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# Do Workers' Remittances Matter for the Egyptian Economy?

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**Abstract** Workers' remittances constitute one of the most important sources of external finance for many developing countries. Although it shows a decreasing trend in recent years, Egypt after 1970s with her regular and massive labor migration to abroad has been still one of the gainer countries on remittances across the world. Empirical studies that implemented for various countries reveal workers' remittances may have increasing, decreasing or neutral effects on economic growth and other macroeconomic variables. The current study aims at investigating the impact of workers' remittances on the major macroeconomic variables in the Egyptian economy during the period (1991-2011) by employing Cointegration, Error Correction Model and Granger Causality techniques. The main findings show the existence of cointegration between workers' remittances and the macroeconomic variables; also there are unidirectional causality runs from workers' remittances to private capital formation, total exports, total imports, money supply and exchange rate, while there is bidirectional causality between workers' remittances and each of private consumption, government spending, and economic growth. The study suggests that the Egyptian management authorities need to formulate appropriate conducive polices for encouraging Egyptian migrants to hold savings in financial assets in Egypt rather than abroad (or spending their savings on consumer goods); and redirecting remittances to official channels, Facilitating investment opportunities to migrants for self-employment and enterprise creation in Egypt, and using remittances in a way that generates a maximum developmental impact of remittances in Egypt.

**Keywords** Macroeconomics, Works' Remittances, GDP, Cointegration.

## 1 Introduction

Workers' remittances in emerging countries particularly are important source of income for households. It identifies as the third pillar of development whereas their volume is the second to foreign direct investment.

During recent decades, workers' remittances were increasing rapidly and played important role in the development of different countries all over the world. The volume of the world remittances has jumped from $3.6 billion to $514 billion during the time period of 1970 to 2012, while the volume of remittances to developing countries has gone up from $61.6 billion in 1990, to $111.3 billion in 2000 and about $377 billion in 2012. (See table (1) in the appendix)

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Egypt is one of the world's leading labor exporting countries. Until 1971, emigration from Egypt was subject to legal restrictions and limited numbers, especially upon professionals who could migrate permanently to the West. The largest boost to outward flows occurred after the adoption of the 1971 Constitution where "permanent" and "temporary" emigration was authorized; and, especially after the 1973 War, with soaring oil prices and subsequent demand for migrant labor in Gulf countries and Libya. Egypt is currently experiencing what has been called the permanence of temporary migration, whereby migration towards Arab countries is becoming less temporary and outnumbers long term migration to Europe, North America, Australia, and Japan. Recently, a rise in mostly irregular migration to Europe, especially to Italy and France, has also been recorded.

According to the official statistics, 6.5 million Egyptian nationals live abroad, representing approximately 8% of total population. CAMPAS [1]

Egyptian workers' remittances flows increased from $2.696 billion in 1980 to $4.05 billion in 1990 and to $7.9 billion in 2011 which represents 3.4% of GDP. IMF [2]. It reached a maximum value of $8.7 billion in 2008, and a minimum value of $927.6 million in 1977. Although the remittances of Egyptian workers are flows of private capital, they are substantially affected by number of economic and political factors.

The study objective is to measure the direction and volume of remittances and it's the impact on the main macroeconomic variables, by using official data for the study variables.

The study employs two econometric models. The first econometric model examines the short run and long run relationship between workers' remittances and other macroeconomic variables by applying Engel-Granger two steps cointegration test and the associated Error Correction Model (ECM), and the second is the application of the Granger causality test to determine the direction of causality between the study variables

The shortage of studies and research on the current issue has urged and motivated the author to conduct this study. This study may help to shed some light on the extent of the impact of remittances not only on Egypt but also on the other recipient countries. In addition, it would be very useful to professionals in the field of socio-planning together with policy/ decision makers.

The reminder of the study is organized as follows: Section two presents the literature review. Section three overview the Egyptian workers' remittances trends during (1991-2011). Section four outlines the model specification, data, methodology and definitions of the variables. Section five illustrates the empirical results, and the last section concludes the paper with important findings and recommendations.

## 2 Review of Literature

Remittances are defined as current transfers by migrants who are employed in foreign countries to their home country in which their families are residing. Based on the IMF 5$^{th}$ edition Balance of Payments Manual, there are three components generally mentioned as constituting remittances, namely compensation of employees (which is part of the income component of the current account), worker's remittances (which is part of current transfers in the current account), and migrants' transfer (which is part of the capital account). If the migrants have lived in the host country for less than a year, their entire income in the host country should be classified as compensation of employees. Migrants' transfers include financial items that arise from the migration (change of residence) of individuals from one economy to another. IMF [3]

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Bryan R. [4] suggested potential benefits and costs of remittance flows:

- **Potential benefits such as:** Stable source of foreign exchange that ease the foreign exchange constraints and help to finance external debts; potential source of savings and investment for capital formation and development; facilitate investment in children's education and human capital formation; raise standard of living of recipients through increasing consumption; and reduce income inequality and poverty.
- **Potential costs such as:** Ease pressure on governments to implement reforms and reduce external imbalances; reduce savings of recipient families and thus negatively impact on growth and development; reduce labor effort of recipient families and thus negatively affect on growth (moral hazard); "Brain drain" negative impacts on economy that are not fully compensated by remittance transfers; increase income inequality; and finally "Dutch disease" that leads to negative impact on economic growth.

Various theories have been advanced to explain why migrant workers remit part of their incomes to homes countries. Chimhowu et al. [5] notes that there are three schools of thoughts on motivation to remit and these are: risk sharing, altruism motives, and risk sharing with altruism. Risk sharing school of thought explains that a migrant sends funds in order to secure own and family livelihoods in the event of external shock. Altruism school explains one's obligation to the household that is remitting out of affection and responsibility. Lastly, the risk sharing with altruism adds the self – interest to the livelihoods.

Workers' remittances, normally in foreign currencies, are channeled through either formal financial institutions like banks, post offices, foreign exchange bureaus and money transfer agencies (Western Union, Money-Gram), or other informal means convenient to the migrants and their families. FEMIP Trust Fund[6]. Hence, remittances reportedly enhance domestic economies' foreign exchange reserves in the national accounts of balance of payment. Chami et al.[7]. Formal remittances are registered by the Central Bank or other national institutions and can also obtained through the IMF balance of payments Statistic publications and other country reports; while informal remittances are not. Informal means are attractive to many immigrants because they are accessible (no bank account needs to be opened, and no complex bureaucratic procedures are needed), anonymous (no proof of identity is required), cheap, swift and reliable. However, at a more collective level, there are disadvantages associated with using informal channels such as: it hinders valuable data collection, increases the risk of misuse of remittances for money laundering and financing of illegal activities, among them terrorism; and diminishes the development impact of remittances. Laura [8]

Amuedo-Dorantes and Pozo [9] suggest a number of independent variables that may determine the choice of remittance channels, such as the amount of remittances, the migrant's documentation status, his age, his gender, his education level, his occupational sector, the time he has spent in country of residence, the extent of his networks of family and friends in country of residence, the degree of rurality of the remittance-receiving household, and the intended use of remittances.

Accordingly, if workers expect that the higher the amount of remittances, they more likely use banks, where the transaction costs on a personal check do not depend on the check amount. Also more educated migrants, migrants with more work experience and with wider networks of family and friends in their country of residence are more likely to use banks, as they are likely to understand the banking system and to hold a bank account. In contrast, banks to be less likely used when migrants are undocumented or older. In addition, using unofficial channels and MTFs is more likely when migrants remit to more rural areas where

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banks may not be available. On the other hand banks transfers are more likely used, if remittances are sent to home country for savings or investment purposes.

