economic recession stayed and GDP growth rate did not exceed 2 percent. Moreover, unemployment rate remained high, and inflation rate stayed at a double-digits number (Khan and Miller, 2016).

Phase 3: 2014 to 2020 The Egyptian Economy under a New Regime:

Starting June 2014, the main economic target was to create around 700,000 job opportunities in order to lower unemployment rate and absorb the new comers into the labour market. Consequently, the Egyptian Economy must achieve continuous economic growth rates amounted around 6 to 7 percent per year to achieve this target (Khan and Miller, 2016).

Therefore, reaching to this level of economic growth requires introducing major economic and institutional reforms. As a result, the Egyptian government has implemented a bold economic reform program that included the introduction of the value-added tax (VAT), and reducing energy subsidies in order to decrease the budget deficit as a percentage of GDP. In November 2016, the Central Bank of Egypt devalued the Egyptian Pound to stop the continuous overvaluation of the Egyptian currency that continued to around five years.

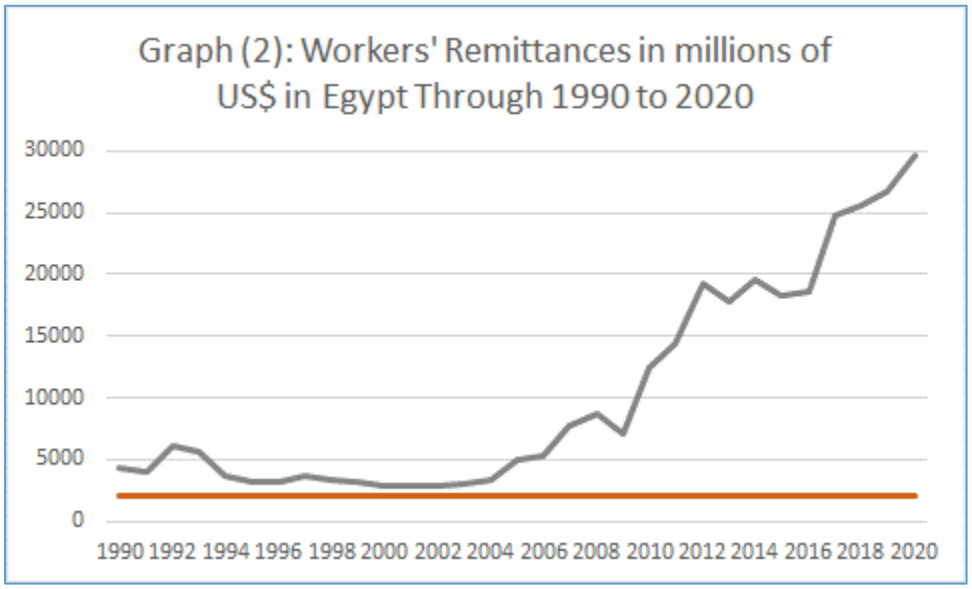
Consequently, the macroeconomic indicators have enhanced in the Egyptian economy, especially during 2017 and 2018, because of these economic reforms. On this road, reducing inflation and unemployment rates, boosting economic growth rates, the sharp increase in international reserves to reach around 45 billion US$ were considered the most significant achievements. It is the first time in the history of the international reserves in Egypt to reach to this historical record. This historical achievement of Egyptian international reserves improves the capacity of the central bank to import commodities. In addition, it gave the incentive to foreign investments to inflow widely inside the Egyptian economic sectors.

A tangible improvement has been showed in macroeconomic indicators in the Egyptian economy through the year 2018. For example, economic growth rate improved from 4.2% to 5.3% during the 2017/2018 fiscal year because of the rise in aggregate investments and several improvements in the infrastructure. As a result, unemployment rate decreased from 12% to 9.9%.