The literature survey revealed that migration has mixed effects on the economic conditions in the receiving country. The debate over the economic impact of migration and remittances are far from over. The most visible effects are summarized in the following points:

**2.1 Remittances impact on macroeconomic stability**

The large size of remittances relative to other external flows and to GDP in many countries suggests that their macroeconomic effects may be of critical importance in some economies. In particular, it has been argued that an important beneficial feature of these flows is that they tend to be more stable than private capital flows, which exhibit considerable volatility and herd-like behavior, and may also be countercyclical to economic conditions in the recipient country. In a broader sense, they can therefore be viewed as a self insurance mechanism for developing countries through enabling them to diversify their sources of external finance. This is especially true where the economic cycles of the host country and country of origin are relatively decoupled and the levels of economic and political risk have a low correlation. According to Ahmed [10] and Yang [11] studies, they provide evidence that remittances increase due macroeconomic shocks and that it helps to smooth consumption and also contribute to the stability of recipient economies by compensating for foreign exchange losses.

Shivani and Tineke [12] focus on the evolution of size and contribution of remittances in the trade balance, analyze its impact on the local economy in developing countries, and highlight the flow of remittances through official channels registered. The study shows that remittances flow to some countries suffered from instability and difficulties faced by the determinants of foreign exchange and foreign trade relations, also they note that the bulk of remittances go to domestic consumption and investment.

Bugameli and Parteno [13] analyze empirically the relationship between workers' remittances and the current account reversals and conclude that workers' remittances help to reduce the probability of financial crisis. They find that the high level of workers' remittances in terms of GDP(more than 3% of GDP) reduce the probability of sharp current account reversals trigger by an increase in external debt or decrease in the stock of international reserve.

Glytsos [14] uses data for (1969-1998) of Egypt, Greece, Jordan, Morocco, and Portugal; he finds that the impact of remittances on output varies over time and across countries. For Egypt, Jordan, and Morocco the growth-generating capacity of rising remittances characteristic was smaller than the growth-destroying capacity of falling remittances. Therefore the large fluctuations in the real value of remittances contribute to large fluctuations of output growth and cause instability in the economies concerned.

Chami et al [15] provide more empirical evidence that an increase in workers' remittances to GDP ratio of 1% leads to a reduction of 0.16 % in the standard deviation of GDP growth. They suggest that countries with high workers' remittances to GDP ratios experience significantly lower economic volatility than they would in the absence of remittances. Ratha [16] argues that remittances used for investment purposes are "Pro-cyclical", which means that it responds to dramatic economic changes in the recipient country like other investment flows. He concludes that the volatility of remittances is lower than private capital inflows and official flows.

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## 2.2 Remittances impact on economic growth

An appropriate understanding of remittance and growth relationship can help policy makers to design a suitable economic policy. There are three types of theoretical models used in literature to study the effects of remittances on economic growth. These theoretical strands are: those arguing that remittances have a positive impact on the economic growth, those explaining negative effects on the economy and then the other combining the above two competing arguments.

### 2.2.1 The positive effects of remittances on economic growth

Workers' remittances have positive effects on the growth of their home country through the following:

- The transmitted funds can feed the productive investment, and that in two manners: *first*, if these funds are deposited in banks or in local institutions of savings, by increasing the financial resources of these institutions for granting the credit to the companies or for short or long term loans granted by non banking financial institutions to companies or households; *second*, when the families of the emigrated workers encounter difficulties of credit rationing, the remittances enable them to circumvent these difficulties and are able to finance their needs for consumption or their capital expenditures. Of course, in order this effect takes place, it is necessary that the families that receive these funds, be incited to do that. In the study of Stahl and Arnold [17] they argue that remittances have possible multiplier effect due to spending on consumption purposes; therefore, they may have positive effect on growth. Adams [18] observes that inward remittances have positive impact on domestic savings, economic investment, and enhance economic growth, where workers' remittances serve a dual role in recipient countries, both enhancing the productive capacity of the economy and generating greater demand. Faini [19] observes that the impact of financial flows on economic growth depends on growth prospects and the investment climate in migrant home countries. He argues that worker remittances serve as a means to counter financial stocks such as crops failures and adverse trading and to maintain consumption levels. Rapoport and Docquier [20] argue that due to the liquidity constraints, remittances could affect investments and human capital formation. Therefore, remittances tend to have an overall positive effect on origin countries' long-run economic performance. Ang [21] shows the relationship between workers' remittances and economic growth in Philippines. He finds that remittances influence economic growth positively and significantly, where remittances translated to value-added activities and investments which are more foundational sources of development and growth.
- The remittances can also contribute to develop the financing capacities of the financial system, in the home economy, in particular in its banking component; and we know, as it has been shown in numerous endogenous growth models, that the enhancing of the financial system in developing or emerging countries is an important factor of growth. the study of Taparia [22] shows that, in the case of several countries like Morocco, the surge of the remittances involves a sur-liquidity of the banks, a characteristic which can be regarded as favorable if the banks use these funds to lend more easily credits to small and medium-sized enterprises; however, it is not always

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the case, banks preferring to buy Treasury bonds in spite of financing small private companies. This effect is thus more or less pronounced according to the degree of financial development already reached in the country. In particular, Bugamelli and Paterno [23] underline that remittances can have a beneficial effect if they reduce the probability that foreign investors suddenly flee out of emerging markets or developing economies; they consider that there is a threshold effect of remittances: if remittances are over 3% of GDP, they can be considered as cheap inflows of foreign currencies which gives guarantees to the foreign investors present in the country. In (2009) Sufian [24] reports the positive direct and indirect impact of remittances on the economic growth, through their interactions with financial and institutional channels. With the regression of panel data for 7 MENA countries during the period (1975-2006). Moreover he finds significant positive effect of remittances on per capita income growth rate in MENA countries. Gyan et.al [25] and Ravshanber [26] find the same results, when they adopted the fixed effect and random effect approaches for the panel data of a sample of 39 developing countries for the period (1980-2004).and 10 selected countries from Asia and the South Caucasus respectively.

- Another important role of remittances is their contribution to fight positively against poverty as many studies show, like Adams [27] or Eken [28] , and they are also favorable to the economic development when part of these funds contributes, in the families of the emigrated workers, to support the building of "human capital" while allowing to pay expenditure for education and training for the young people living in these families. Thus, one could note, in certain countries, that remittances can actually contribute to the accumulation of human capital, and then to the growth of total factor productivity of the local economy. Giuilano and Arranz [29] observe that worker remittances have positive impact on economic growth because they facilitated credit access among the poor and aid in the development of the financial sector. In the study of Jongwanich [30] using panel data for 17 countries in the Asian and Pacific region for the period (1993-2003). He finds that the remittances may have indirect impact on economic growth through household credit availability, also he finds that remittances have significant influence on poverty reduction and increase standard of living.

#### 2.2.2 The negative impacts of remittances on economic growth

These negative effects can be gathered and analyzed around three analytical topics:

- First: the mechanical monetary consequences of the entry of foreign currencies in a low developed country open to the movements of capital (through their effects on the exchange rate of the local currency and on the domestic price level);
- Second: the uses of these incomes either within the family of the migrant worker (ostentatious consumption expenditure), or by the worker himself who chooses to spend his savings through land acquisitions or real estate investment;
- Third: the effect of the remittances can be also negative in terms of incentives to not-work (or to less work) among the members of the family remained in home country or to encourage them (and also some neighbors) for a new wave of emigration.

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Chami et al [31] use the World Bank aggregate panel data for 113 countries for the period (1970-1998). They analyze the causes and effects of workers' remittances, and they find a negative and significant relationship between the growth of remittances and the GDP growth rate. They also find that remittances differ greatly from private flows in terms of motivation and their effects and they conclude that remittances do not appear to be significant source of capital for economic development, and it could also decrease economic growth through a Dutch disease effect.

Emmanuel et al [32] use unbalanced panel data set comprising 109 developing and transition countries for the period (1990-2003). They find "Dutch disease" effects of rising levels of remittances in these emerging economies.

Some empirical studies found that the remittances either have mixed effects or have no effects on economic growth such as:

Habib and Nourin [33] observe that the impact of worker remittances on economic growth are mixed in South and South East Asian economies. They find that there is negative relationship between migrant remittance and per-capita GDP growth in Thailand, Srilanka, India and Indonesia, whereas this relationship is positive in Bangladesh, Pakistan and Philippines. Adolfo et al. [34] run regression analysis of OLS with instrumental variables (IV) and fixed effects model for the sample of data comprising 84 recipient countries with annual observations for the years (1970-2004), they find that remittances have contributed little to the economic growth in remittance receiving economies and may have retarded growth in some.

In a study conducted by IMF [35] about the impact of remittances on growth over an extended period (1970-2003) for 101 developing countries finds no statistical link between remittances and per capita output growth, or between remittances and other variables such as education or investment rates. However, this inconclusive result attributed to measurement difficulties arising from the fact that remittances may behave countercyclical with respect to growth.

From the above, we can say the different positive or negative effects of remittances on macroeconomic performance analyzed above show that these specific financial funds, contrary to FDI and portfolio inflows, do not insure economic growth.

### 2.3 Remittances impact on investment

Since workers' remittances are so large, many researchers feel that how migrants spend their remittance earnings will have an important development effect on local economies. But the question of how migrants spend their remittance earnings is a topic of much lively debate. Some studies claim that migrants spend most of their remittances on consumption goods (such as food and consumer goods), and that such patterns of expenditure tend to have little positive development effect on local economies. However, other studies find that migrants spend their remittance earnings on investment goods (like education, housing and business), and that these patterns of expenditure help to build human and physical capital. For example, remittance inspired expenditures on education can help to create the type of human capital that is often seen as an important condition for accelerating economic growth. Similar patterns of remittance-inspired expenditure on housing can create both better living conditions for migrants and new income and new employment opportunities for local people who are working in construction sector.

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In the study of Glytsos [36] he uses Greek household survey to analyze the remittances effects on consumption, production, imports, employment and capital formation. His findings indicate that remittances increase the living standards of individual by spending on consumption goods, education, health and leisure , also the remittances benefits are felt in the all community through the multiplier effects. Chami et al [37] report three "stylized facts": (a) a significant proportion, and often the majority of remittances are spend on consumption that is "status-oriented"; (b) a smaller part of remittance funds goes into saving or investment; and (c) the way in which remittances are typically invested – in housing, land and jewelry-are not necessarily productive to the economy as a whole. However, these pessimistic findings are challenged by Adams et al. [38] who use household data from Ghana. Focusing on how households spend at the margin, they find that households receiving remittances do not spend more at the margin on food and consumer goods than households that receive no remittances. In addition migrant households treat remittance income just like income from any other source, and these households do not spend more–or less–at the margin on consumption or investment than households with no remittances.

Using data from El Salvador, Edwards and Ureta [39] identify a more positive role of remittances. Specifically, they find that households receiving remittances do spend more at the margin on education. Comparing how income from remittances and income from other sources affect school attendance. Moreover, they find that remittance income has a much larger positive impact on school retention rates than income from other sources. In urban areas of ElSalvador the average level of remittances lowers the hazard that a child will drop out of elementary school by 54%.

Yang [40] analyzes how exchange rate shocks during the 1997 Asian financial crisis affect the expenditure patterns of households receiving international remittances. Since he has panel data from before and after the 1997 crisis, he analyzes how different types of exchange rate shocks – positive and negative – affect changes in the expenditure patterns of households receiving remittances. Focusing on changes in household spending on education, he finds that a one-standard deviation increase in the exchange rate leads to a 0.4%increase at the margin in household expenditure on education. He concludes that the remittance-inspired increases in spending on education can help to build human capital in the Philippines at large.

Several studies find that migrants tend to spend more on housing. For example, in a study in Nigeria, Osili [41] finds that older migrants and those with higher incomes are more likely to invest in housing. At the mean, a 10% increase in migrants' income increases the probability of investing in housing by 3% points. From the standpoint of the migrant, these remittance expenditures on housing represent an important form of local investment.

On the issue of remittances and business investment, Woodruff and Zenteno [42] find that international migration (Mexico-to-US) is associated with a large (35% to 40%) increase in the level of capital investment. Specifically, they find that, through remittances, migrant households in Mexico were able to obtain the capital needed to grow and expand their micro-enterprises (those with fewer than 15 employees).

Finally, in a more theoretical study, Osili [43] examines the extent to which remittances to Nigeria and savings in Nigeria are influenced by altruism vs. insurance motives. he finds that remittances to Nigeria are motivated by altruism because remittances increase as the family's asset holdings (landholdings) at home declines. However, savings in Nigeria are dominated more by investment motives because savings at home are positively associated with family assets.

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On the whole, it is possible that migrant households-just like non-migrant households-spend a large portion of their incomes on consumption (food and consumer goods). However, identifying the conditions under which migrant households spend more at the margin on investment goods (like education, housing and business), and the impact of these investments on local economic development, remains an important topic of inquiry.

**2.4 Remittances impact on real exchange rate**

Remittance inflows effects on the recipient country's real exchange rate are one of the most potential macroeconomic effects of remittances. The existing studies are based on Dutch diseases theory which was first coined in 1977 (in reference to the decline in the manufacturing sector in the Netherlands after the discovery of a large natural gas field in 1959). It is a phenomenon that arises when exploitation in the exporting of natural resources leads to an appreciation in the value of the currency of a country thus making its exports less competitive internationally. An increase in the revenues from natural resources pushes up the value of a nation's currency compared with other countries. This directly impacts the trade balance of that country as exports seem comparatively more expensive and thus less competitive. Out of all the sectors this has the greatest impact on the manufacturing sector. Dutch Disease is usually beneficial in the short-run as it provides a country with substantial amounts of income arising from its new found natural resources. However, in the long-run the economy usually suffers as the focus on the production of these natural resources leaves the rest of the economy, especially the manufacturing sector, much weaker. After these resources run out, the country is left with a very uncompetitive and unproductive manufacturing sector, and thus it has no way to generate export revenue. The economy will then almost certainly undergo a recession, generally leaving it weaker and less productive than before it began to exploit its natural resources.

In the study of Nemat [44] about the economic consequences of the Egyptian foreign exchange windfall , trade shocks and Dutch disease in the Egyptian Economy, she finds that, Egypt experienced a number of different trade shocks during the late 1970s that coincided with a partial liberalization program, where the increase in foreign exchange revenues associated with four sources: sharp increase in petroleum prices , increase tourism revenues, increase the remittances of migrant labor working in the oil exporting countries, and reopening of the Suez Canal after the 1973 war that provided the government a steady supply of foreign exchange that amounted to approximately 10% of total export earnings. She concludes that the prices indices provide strong evidence of the existence of Dutch Disease and construction boom effects in Egypt. Relative price movements indicated a rise in the price of non-tradable relative to tradable and they shown an increase in the price of non-tradable capital goods relative to other prices during the windfall period. This is evident in both the data of output prices and wages. Capital and labor movements also indicated fairly classic Dutch Disease effects with the non-tradable sectors gaining relative to tradable. The construction sector experienced some of the most extreme shifts with a doubling of investment and employment alongside a fourfold increase in prices. There also emerged a parallel market for construction materials and a widespread deterioration in building standards to save on costs.

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Amuedo-Dorantes and Pozo [45] use panel data of 13 Latin American Caribbean countries to study the impact of workers' remittances on the real exchange rate in receiving countries. They control other factors that might influence the exchange rate and findings indicate that workers' remittances have potential to appreciate the real exchange rate in the receiving countries thereby reducing the competitiveness of imported goods in the international economy. They find that transfers doubled in the form of remittances as result of appreciation real exchange rate by 22%. They argue that the situation is similar to Dutch Disease or Resource Boom Models where resource discoveries result in real exchange rate appreciation and the subsequent shift of resources from the traded to non-traded sectors of the economy.

Rajan and Subramanian [46] use a sample of 15 countries during 1990s and they find that higher remittance receipts do not associate with slower growth in manufacturing with higher labor intensity or greater export orientation, and it has not adverse affects on country's competitiveness. IMF [47] and Ratha [48] contend that remittances tend to be relatively stable, unlike other natural resources windfalls and other cyclical flows, the Dutch Disease effects of remittances should be less of concern. Governments in countries receiving large remittances could allocate a larger portion of government expenditures on infrastructure and also practice more liberal trade policies; both these measures would tend to increase exports and also contribute to improved labor productivity and competitiveness. Bourdet and Falck [49] confirm that an increase in remittance receipts associated with appreciation of exchange rate. However, they find that, the higher the level of official aid, the larger would be the depreciative effect of an increase in remittances and vice versa.