Development of the Egyptian Workers' Remittances Through 1990 to 2020:

Remittances from Egyptian workers have been a major contributor to the country's overall foreign exchange earnings and have continued to play a vital role in the balance of payments. The

following graph (2) shows the development for these remittances through the period 1990 to 2020 in Egyptian Economy[4];



Source: World Bank Data Base

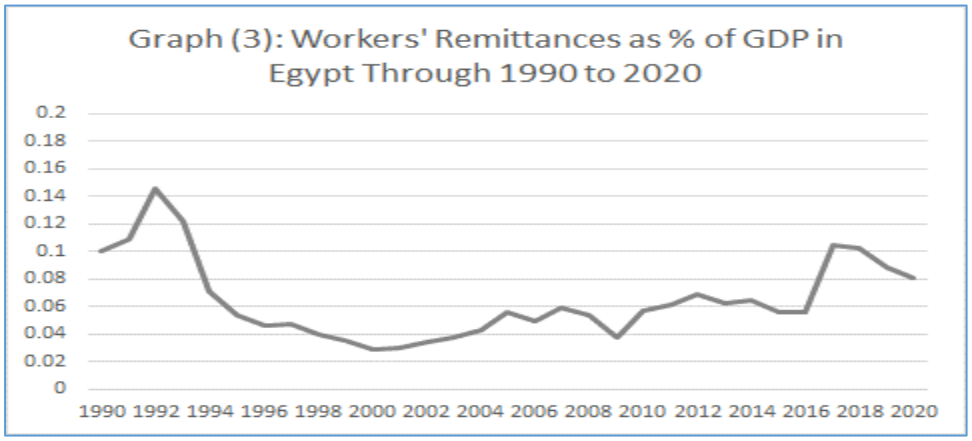
The Egyptian workers' remittances increased significantly in 1991 and 1992 as a result of the developments in the immediate post-Persian Gulf War period, when the Gulf States decided to receive more Egyptian labor. Remittances decreased at an annual rate of 8% between 1991 and 2000 due to the drop in oil prices, falling from $5.66 billion in 1993 to $2.85 billion in 2000. This resulted in a contraction in the employees' remittance to GDP ratio from 12.1% in 1993 to 2.8% in 2000.

In the aftermath of 11th of September 2001, workers' remittance began to increase in 2003, reaching $2.96 billion, and it reached its highest level ($8.7 billion), or 5.34% of GDP, in 2008.

In 2009, employees' remittances fell to $7.15 billion as a result of the consequences of the world financial crisis. Notwithstanding the political unrest in Egypt in January 2011, which caused economic instability and had an impact on all aspects of economic life, worker remittances rose to $7.9 billion by the end of that year. In 2020, Egyptian employees' remittances climbed sharply to reach $29.6 billion as a result of huge transfers from Egyptian immigrants and workers abroad to

[4] World Bank, Data Base, downloaded from the following link: https://data.worldbank.org/indicator/BX.TRF.PWKR.CD.DT?locations=EG

save their families and relatives living inside Egypt and facing the consequences of the deep economic stagflation. Graph 3 illustrates a gradual improvements in workers 'remittances as a percentage of GDP since the start of the third millennium. The sources of remittance flows to Egypt clearly reflect the geographic distribution of the stock of Egyptian migrants abroad. Almost 50% of current Egyptian migrants reside in Saudi Arabia, followed by Kuwait, Libya, and Jordan, which together house another 40% of Egyptian exiles.



Source: World Bank Data Base

Literature Review:

A proper knowledge of the relationship between remittances and growth can assist decision-makers in creating an effective economic strategy. According to the literature about the impacts of remittances on economic growth, there are three different sorts of theoretical conclusions. Some theoretical conclusions include the following: remittances have a beneficial impact on economic growth, others explain negative effects on the economy, and the third is integrating the two conflicting theories to discover no effect or a mixed effect. Remittances have emerged as one of the most significant sources of foreign funding in recent years, second only to foreign direct investment (FDI), particularly for a number of developing nations (Giuliano & Ruiz-Arranz, 2009; Adenutsi, 2011; Rao & Hassan, 2011).

Several studies have tried to determine how remittances affect economic growth and poverty reduction. In their study of 99 countries from 1975 to 2003, Aggarwal et al. (2006) discovered that remittances have a favorable impact on bank deposits and the credit to GDP ratio. Using prior

research demonstrating the beneficial effects of these two variables on economic growth, the study then investigates the positive effect on economic growth.

Remittances and economic growth are found to be positively correlated by Taylor (1992) and Faini (2001). According to Taylor (1999), every dollar that migrants from Mexico send or bring back to their country raises the GDP of Mexico by anywhere between USD 2.69 and USD 3.17.