### 2.5 Remittances impact on inflation

Remittances effect on inflation can be viewed from three different perspectives: namely, from the points of view of appreciating exchange rates, increasing money supply, and balance of payments. The rising level of remittances in developing economies can have expenditure effect. This can trigger a rise in the price level of non-tradable. The Salter-Swan-Corden-Dornbusch paradigm offers an avenue for understanding the theoretical relationship among capital inflows (in our case, remittances), the price level, and the real exchange rate in developing economies. The model shows that if remittances increase, it could cause real exchange rate appreciation via rising domestic prices. More importantly, the extent of the effect of rising level of remittances on domestic prices will depend on the country's exchange rate regime.

Elbadawi and Rocha [50] use panel data to analyze the flows of workers remittances in six labor exporting countries of North Africa and Europe, they conclude that remittances have a significant effect on inflation. They argue that the influence of inflation is indirect because it discourages investment and this leads to less remittances flows into the receiving countries. Similar evidence is provided by Katseli and Glytsos [51] find that remittances are negatively related to inflation in the receiving country. Obstfeld and Rogoff [52] contend that a positive transfer of resources to country erodes its competitiveness in the global market because transfers lead to an appreciation of the real exchange rate, and means that resource transfers generate inflation.

Ghosh [53] reviews several studies and he concludes that the increase in land prices and construction costs in remittances receiving communities was quite common as found in Egypt, Greece, Pakistan, Yemen and several Caribbean countries.

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Acosta et al. [54] develop a micro-founded dynamic stochastic general equilibrium model that explains the increasing price level when remittance is high. They consider the following transmission mechanism: an increase in the household income (due to remittances) results in a decrease in the labor supply, shrinking labor supply is associated with higher wages in terms of the price of the tradable output, this in turn leads to higher production costs, contributing to a further contraction of the tradable sector. Therefore both the real exchange rate and the ratio of tradable to non-tradable output induce high spending and resource movement. This can potentially lead to increase inflation.

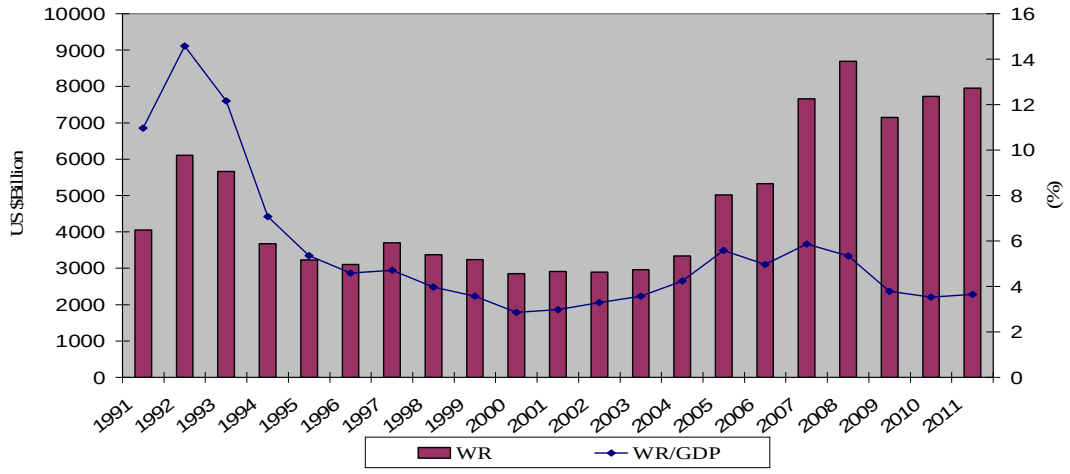
The relationship between remittances and inflation can also be looked at from the point of view of the balance of payments and foreign reserves accumulation, as follows. Remittances can also be a source of balance-of-payments surplus and international reserves accumulation. Failure of central banks to fully sterilize the increase in international reserves will lead to an increase in the monetary base. This will result in further appreciation of the exchange rate. As a result, there will be an upward pressure on prices. Bugamelli and Paterno [55]

It is clear from previous discussion that, the economic impact of workers' remittances are widely debated issue and the volume of remittances is important for both sending and receiving countries. Several empirical studies tries to measure the impact of workers' remittance flows on one or two macroeconomic variables only, and they utilize cross country data, but they do not try to test the causality relation and its direction between workers' remittance and several macroeconomic variables at the same time particularly to Egypt. This reflects the importance of the current study that attempt to measure the causality and its direction (if any) among Egyptian remittances and macroeconomic variables in Egypt during the period (1991-2011).

## 3 Trends of remittance in Egypt: An Overview

Egyptian labor migration started in the beginning of the seventies of the last century, especially to Persian Gulf countries, Libya and to a lesser degree to Lebanon and Jordan. Outside the Middle East, Egyptians migrated to USA, Europe, Canada, Australia, and Japan. Emigration to oil-producing countries is always "temporary" as residency laws in these countries deny permanent residency to emigrants. Egyptian emigrants who seek permanent residency abroad have no choice but to go to countries where such residency is permissible, in particular to Australia, European countries, and Canada. However, given that labor markets in these countries are highly competitive, only skilled emigrants are able to emigrate to them and receive residency privileges. Essentially, this is a form of the "Brain Drain" from which Egypt has been suffering. By contrast, most of the Egyptian workers who immigrate to oil countries in the region are less skilled and of lower educational levels, including teachers and clerical and construction workers. All those are temporary migrants,(*where they have a target level of savings that they seek to achieve and then return to Egypt with those savings*).

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Source: IMF,Balance of Payment Statistics Yearbook& International Financial Statistics: Various issues

**Fig. 1** Egyptian worker's remittance trend during (1991-2011)

Workers' remittances in Egypt continued to be a significant component of balance of payments and have made tremendous contribution towards overall foreign exchange earnings of the country. The inflow of workers' remittances in Egypt was widely fluctuating over the study period, as shown in Figure (1), where workers' remittances increased greatly in 1991 and 1992, as a result of the developments in the immediate post-Persian-Gulf War period, when the Persian Gulf states decided to replace large numbers of Jordanians, Palestinians, Sudanese, and Yemeni workers with Egyptian labor. The fall of oil prices after 1993 contributed to decline remittance at a rate of 8% annually over the period 1991-2000, where it declined from $5.66 billion in 1993 to $2.85 billion in 2000; this led to decrease the workers' remittance to GDP ratio from 12.1% in 1993 to 2.8% in 2000. After the 11$^{th}$ of September events, the workers' remittance started to rise to $2.96 billion in 2003, and it reached a maximum value ($8.7billion) in 2008, which represented 5.34% of GDP. In 2009 workers' remittance decreased to $7.15 billion due to the global financial crises effects. Despite of the political events that happened in Egypt during January 2011, which led to economic instability and it reflected on all forms of economic life, the workers' remittances increased to $7.9 billion by the end of 2011

The geographic distribution of the stock of Egyptian migrants abroad is reflected vividly in the sources of remittance flows to Egypt. Saudi Arabia hosts almost 50% of current Egyptian migrants closely followed Kuwait, Libya and Jordon which together host another 40% of the Egyptian migrants. CAMPAS [56] Among the stock of Egyptian migrants the reside in non-Arab countries, 78.6% of them are concentrated within five industrialized countries USA (318,000 or 38.6%), Canada (110,000 or 13.3%), Italy (90,000 or 10.9%), Australia (70,000 or 8.5%) and Greece (60,000 or 7.3%).The remaining of the Egyptian migrants are mainly in western European countries including UK, Netherland, France, Germany, Switzerland, Austria and Spain.

Table (2) presents the relative importance of workers' remittances on balance of payments, which is the one of the main resources of national economy and income for large number of families in Egypt. Until 1994, the remittance flows had exceeded the value of Egyptian exports of goods. Starting from this year (with the exception of 1998), the proportion of remittances to Egyptian exports has continuously declined, reaching its lowest level in 2008, which corresponded to 32.6% of total exports. Currently remittances represent almost 37% of Egyptian exports, and about 16% of imports. The ratio of remittances to private consumption

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represents almost 6%, 23%, 38%, 23% and 1.5% of private investment, government spending, national savings and (M2) respectively.

The previous analysis reveals that workers' remittances are vital to the Egyptian economy. Therefore, policy makers must deal with remittances with extreme caution in order to ensure the stability of the foreign exchange market and the Egyptian pound.

## 4 Econometric model and Methodology

### 4.1 Data

The study will use time series data for testing the relationship between workers' remittances and the major macroeconomic variables in Egypt. The included variables in this study are: workers' remittances, Gross Domestic Product (GDP), private consumption, private investment in physical capital formation, government spending, total exports, total imports, money supply (M2), and exchange rate. The data for the period (1991-2011) are taken from the world Banks, World Development indicators, IMF balance of payment statistics yearbook, the World Economic Outlook database, and Central Bank of Egypt annual reports. The variables are in real terms (2000=100), and transformed into log form at the stage of model specification in order to smooth out the data after it transferred from Egyptian pound to US dollar. The description of variables will be as follow:

| | |
|---|---|
| $LWr_t$ | Log of workers' remittance in US$ million |
| $LGDP_t$ | Log of Gross Domestic product in US$ million |
| $LCx_t$ | Log of private consumption in US$ million |
| $LIx_t$ | Log of private investment (gross capital formation) in US$ million |
| $LGx_t$ | Log of government spending in US$ million |
| LXt | Log of total exports in US$ million |
| LImt | Log of total imports in US$ million |
| LM2 | Log of boarder definition of money supply(domestic liquidity) in US$ million |
| $LEXr_t$ | Log of Exchange rate US$ / L.E |

### 4.2 Methodology

The study adopted the econometric approach to estimate ratios and relations of trends of workers' remittances and the macroeconomic variable in Egypt by employing the following:

- Analyzing the time series to determine the order of integration;
- Investigating the long run relationship between the workers' remittance and each one of the macroeconomic variables in Egypt; and
- Investigating the existence of cointegration between the time series that indicates the existence of a causality relationship at least in one direction on the short and long runs.

The developments in the time series econometrics over the time revealed that most of the time series were not stationary and if time series are not stationary, then the use of the OLS method to analyze such data is not appropriate. Thomas [57]. Most of the time series were trended over time and relation among these series might produce significant results with high $R^2$, these results were termed as spurious or meaningless Granger and Newbold [58]. Dickey and Fuller [59] formulated regressions in which the time series are expressed in first differences to resolve the problem of spurious results. It was assumed in this approach that non-stationary

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data could be converted into stationary series by taking differences repeatedly, by adopting Augmented Dickey-Fuller unit root test (ADF). The ADF statistics in the test is negative numbers. The more negative it is, the stronger the rejection of the hypothesis that there is a unit roots at certain level of confidences. Green [60]

If variables are integrated of the same order i.e. I (1), the Engel-Granger two steps test approach (that based on residuals) will be applied to test the cointegration. Cointegration technique explains that an individual data series may move without specified pattern but when this series is paired with another series, the pairs tend to move together over time and show relationship among them. Gonzalo [61]. When the variables are cointegrated its long run relationship will be estimated via ordinary least square (OLS) method. The Vector Error Correction Model (VECM) will be applied for estimating the short run adjustment towards long-run equilibrium. The Error correction model is based upon the Granger theorem, which states that if time series are cointegrated, the series exhibit long run relationship among them. Engle and Granger [62]. If the Error Correction Terms i.e. ($g_1$, $g_2$) are negative and statistically significant, there will be mutual causality relationship between each two variables, while if one of the error correction terms is statistically significant, there will be unidirectional causality. Granger Causality analysis will be carried out in order to assess whether there is any potential predictability power of one variable for the other.

**4.3 Models specification and expected signs**

For the purpose of the study, a very simple linear macroeconometric model would be appropriate. According to the empirical studies that discussed in section two, we assume that all macroeconomic variables are function of workers' remittance holding other factors constant. We can test the causality between each two variables on both short and long runs by estimating the following equations using (OLS) regression method:

- $LCxt = a_0 + a_1 LWrt + g_1 et\text{-}_1 + vt$ (1)
- $LWrt = B_0 + B_1 LCxt + g_2 et\text{-}_1 + ut$ (2)
- $LIxt = a_0 + a_1 LWrt + g_1 et\text{-}_1 + vt$ (3)
- $LWrt = B_0 + B_1 LIxt + g_2 et\text{-}_1 + ut$ (4)
- $LGxt = a_0 + a_1 LWrt + g1\ et\text{-}1 + vt$ (5)
- $LWrt = B_0 + B_1 LGxt + g_2 et\text{-}_1 + ut$ (6)
- $LXt = a_0 + a_1 LWrt + g_1 et\text{-}_1 + vt$ (7)
- $LWrt = B_0 + B_1 LXt + g_2 et\text{-}_1 + ut$ (8)
- $LImt = a_0 + a_1 LWrt + g_1 et\text{-}_1 + vt$ (9)
- $LWrt = B_0 + B_1 LImt + g_2 et\text{-}_1 + ut$ (10)
- $LM2 = a_0 + a_1 LWrt + g_1 et\text{-}_1 + vt$ (11)
- $LWrt = B_0 + B_1 LM2 + g_2 et\text{-}1 + ut$ (12)
- $LExrt = a_0 + a_1 LWrt + g_1 et\text{-}_1 + vt$ (13)
- $LWrt = B_0 + B_1 LEXrt + g_2 et\text{-}_1 + ut$ (14)
- $LGDPt = a_0 + a_1 LWrt + g_1 et\text{-}_1 + vt$ (15)
- $LWrt = B_0 + B_1 LGDPt + g_2 et\text{-}_1 + ut$ (16)

According to empirical studies, we predict workers' remittances may positively affect consumption, investment, money supply, government spending, and imports, while it may negatively affect exports, and exchange rate. In addition, it may affect GDP growth positively or negatively as suggested by theory and existing literature. Therefore, it is difficult to predict the exact sign of the coefficient of log(Wrt) in advance.

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## 5 Empirical results

Augmented Dickey-Fuller (ADF) unit root test employs to find out the order of integration of the series in the study. The stationary of these series determined by the presence of a unit root; the results presented in Table (3), which shows that variables are non-stationary with respect to level and stationary with respect to first difference. Which means all variables are integrated of order one I (1). Although the time series tend to deviate from equilibrium in the short run, they may have long run equilibrium. Having confirmed the stationarity of the variables at 1(1), we proceed to examine the presence or non-presence of cointegration among the study variables by using Engle and Granger two steps test. Table (4) shows the outcome of regression of the two equations for each model and the ADF test for the residuals obtained from regression. The results imply that ADF calculated for residuals is greater than the critical values for ADF statistics (which equals to 3.67), this indicates that the residuals are free of unit roots and cointegrated of degree zero I (0). This means that there exist cointegration between workers' remittance and each variable; therefore, it would be causality relationship at least in one direction between them. In the other hand, table (4) shows that, the increase in workers' remittance will increase private consumption, capital formation, government spending, imports, money supply, exchange rate and economic growth, while it declines the Egyptian total exports.

Following the Granger representation theorem, the Error Correction Model is applied to test the short run adjustment towards long run equilibrium (Engle and Granger, 1987), as well as to test for causality between variables. The results of ECM estimate shown in table (5) shows that the ECM coefficient is negative and significant in several models. The value of error terms ($g_1$,$g_2$) indicates the speed of adjustment of any disequilibrium towards long run equilibrium, for example, the estimated coefficients of the ECM in WR equation in model (1) is 18% showing a slow speed of adjustment from the previous year to the long run equilibrium. The estimated outcomes of the long-run and short-run coefficients reveal the positive role of worker remittances on all macroeconomic variables, except total exports. The significant error term in several models provides more evidence for the existence of cointegration between workers' remittances and the macroeconomic variables. Moreover, the results indicate the existence of unidirectional causality running from workers' remittances to capital formation, total exports, total imports, money supply and exchange rate, while there is bidirectional causality between workers' remittances and each of private consumption, government spending, and economic growth in Egypt during the study period.