Spatafora (2005) discovers that there is no connection between remittances and the development of per capita output. Moreover, Chami et al. (2003) found that remittances have a negative impact on economic growth across a sample of 113 nations in one of the more extensive cross-country studies. The study contends that because remittances deter beneficiaries from working, they have a detrimental effect on economic growth. So, the economic situation in countries that receive remittances is made worse by the low productivity of the remaining labour force.

Remittances are said to contribute to the reduction of poverty because the majority of these funds are utilised to sustain the recipient families' incomes, which are frequently low-income households back home. Remittances therefore aid in bridging the income gap in the nation of origin (Admas, 1989; Barham & Boucher, 1998; and Docquier & Rapoport, 2003). Nevertheless, according to Quartey and Blanson (2004), the amount of remittances coming into Ghana grew throughout the economic shocks, which lessened their negative effects on household wellbeing. Also, certain empirical investigations revealed that the remittances have increased both the investment in real estate as well as the spending power for consumer products (Stahl & Habib, 1989; Glytsos, 1993) and (Durand et al, 1996).

Studies concluded positive impact:

Remittances are spent on lavish consumption rather than the accumulating of productive assets, according to some who say that they do not contribute to economic progress (Rahman et al. 2006). (Stahl and Arnold, 1986).

On the other hand, proponents of remittances who believe they have positive effects on growth emphasise the multiplier effects of consumption (Stahl and Arnold, 1986), the development of financial institutions that handle remittance payments (Aggarwal et al. 2006), the use of remittances as foreign exchange (Ratha 2005), and the use of remittances as a substitute for debt that helps people in nations where microfinance is not (Guilamo and Ruiz-Arranz, 2006).

It should be emphasized that several scholars have reported conflicting findings about the relationship between remittances and economic growth. Remittances have a favorable association with economic growth, according to Glytsos' 2005 analysis. Remittances contribute to growth, but the cost of the growth slowdown caused by them is greater. Remittances can strengthen an economy if it is on the rise, but they can also be detrimental if it is on the decline, according to studies by Jackman et al. (2009) that produced similar findings. As a result, a country's economy shouldn't rely too heavily on remittances for revenue.

There is considerable disagreement over the relationship between remittances and economic expansion in the nations that receive them. In addition, not many research have looked at the relationship between remittances and economic growth in the context of Egyptian economy. This research paper tries to contribute to that gap.

Surveying the empirical studies one can find the study of (Stahl and Arnold, 1986) who contend that because remittances are often spent on personal consumption, they could potentially have a favorable impact on growth. Adams (1998) notes that inward remittances, when workers' remittances increase the productive capacity of the economy which enhance demand and boost output growth. According to (Faini, 2002), the prospects for economic growth and the business climate in the home countries of migrants determine how much influence financial flows have on economic expansion. It makes the case that worker remittances act as a buffer against economic and financial crisis to keep consumption levels stable.

Remittances, according to (Rapoport and Docquier, 2006), could have a favorable effect on investments and the creation of human capital because of the liquidity limitations. Remittances typically have a favourable overall impact on the long-term economic success of the origin countries. In (Ang, 2007), it is demonstrated that there is a positive and significant association between workers' remittances and economic growth in the Philippines, with remittances translating into investments and value-added activities that are more fundamental sources of economic development and progress.

Taparia (2005) declares that the boom in remittances involves an excess of bank liquidity in many countries, like Morocco, a trait that might be seen favorably if the banks use these funds to lend loans to small and medium-sized firms more easily. It is not always the case, though; sometimes

banks will choose to purchase Treasury bonds even while they are backing little private businesses. Its influence can more or less be seen depending on the nation's financial progress.

Remittances can be advantageous, according to (Bugamelli and Paterno, 2005), if they lessen the likelihood that foreign investors will abruptly leave developing economies. Additionally, they believe that there is a threshold impact for remittances: if they reach 3% of GDP, they can be viewed as low-cost inflows of foreign currency that provide security to the foreign investors already present in the nation. According to (Sufian, 2009) study, remittances have a beneficial direct and indirect impact on economic growth as a result of interactions with financial and institutional channels.