The Granger causality test helps to determine the direction of causality between each two variables included in the model. The Granger causality test uses the first differences of variables involved in each model, and excluding the Error Correction Term ($e_{t-1}$) from each two equations. Table (6) presents the results of the Granger Causality test. The outcomes of the Granger Causality tests with lags by two periods confirm with results that worker remittances have significant impact on the macroeconomics variables. From Tables (5) and (6) we conclude the following:

- There is a positive bidirectional causality between workers' remittances and private consumption, where the increase in workers' remittances by one unit lead to increase private consumption (0.75) unit, also the increase in private consumption by one unit due to raising the standard of living and increasing inflation rates lead to increase the value of remittances but at lower rate (0.51) unit.

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- There is a positive unidirectional causality running from workers' remittances to private capital formation, where the increases in workers' remittances by one unit lead to increase the capital formation during the study period by (0.46) unit. Workers' remittances increase the private capital formation, because it is considered as one of the most important sources of income that finance investment projects, particularly in the construction sector in Egypt, which relies heavily on external remittances. This result is consistent with several empirical studies such as: International Organization for Migration survey in 2010.
- There is a positive bidirectional causality between workers' remittances and government spending, where the increase in workers' remittances lead to increase the government spending, and vice versa. Increasing the flow of remittances will increase the volume of deposits in banks, whether local or foreign currency, that will help to increase credits granted to the public and private sectors, and it will help the Egyptian government to borrow from local banks through selling treasury bills (T.B) to finance spending on public projects. In the other hand, increasing the government spending on infrastructure projects and public utilities, especially in the new cities will motivate the migrants to increase the flow of remittances from abroad to purchase land and apartments in these cities. The impact of increasing remittances on government spending is greater than the impact of increasing government spending on remittances, this shown in regression results where increasing the remittances by one unit will increase government spending by (0.16) unit, while increasing the government spending by one unit would increase the flow of remittances by (0.03) unit.
- There is a negative unidirectional causality running from workers' remittances to total exports. The direction and nature of the relation is consistent with the concept of economic theory, where the increasing workers' remittances lead to reduce the total exports due to increasing private consumption expenditure on local products that produced for export purposes. Where Egyptian producers for exports prefer to market their products locally because they achieve greater profits rather than export to foreign markets, especially for the goods and services which have high export ratio such as: building materials, cement, electrical appliances, clothing and others. Since high percentage of remittances is spent on purchasing land and construction of buildings or of machinery and durable goods; this would reduce the exports of such goods destined for export. This means that any increase in remittances by one unit would reduce the total exports by (0.06).
- There is a positive unidirectional causality running from workers' remittances to total imports, where increasing workers' remittances lead to raise the total imports. The causality indicates that any increase in workers remittances due to increase private consumption of imported goods and services will generate an increase in imports of Egypt, especially luxury goods and services; thereby negatively affect economic development. According to regression results the increase in the flow of workers' remittances by one unit would increase the total imports in Egypt by (0.09) unit.
- There is a positive unidirectional causality running from workers' remittances to money supply in Egypt. Increasing the flow of remittances will increase the foreign assets in the Egyptian banking system and improve the liquidity of commercial banks and raise its cash reserves, thereby increasing their lending and granting more credit and consequent eventually increasing the money supply through money multiplier. According to the CBE annual reports the increasing in workers' remittances by 16.53% annually on average during the period(1991-2011) was one of the most important sources that led to increase

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the domestic liquidity, aggregate deposit, total deposits in local currency, and total deposits in foreign currency by 22.2%, 20.4%, 23.6%, and 16.5%. Respectively. (CBE, 2011).The regression results show that the increase in the flow of workers' remittances by one unit would increase money supply by (1.31) unit.

- There is positive unidirectional causality running from workers' remittances to exchange rate. According to the lack of flexibility in the Egyptian domestic market supply, particularly in the markets of durables goods that lead to raise imports from abroad to meet the additional local demand that funded by workers' remittances. The increasing in the volume of imports would increase the demand for foreign currency, and it creates a shortage in foreign exchange market, despite the CBE attempted to control the exchange rate by increasing foreign currency supply during the study periods, this led to increase the exchange rate of foreign currency against the Egyptian pound. The exchange rate of US$ against Egyptian pound reached to 6.03LE for $1 by the end of 2011 compared with 3.3 LE in 1991 and 3.4 LE in 2000. This result is contrast with what we expect (where the increase in remittances in the form of foreign currencies would lead to increase the supply of foreign currencies(in particular US dollar) and decrease the exchange rate of the dollar against the pound). The regression results show that the increase in the flow of workers' remittances by one unit would increase the exchange rate by (0.08) unit.
- There is positive bidirectional causality between workers' remittances and economic growth rate. The workers' remittances have significant and direct impact on the GDP growth, due to increasing aggregate demand and the value of expenditure multiplier. According to regression results the increase in the flow of workers' remittances by one unit would increase the real GDP in Egypt by (0.18) unit. Therefore, workers' remittances significantly contribute (as a yearly income resource) to improve the level of economic well-being at the level of the individual and families in Egypt. In the other hand, the economic growth is very important determinant to the flow of remittances, where remittances increase when economic activity in the home country accelerates and they decrease when economic conditions deteriorate. According to CBE [63] annual reports, the growth rate in 2004 was 7.8% led to an increase in remittances by 12.8% while in year 2011 the economic growth was 3.8% led to increase in remittances by 7.2%.This suggests that remittances may respond to investment opportunities and the business and political climate in Egypt as much as to altruistic and insurance consideration. It also implies that the flows may not as important to smooth fluctuations or shocks in the economy as commonly believed. The regression results show that when GDP growth increases by one unit the flow of workers' remittances would increase by (0.39) unit.

## 6 Conclusions and recommendations

The study attempted to investigate the relationship between workers' remittance and the main macroeconomic variables in Egypt during the period (1991-2011). The study methodology is based on econometrics analytical approach by adopting Cointegration, Error Correction Model and Granger Causality techniques. Study concludes there is unidirectional causality running from workers' remittances to capital formation, total exports, total imports, money supply and exchange rate, while there is bidirectional causality between workers' remittances and each of private consumption, government spending, and economic growth. The results are consistent with the concepts of economic theory and several empirical studies. Accordingly, Egyptian policy makers should aims at achieving the following goals:

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- Encourage Egyptian migrants to hold savings in financial assets in Egypt rather than abroad (or spending their savings on consumer goods); and redirecting remittances to official channels.
- Facilitate investment opportunities to migrants for self-employment and enterprise creation in Egypt, and
- Use remittances in a way that generates a maximum developmental impact of remittances in Egypt

In order to achieve these goals, the Egyptian policy makers could apply the following suggestions:

1. **Improve the payment systems in Egypt** : Payment systems in Egypt need to be improved and links with migration countries, need to be strengthened in order to reduce transactions costs, foster the transmission of remittance funds through Formal channels, and thereby augment the potential developmental impact of remittance flows. The proposed reform implies harmonizing standards, and payment instructions and services, and strengthens outreach with the aim to facilitate the inclusion of the mass public in the Egypt into convenient low cost payment facilities. The establishment of mass consumer payment service infrastructures in Egypt should be promoted and supported by the authorities and donors. The authorities should be actively involved in setting payment standards and services through national payment councils, and governments and donors need to coordinate to ensure financial and technical support for the development of more efficient payment systems and inter-operability of cross border payment systems.
2. **Offer migrant oriented banking and investment services:** banking system is an effective way for channeling remittances into productive investments. Johanssen[64] Developing Egyptian banking services specifically targeted at migrants may prove very successful in attracting remittance funds to the banking sector. For example, Egyptian banks could develop financing packages for migrants wishing to buy or build property in their home country, and design savings accounts for migrants for specific purposes—such as building a home, paying for school fees, or for supporting a business. Banks could also set up investment funds or issue bonds directly targeting migrant groups for investment projects in Egypt.
3. **Encourage Egyptian banks to alliances**: when Egyptian banks take the remittance seriously, it should learn the importance of building alliances to leverage local expertise and combine distribution networks to reduce the cost of their operations. Alliances could also be strengthened by including Micro Finance Institutions (MFIs) that have a good presence in the rural areas where migrants originate from or by linking banking services to post offices, when the later have a dominant network.
4. **Improve migrant access to bank accounts via simple ID card**: migrant access to several Egyptian banks is proving to be a problem in Egypt. Migrants, often young migrants, have an irregular status (they may be illegal or have an expired visa) and consequently do not have an ID that allows them to open a bank account. For remittance transfers through MTOs this is less of a problem due to the lighter verification regime.

5. **Use of new technologies:** New technologies i.e. (telephone or internet transfers) can lead to lower transaction costs and reduce processing times and to be strong inducement for remitting funds. Therefore the Egyptian government banks and communication companies should to start developing migrant remittance services
6. **Use remittance flows for securitizing Egyptian capital market instruments**: Egyptian government banks that receive substantial amounts of remittance flows should be

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encouraged to structure remittance backed bonds, where the securitization of bonds through remittance flows has a number of distinct advantages such as, it tends to lower the cost of borrowing for issuing banks and helps mobilize additional foreign savings for on lending in Egypt. There is therefore an opportunity to use remittance receipts indirectly to strengthen Egyptian bank access to finance at lower cost for productive investments.

7. **Training schemes for migrants**: Egyptian government could offer special training schemes for Egyptian migrants to open small businesses when they return back to Egypt. In addition to offer special import privileges and premium interest rates on remittance funds. These have been met with varying degrees of success in several developing countries and could be envisaged to complement other instruments described above.
8. **Capital controls**: it can deter remittance flows, particularly those may be intended for investments in Egypt. Thus, removal of such controls could provide an incentive for Egyptian migrants to remit additional funds.
9. **Use attractive investment policies such as:** new policies aimed at equating between Egyptian migrants and foreign investors in case they invest and open new projects in Egypt; and creating foreign currency portfolios to invest deposits of migrants**.**

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## Appendix

**Table 1** Workers' remittances flow to developing countries (1970-2012)

| | 1970 | 1980 | 1990 | 2000 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| World($ billion) | 3.6 | 43.4 | 101 | 154.6 | 449 | 483 | 514 |
| Developing countries ($ billion) | 1.9 | 31.21 | 61.6 | 111.3 | 325 | 351 | 377 |
| Mean WR across developing countries and time ($ billion) | 0.23 | 0.65 | 1.67 | 1.89 | 2.08 | 2.25 | 2.42 |
| Maximum WR across developing countries and time ($ billion) | 0.54 | 7.5 | 15 | 27 | 45 | 55 | 70 |
| Cross country Standard deviation | 8.7 | 8.4 | 7 | 6.6 | 6.8 | 7.1 | 7.3 |

Source: IMF Balance of Payments Yearbook and World Bank staff estimates. [65], [66]

**Table 2** Importance of remittances in Egypt during (1991-2011)
**(%)**

| Years | WR/X | WR/IM | WR/I | WR/C | WR/G | WR/M2 | WR/NS |
|---|---|---|---|---|---|---|---|
| 1991 | 95.3 | 35.48 | 63.42 | 15.88 | 110.66 | 4.17 | 29.57 |
| 1992 | 157.3 | 60.71 | 115.94 | 26.75 | 183.07 | 5.46 | 43.63 |
| 1993 | 152.04 | 52.79 | 89.75 | 21.94 | 149.59 | 4.49 | 56.08 |
| 1994 | 110.01 | 34.48 | 49.28 | 13.06 | 87.64 | 2.59 | 32.46 |
| 1995 | 65.07 | 25.18 | 35.47 | 9.83 | 65.47 | 2.05 | 24.04 |
| 1996 | 67.41 | 22.02 | 28.07 | 6.53 | 50.23 | 1.83 | 22.03 |
| 1997 | 69.16 | 23.75 | 28.75 | 8.08 | 54.72 | 2.02 | 25.99 |
| 1998 | 65.71 | 19.94 | 23.11 | 6.64 | 45.86 | 1.71 | 21.58 |
| 1999 | 72.78 | 19.02 | 21.99 | 5.92 | 41.84 | 1.53 | 19.03 |
| 2000 | 44.64 | 15.96 | 18.81 | 4.67 | 32.74 | 1.25 | 15.63 |
| 2001 | 41.13 | 17.70 | 20.79 | 5.07 | 29.73 | 1.25 | 16.74 |
| 2002 | 40.62 | 19.76 | 24.69 | 5.52 | 32.25 | 1.07 | 17.40 |
| 2003 | 36.08 | 19.97 | 25.57 | 5.95 | 34.78 | 0.93 | 18.75 |
| 2004 | 31.96 | 18.27 | 25.82 | 6.32 | 37.68 | 0.93 | 17.86 |
| 2005 | 36.27 | 20.73 | 36.25 | 9.47 | 58.14 | 1.24 | 26.35 |
| 2006 | 28.87 | 17.50 | 28.69 | 8.66 | 56.84 | 1.18 | 24.33 |
| 2007 | 34.77 | 19.98 | 25.89 | 7.45 | 47.64 | 1.44 | 25.98 |
| 2008 | 29.61 | 16.47 | 30.14 | 9.42 | 62.35 | 1.45 | 23.27 |
| 2009 | 28.40 | 14.20 | 26.65 | 7.08 | 46.89 | 1.10 | 22.51 |
| 2010 | 32.35 | 15.76 | 23.47 | 6.16 | 41.06 | 1.09 | 20.18 |
| 2011 | 37.16 | 15.68 | 22.72 | 5.91 | 37.80 | 1.04 | 23.28 |

**Where:** C: Households Consumption, G: government spending, I: Investment, X: Exports, IM: Imports, NS: National Savings, M2: Money supply.
**Source:** Calculated by researcher from IMF, Balance of Payment Statistics Yearbook& International Financial Statistics: Various issue

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**Table 3 ADF** Unit Root test

| Variables | Level | | 1st difference | |
|---|---|---|---|---|
| | Intercept | Intercept &Trends | Intercept | Intercept &Trends |
| $LWr_t$ | -1.35(1) | -1.94(3) | -3.56*(2) | -4.82*(3) |
| $LGDP_t$ | -1.84(0) | -2.14(1) | -3.42*(3) | -3.95*(4) |
| $LCx_t$ | -2.08(2) | -2.19(1) | -5.14*(0) | -6.67*(2) |
| $LIx_t$ | -1.98(3) | -2.43(2) | -3.49*(1) | -4.02*(3) |
| $LGx_t$ | -0.851(2) | -0.96(1) | -3.42*(3) | -3.51*(1) |
| LXt | -1.07(4) | -1.26(3) | -3.02*(1) | -3.52*(3) |
| LImt | -1.46(3) | -1.71(2) | -3.41*(3) | -3.64*(4) |
| LM2 | -1.58(4) | -2.01(3) | -3.64*(1) | -3.98*(2) |
| $LEXr_t$ | -1.37(4) | -1.86(2) | -4.22*(4) | -4.92*(1) |

* Source: Researcher's estimation using SPSS

**ADF critical values at level are: -4.071 at 1%, -3.464 at 5% and -3.158 at 10%. While ADF critical values at first differences are: -2.727 at 1%,-1.964 at 5% and -1.627 at 10%

***The numbers in parentheses are the lags used for the tests, which are augmented up to a maximum of 4 lags. The choice of optimum n lag was decided on the basis of minimizing the Schwarz information criterion.