Remittances also play a significant part in the fight against poverty, as numerous studies such as (Adams, 2004) and (Eken, 2005). Additionally, they discover that remittances are advantageous for economic growth when a portion of the money helps to support the development of "human capital" by covering the costs of youth education and training in these nations.

As a result, it has been observed that remittances in some countries can really help people build up their human capital, which in turn helps the local economy's total factor productivity increase. (Giuilano and Arranz, 2005) note that worker remittances have a favorable effect on economic growth since they make it easier for the poor to access credit and support the growth of the banking sector. Applying panel data on 17 nations in Asia and Pacific during (1993-2003), (Jongwanich, 2007) discovers that remittances have a major effect on reducing poverty. In addition, remittances raises the standard of living for the underprivileged and middle class in their economies.

Studies concluded negative impact:

(Chami et al., 2003) use the World Bank's aggregate panel data for 113 countries through (1970-1998). They examine the factors that contribute to and are affected by worker remittances, and they discover a strong and unfavorable correlation between the rise of remittances and GDP growth. They also come to the conclusion that remittances do not seem to be a substantial source of capital for economic development and that they might rather hinder it due to the so-called "Dutch disease impact" in the economy. Also, 109 developing nations were included in the panel data technique employed by (Emmanuel et al., 2010) during (1990-2003). They discover "Dutch disease" implications of rising remittance levels in these developing nations.

Studies concluded no or mixed impact:

According to several empirical studies, worker remittances either have mixed effects on economic growth or have no effect at all. For example, (Habib and Nourin, 2006) found that worker remittances had a mixed impact on economic growth in some of the East Asian economies. In Thailand, Sri Lanka, India, and Indonesia, they discover a bad correlation between remittances and per-capita GDP growth. Yet, Bangladesh, Pakistan, and the Philippines have positive relationships with it. An OLS using instrumental variables (IV) and fixed effects model is performed by (Adolfo et al., 2009) for a group of 84 recipient nations with annual data through (1970-2004). As a result, they discover that remittances have a negligible impact on the economies of remittance recipients and may even have slowed growth in others. In a research [2005] by the IMF, 101 developing nations were used to analyze this link over a long period of time (1970–2003). Remittances and other factors like education or investment, as well as remittances and per capita production growth, are found to have no statistical relationship. Given the foregoing, we can conclude that, in contrast to FDI and portfolio inflows, the various positive and negative effects of remittances on GDP performance discussed above do not guarantee economic growth.

To sum up, a number of recent studies have begun to focus on the effect of workers' remittances on the economic growth of the receiving country through capital accumulation or other mechanisms. On the one hand, some scholars have established the link between high amounts of remittances and lower poverty and rapid economic growth (Adams and Page 2005; Acosta et al. 2008). Other studies contended that a high level of remittance inflows results in greater investments in human capital, less fluctuation in consumption, and economic stability (Gupta, Patillo and Wagh 2009). Nevertheless other studies have asserted that high levels of remittances may improve the underdeveloped financial system in developing nations by easing lending restrictions, which would have a favorable impact on capital accumulation and economic growth (Woodruff and Zenteno, 2007; Lartey, 2013).

On the other hand, a number of studies have suggested that significant remittance inflows can have negative long-term effects on the recipient nation and result in slower growth rates. Their reasoning is that large amounts of remittances may cause receiving households' labour supply to decline (Amuedo-Dorantes and Pozo, 2006b; Hanson, 2005). As a result, the present paper will investigate

the relationship between worker remittances and economic growth in the Egyptian economy based on the literature's most recent discussion and findings.

Methodology and Data:

The present paper tries to investigate the relationship between Workers' Remittances and GDP growth rates in Egypt. Therefore, the study will follow the econometric analysis conducted by Glytsos (2002) and Abou Elseoud (2014). Based on the methodology proposed by Abou Elseoud (2014) that examined the relation between Egyptian Workers' Remittances and the GDP in US dollars as an empirically observed relationship. Therefore, this study will estimate the relationship between these two variables in the long term using the Ordinary Least Squares (OLS) and Augmented Dickey-Fuller methods in order to estimate the model of one dependent variable (Real GDP growth rate Log GDP) and one independent variable (Workers' Remittances' growth rate Log WR). Also, Unit root tests on both variables will be calculated using the Augmented Dickey-Fuller (ADF) and Phillips–Perron tests techniques. Moreover, the present paper employs co-integration, Vector Error Correction Model (VECM) and Engle – Granger test to investigate this relationship accurately.

Table 1. Summary statistics and correlations

	Log GDP	Log WR
Mean	5.59	4.36
Median	5.62	4.32
Maximum	5.71	4.71
Minimum	5.31	4.13
Std. Dev	0.107	0.158
Skewness	−1.284	0.606
Kurtosis	3.845	2.786
Jarque - Bera test for normality	9.443	1.954
Probability	0.00891	0.00376
Obs.	31	31
Log GDP	1.000	
Log WR	0.018*	1.000

- * Denotes significance at a 95% confidence level.
- Variable definition: Log GDP and Log WR are the logarithmic forms of GDP and workers' remittances in Egypt, respectively.
- Source: Authors' calculations using E-views 12.

Table 1 presents the descriptive statistics as well as the correlation matrix of the data used in the study after logarithmic transformations. As can be seen in Table 1, the measures of the probabilities of Jarque–Bera test for normality which shows that the two variables do not follow a normal

distribution. In addition, looking at the coefficient matrix, a strong positive and statistically significant relationship between these two variables can easily be found.

The motive for this work is clear and straightforward: if there is a positive relationship between these two variables in Egypt, it will provide information on how to increase GDP growth through increasing workers' remittances[5]. Consequently, the study will use annual data through the period 1990 – 2020 collected from the World Bank data base. The data is in constant 2017 US Dollar basis[6]. Following Glytsos (2002) and Abou Elseoud (2014), the study calculated the logarithm for both variables to be used in the econometric analysis. Therefore, (Log GDP) was taken for the Real GDP and (Log WR) was taken for the Workers' Remittances for the whole time series.

The first step in this econometric analysis is to conduct the Augmented Dickey-Fuller (ADF) and Phillips–Perron tests techniques for the group of variables in this study in order to reach to stability and determine the level of integration among these variables.

(ADF) Unit Root Test

The order of integration for a non-stationary time series is examined in this work using the Augmented Dickey-Fuller (ADF) test described in Dickey and Fuller (1979 and 1981). The following equation (1) describes how to perform the ADF test;

$$\Delta Y_t = \Phi . Y_{t-1} + {}^{k}\Sigma_{i=1} \Phi i . \Delta Y_{t-i} + \varepsilon t \qquad (1)$$

Where k is the amount of lags for Yt-i that must be in a level to preserve degrees of freedom and permit the presence of autocorrelation in ε t.

The autoregressive coefficient (α 0) , meanwhile, can be represented through;

$$Y_t = \alpha_0 Y_{t-1} + \varepsilon t$$

And so it can be adjusted to;

$$\Delta Y_t = (\alpha 0 - 1) Y_{t-1} + \varepsilon t$$

Yt is integrated of order 0 if α 0 is smaller than 1. If not, the further test needs to be carried out;

$$\Delta\Delta Y_t = (\alpha t - 1) \Delta Y_{t-1} + \varepsilon t$$

Yt is integrated of order one if α 1 is smaller than 1. As a result, this process is carried out repeatedly until stationarity.

[5] Data for Workers' Remittances in constant 2017 US Dollar is downloaded from the following link : https://data.worldbank.org/indicator/BX.TRF.PWKR.CD?locations=EG

[6] Data for GDP in constant 2017 US Dollar is downloaded from the following link : https://data.worldbank.org/indicator/NY.GDP.MKTP.KD?locations=EG

The current study demonstrates that there is evidence of a unit root in the two variables using E-views 12. ADF test demonstrates that the two variables are non-stationary as a result. Table 2 clarifies results for ADF tests where logarithm of real GDP is (LRGDP), and logarithm of Worker Remittances is (LWR).

Table 2. Augmented Dickey-Fuller (ADF) unit root tests results.

ADF (With trend)	LRGDP	LWR
In Levels	-2.61	-2.13
In First Differences	-3.86**	-5.42**
Critical Values 5% level	-3.57	-3.57
Integration Level	I(1)	I(1)

** Significant at 5% level
Source: Author's estimations using E-views 12 with the same data.

The two model variables, LRGDP and LWR, are obviously integrated of order one (1). In light of this unit root test's demonstration that the two variables are discovered to be of the same order of integration, the paper is sufficiently justified to examine the co-integration test to this model to discover their relationships. In addition, the paper conducts Phillips-Perron (PP) Unit Root Tests to support these findings.

Phillips-Perron (PP) Unit Root Tests

It is crucial to note that the treatment of heteroskedasticity and serial correlation in errors between the Phillips-Perron (PP) unit root tests and the ADF tests appears to be the primary distinction between them. The key benefit of PP tests over ADF tests is that they are more resistant to common types of heteroskedasticity in the error term. Moreover, the PP test regression does not require a lag period to be specified. Regression from the PP test can so take this shape;

$$\Delta Y_t = \beta_0 . D_t + \Phi_i . Y_{t-i} + \varepsilon_t \qquad (2)$$

ε_t is I(0) and could be heteroskedastic in this case. The asymptotic distributions of the PP and ADF tests are identical under the null hypothesis that $\Phi_i = 0$. the PP and ADF tests have the same asymptotic distributions. The article discovered that using E-views 12, PP tests produce the same results as ADF testing. Table 3 represents results for PP tests for the model.

Table 3. Phillips-Perron (PP) unit root tests.

PP (With trend)	LRGDP	LWR
In Levels	-1.35	-2.11
In First Differences	-3.85**	-5.42**
Critical Values 5% level	-3.57	-3.57
Integration Level	I(1)	I(1)

** Significant at 5% level
Source: Author's estimations using E-views 12 with the same data.

Table 3 makes it clear that PP unit root tests guarantee the outcomes of ADF testing. The integration of the two variables is determined to be of order one I(1). The validity of assessing co-integration relationships for this system of variables is established by the light of these findings. There are static long-run equations of order two that are integrated, and it is anticipated that co-integration relationships will be found between the two variables. This indicates that the variables are co-integrated in all bivariate equations. As a result, the findings in Abou Elseoud (2014) indicate that these variables have a long-term association.

Co-integration Test Results

Therefore, the second step is to examine co-integration relationships between the two variables. In case of a bivariate co-integration test, it is highly recommended to use Engle and Granger two steps test (Engle and Granger, 1987). Two hypotheses are tested using this method. The alternative stating co-integration to the null hypothesis of no co-integration. The greatest eigenvalue, the trace statistics, and two likelihood ratio statistics relating to the quantity of co-integration vectors are the results of the test. Additionally, this framework investigates if the GDP growth rate and worker remittances in Egypt have any long-term links.

Estimations in the Long Run

The following Table 4, clarifies that there exists an equilibrium relationship between GDP growth rate and worker remittances in Egypt in the long-run. It is found that the null hypothesis $R = 0$ is rejected which means the existence of long-run relationship between these two variables in Egypt.

Table 4. Results for Co-integration Test (Engle – Granger) between LGDP and LWR

Engle – Granger z-statistic	Value	Probability
-14.738	35.126*	0.0929*

* Long-run Engle - Granger test with one co-integration equation and at 10% level of significance.
Source: Author's estimations with the same data series.

The long-run relationship between these two variables can be illustrated through the following equation (3);

$$\mathbf{LGDP = 5.51 + 0.018\ LWR} \qquad \mathbf{(3)}$$
$$(-2.97) \quad (-1.58)$$

It presents that GDP growth rate (LGDP) is positively affected by changes in worker remittances growth rate (LWR). This long-run equation shows that a 1 percent increase worker remittances growth rate leads to 0.018 percent increase in GDP growth rate in the Egyptian economy; This coefficient is significant; R-square and R-square adjusted are 0.54 and 0.48 respectively.

To illustrate the short-run interactions for this model, the Vector Error Correction Model (VECM) is used to derive the short-run model from the long-run one. This makes it possible for the present paper to discuss how the GDP growth rate responds to changes (or shocks) in the growth rate of worker remittances in the Egyptian economy. Table 5 presents VECM estimates as follows;

Estimating the Relationship in the Short Run

Table 5. VECM estimates between LGDP and LWR.

	LGDP	LWR
Error correction co-integration equation	1	0.1377 (0.127)*
ΔLWR(-2)	0.128 (0.146)	0.130 (0.173)
ΔLGDP (-2)	0.40 (0.399)	0.97 (0.472)
C	0.0129 (0.0169)	
R-square	0.44	
Adj. R-square	0.40	
F-statistic	0.939	0.994
Akaike Information Criteria	-2.459	-2.125

* t-values in parentheses.
Source: Author's estimations with the same data series.

For short-run, table 5 illustrates that a one percent rise in WR growth rate increases GDP growth rate by around 0.1377 percent. In addition, the error correction coefficient is positive and significant = 0.013 which means that 1.3% of the deviations from the long-run equilibrium will be continued in the following years. It is an indication to a so slow adjustment that can be attributed

to the deep recession that the Egyptian economy has faced since 2011. These results assure the long-run analysis.

OLS Estimation for the Model

The fourth and the final step is to calculate the Ordinary Least Squares (OLS) estimates where GDP Growth Rate is the dependent variable and Workers' Remittances is the independent variables. The following table represents the results for OLS estimation;

Table 6. OLS estimates between LGDP and LWR.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLWR	**0.028**	0.133731	0.210328	**0.0435**
C	**-0.010**	0.011115	-0.875533	**0.0388**
R-squared	**0.901842**	Mean dependent var		0.846199
Adjusted R-squared	**0.894035**	S.D. dependent var		6.345868
S.E. of regression	5.070260	Akaike info criterion		5.677646
Sum squared resid	4689.902	Schwarz criterion		5.955512
Log likelihood	-325.0452	Hannan-Quinn criter.		7.129270
F-statistic	4.587655	Durbin-Watson stat		0.476387
Prob(F-statistic)	0.034008			

The findings in table 6 show that the variables have a static long-run relationship. Indicating the positive correlation between the GDP Growth Rate and the Workers' Remittances in the Egyptian Economy, the coefficient of the independent variable is positive (equal to 0.028). Hence, as aggregate demand rises and the value of the expenditure multiplier increases, the remittances of workers have a considerable and direct impact on GDP growth.

Regression analysis shows that a one percent rise in worker remittances growth rate will result in a 0.028 percent increase in Egypt's real GDP growth rate. As a result, worker remittances provide a major contribution (as a source of yearly income) to raising the degree of economic well-being for Egyptian individuals and families. On the other hand, economic growth is a key factor in determining the flow of remittances, with remittances rising when economic activity in the recipient country picks up and falling when things get worse.

The probability values for these coefficients are all less than 0.05 in the final column, and the corresponding R-squared and Adjusted R-squared values are 0.90 and 0.89, respectively, indicating a highly significant long-run positive link between these two variables.

Conclusion:

To sum, the present paper finds that Egypt's economic growth rate over 1990 until 2020 is significantly positively impacted by the Egyptian Workers' Remittances during this period of time.

Of course, this result is applicable with both economic theory and practical practices. For the expansion of Workers' Remittances; private consumption increases. Therefore, it follows the Keynesian theory where expansionary effective demand through the increase in household spending has its positive effect on economic growth through the multiplier effect. The paper finds that, during the period 1990 until 2020, there exists a static short run and long run positive relationship between Workers' Remittances (as an independent variable) and GDP growth rate (as a dependent variable).

In the long-run, the present paper estimates that one percent increase in Workers' Remittances' growth rate causes GDP growth rate to increase by around 0.018 per cent (as expressed in table 4 for the estimates in the long-run). The relationship can be expressed in the long run by the following equation;

GDP Growth Rate = 5.51 + 0.018 Workers' Remittances Growth Rate + Error Term

In the short-run, the paper finds that an increase in Workers' Remittances by one per cent causes an increase in GDP growth rate by 0.14% in the following year (as illustrated in table 5 for the estimates in the short-run).

Policy Recommendations:

Finally, it is better to the Egyptian government to;

- Facilitate the emigration of Egyptian labor force and,
- Attract the workers' remittances transfer to the Egyptian Economy in order to,
- Use these remittances' transfers to boost economic growth and,
- Employ these workers' remittances to expand Small and Medium Enterprises (SMEs) to become the main employer for the labor force in Egypt, especially for the poor and middle class to improve their standards of livings,

- Give incentives to the Egyptians working abroad to transfer their remittances through official financial channels in order to promote international reserves in the Central Bank of Egypt.

References

1. Abou Elseoud, M., (2014) Do Workers' Remittances Matter for the Egyptian Economy? International Journal of Applied Operational Research, Vol. 4, No. 1, 1-26, Winter 2014.
2. Amuado-Dorantes, C., and Pozo, S., (2005). On the Use of Differing Money Transmission Methods by Mexican Immigrants. The International Migration Review. 39(3).
3. Bourdet, Y., and Falck, H. (2006), Emigrants' remittances and Dutch Disease in Cape Verde, International Economic Journal, 20(3).
4. Bryan, R., (2004). Remittances in Armenia: Size, Impacts and Measures to Enhance their Contribution to Development. USAID/Armenia, October 1.
5. Bugamelli, M., Paterno, F., (2005). Do Workers' Remittances Reduce the Probability of Current Account Reversals? World Bank Policy Research Working Paper (3766).
6. Chami, R., Barajas, A., Cosimano, T., Fullenkamp, C., Gapen, M. and Montiel, P., (2008). Macroeconomic Consequences of Remittances. IMF Occasional Paper (259), Washington DC.
7. Chimhowu A., Pinder C., Piesse J., (2003). Assessing the impact of Migrant Workers' Remittances on Poverty. Presented at New Direction in Impact Assessment for Development Methods and Practices. IDPM, University of Manchester, Kings College, London. Institute for Development Policy and Management. Wise Development LTD 24 – 25 November.
8. Dickey, D., Fuller, W., (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. Journal of the American Statistical Association. (74).
9. Dickey, D. A. and W. A. Fuller, Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. Econometrica, 1981. 49 (4), 1057-1072.
10. Dickey, D. A., Jansen, D. W. and D. L. Thornton, A Primer on Co-integration with an Application to Money and Income. Federal Reserve Bank of St. Louis Review, 1991. 73 (2), 58-78.
11. Engle, R. F., Granger, C. W., (1987). Cointegration and Error Correction: Representation. Estimation and Testing. Econometrica. 55(2).

12. Glytsos, N.P., (2005).The Contribution of Remittances to Growth. A Dynamic Approach and Empirical Analysis. Journal of Economic Studies. 32(6).
13. Granger, C. W. J., Some recent developments in a concept of causality. Journal of Econometrics, 1988. vol. 39, pp. 199–211.
14. Hamilton, J. D. (1994). Time series analysis. Princeton University Press: Princeton, New Jersey.
15. Kamaly, A. (2006). Economic Growth Before and After Reform: The Case of Egypt, 1973-2002. International Journal of Applied Econometrics and Quantitative Studies, 3(2), 21-54.
16. Khan, M., & Miller, E. (2016). The Economic Decline of Egypt after the 2011 Uprising. Retrieved from http://www.jstor.org/stable/resrep03663.
17. Kheir-El-Din, H., & Moursi, T. A. (2006). Chapter 7 Sources of Economic Growth and Technical Progress in Egypt: An Aggregate Perspective. In J. B. Nugent & M. H. Pesaran (Eds.), Contributions to Economic Analysis (Vol. 278, pp. 197-236): Elsevier.
18. Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth*. The Quarterly Journal of Economics, 107(2), 407-437.
19. Phillips, P. C. B. & P. Perron. (1988) Testing for a unit root in time series regression, Biometrika, 75, 335- 346.
20. Ratha, D., (2006). Trends, Determinants and Macroeconomic Effects of Remittance. In Global Economics Prospects 2006: Economic Implications of Remittances and Migration, World Bank, Washington, D.C.
21. Senhadji, A. (2000). Sources of Economic Growth: An Extensive Growth Accounting Exercise. IMF Staff Papers, 47(1), 129-157.
22. World Bank, (2006). Global Economics Prospects: Economic Implications of Remittances and Migration 2006. Washington, D.C.

Reports, Database, and Websites:

- Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS), Statistical Yearbook 2020, Labor Division: https://www.capmas.gov.eg/Pages/StaticPages.aspx?page_id=5034.
- Egyptian Ministry of Finance: https://mof.gov.eg/en
- Egyptian National Accounts data: https://mped.gov.eg/Analytics?lang=en
- World Bank, World Development Indicators: https://data.worldbank.org/indicator/