**Table 4** Engle and Granger two-step Cointegration test

| Equation | $a_0$ | $LWr_t$ | $LCx_t$ | $LIx_t$ | $LGx_t$ | LXt | LImt | LM2 | $LEXr_t$ | $LGDP_t$ | $R^2$ | ADF Stat. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | 6.4 | 1.13 | | | | | | | | | 0.516 | 3.78 |
| | (0.78) | (3.34) | | | | | | | | | | |
| (2) | 0.86 | | 0.54 | | | | | | | | | 4.02 |
| | (1.23) | | (2.12) | | | | | | | | | |
| (3) | 2.5 | 0.43 | | | | | | | | | 0.546 | 3.98 |
| | (1.07) | (4.01) | | | | | | | | | | |
| (4) | 2.1 | | | 0.16 | | | | | | | | 3.72 |
| | (3.45) | | | (1.91) | | | | | | | | |
| (6) | 2.2 | | | | 0.27 | | | | | | | 3.82 |
| | (3.18) | | | | (2.12) | | | | | | | |
| (5) | 1.8 | 0.48 | | | | | | | | | 0.472 | 4.1 |
| | (0.54) | (3.12) | | | | | | | | | | |
| (8) | -2.4 | | | | | -0.39 | | | | | | 3.98 |
| | (1.04) | | | | | (1.62) | | | | | | |
| (7) | -6.03 | -0.71 | | | | | | | | | 0.701 | 3.75 |
| | (-2.18) | (2.67) | | | | | | | | | | |
| (10) | 2.14 | | | | | | 0.11 | | | | | 3.84 |
| | (4.68) | | | | | | (6.8) | | | | | |
| (9) | 6.7 | 1.05 | | | | | | | | | 0.711 | 3.68 |
| | (1.4) | (3.8) | | | | | | | | | | |
| (12) | 1.56 | | | | | | | 0.25 | | | | 3.72 |
| | (1.56) | | | | | | | (1.96) | | | | |
| (11) | 2.5 | 1.4 | | | | | | | | | 0.589 | 4.11 |
| | (2.71) | (5.2) | | | | | | | | | | |
| (14) | 5.9 | | | | | | | | 0.09 | | | 4.01 |
| | (0.38) | | | | | | | | (1.41) | | | |
| (13) | 2.9 | 0.13 | | | | | | | | | 0.295 | 4.12 |
| | (5.14) | (2.82) | | | | | | | | | | |
| (16) | 1.87 | | | | | | | | | 0.015 | | 4.09 |
| | (3.15) | | | | | | | | | (4.3) | | |
| (15) | 2.3 | 0.29 | | | | | | | | | 0.496 | 3.89 |
| | (0.429) | (4.32) | | | | | | | | | | |

*95% critical values for ADF statistics=3.67 **values in brackets are t-ratio

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**Table 5** Results of VECM

| Regression Equation | $LWr_t$ | $LCx_t$ | $LIx_t$ | $LGx_t$ | LXt | LImt | LM2 | $LEXr_t$ | $LGDP_t$ |
|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | | | | | | | | | |
| a0 | 0.64 | 4.9 | | | | | | | |
| | (1.15) | (1.08) | | | | | | | |
| g1 | -0.18 | | | | | | | | |
| | (-2.13)* | | | | | | | | |
| g2 | | -0.12 | | | | | | | |
| | | (-2.32)* | | | | | | | |
| LWrt-1 | 0.46 | 0.75 | | | | | | | |
| | (4.41)* | (2.47)* | | | | | | | |
| LWrt-2 | 0.16 | 0.63 | | | | | | | |
| | (1.2) | (1.87) | | | | | | | |
| LCxt-1 | 0.51 | 0.54 | | | | | | | |
| | (2.5)* | (2.21)* | | | | | | | |
| LCxt-2 | 0.34 | 0.16 | | | | | | | |
| | (0.76) | (0.73) | | | | | | | |
| F-stat | 3.34* | 5.14* | | | | | | | |
| **Model 2** | | | | | | | | | |
| a0 | 1.95 | | 1.96 | | | | | | |
| | (2.45)* | | (1.07) | | | | | | |
| g1 | -0.29 | | | | | | | | |
| | (-2.82)* | | | | | | | | |
| g2 | | | -0.23 | | | | | | |
| | | | (-1.57) | | | | | | |
| LWrt-1 | 1.1 | | 0.46 | | | | | | |
| | (3.36)* | | (3.76)* | | | | | | |
| LWrt-2 | 0.87 | | 0.43 | | | | | | |
| | (1.23) | | (1.43) | | | | | | |
| LIxt-1 | 0.18 | | 0.34 | | | | | | |
| | (0.81) | | (2.18)* | | | | | | |
| LIxt-2 | 0.15 | | 0.26 | | | | | | |
| | (0.65) | | (1.67) | | | | | | |
| F-stat | 1.16 | | 4.12* | | | | | | |
| **Model 3** | | | | | | | | | |
| a0 | 1.6 | | | 0.97 | | | | | |
| | (1.26) | | | (1.34) | | | | | |
| g1 | -0.42 | | | | | | | | |
| | (-2.36)* | | | | | | | | |
| g2 | | | | -0.11 | | | | | |
| | | | | (-2.12)* | | | | | |
| LWrt-1 | 0.35 | | | 0.16 | | | | | |
| | (2.45)* | | | (2.65)* | | | | | |
| LWrt-2 | 0.21 | | | 0.05 | | | | | |
| | (1.1) | | | (0.87) | | | | | |
| LGxt-1 | 0.03 | | | 0.19 | | | | | |
| | (2.10)* | | | (2.18)* | | | | | |
| LGxt-2 | 0.01 | | | 0.12 | | | | | |
| | (1.23) | | | (0.98) | | | | | |
| F-stat | 3.16* | | | 3.42* | | | | | |
| **Model 4** | | | | | | | | | |
| a0 | 2.98 | | | | 1.27 | | | | |
| | (1.75)* | | | | (1.12) | | | | |
| g1 | -0.46 | | | | | | | | |

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| Regression Equation | $LWr_t$ | $LCx_t$ | $LIx_t$ | $LGx_t$ | LXt | LImt | LM2 | $LEXr_t$ | $LGDP_t$ |
|---|---|---|---|---|---|---|---|---|---|
| | (-2.54)* | | | | | | | | |
| g2 | | | | | -0.15 | | | | |
| | | | | | (-1.02) | | | | |
| LWrt-1 | 0.12 | | | | -0.06 | | | | |
| | (1.96)* | | | | (-2.29)* | | | | |
| LWrt-2 | 0.08 | | | | -0.04 | | | | |
| | (1.56) | | | | (-1.38) | | | | |
| LXt-1 | -0.26 | | | | 0.17 | | | | |
| | (-1.43) | | | | (2.35)* | | | | |
| LXt-2 | -0.19 | | | | 0.13 | | | | |
| | (-1.25) | | | | (0.65) | | | | |
| F-stat | 1.25 | | | | 6.12* | | | | |
| **Model 5** | | | | | | | | | |
| a0 | 2.11 | | | | | 5.8 | | | |
| | (3.86)* | | | | | (1.3) | | | |
| g1 | -.36 | | | | | | | | |
| | (-2.74)* | | | | | | | | |
| g2 | | | | | | -.19 | | | |
| | | | | | | (-1.19) | | | |
| LWrt-1 | 0.18 | | | | | 0.09 | | | |
| | (2.01)* | | | | | (2.06)* | | | |
| LWrt-2 | 0.14 | | | | | 0.12 | | | |
| | (1.38) | | | | | (1.62) | | | |
| LImt-1 | 0.05 | | | | | 0.17 | | | |
| | (1.39) | | | | | (1.98)* | | | |
| LImt-2 | 0.02 | | | | | 0.12 | | | |
| | (0.82) | | | | | (1.29) | | | |
| F-stat | 0.89 | | | | | 4.23* | | | |
| **Model 6** | | | | | | | | | |
| a0 | 1.43 | | | | | | 2.1 | | |
| | (1.49) | | | | | | (2.98)* | | |
| g1 | -0.36 | | | | | | | | |
| | (-2.64)* | | | | | | | | |
| g2 | | | | | | | -0.35 | | |
| | | | | | | | (-1.56) | | |
| LWrt-1 | 0.41 | | | | | | 1.31 | | |
| | (1.94)* | | | | | | (2.41)* | | |
| LWrt-2 | 0.32 | | | | | | 0.21 | | |
| | (1.65) | | | | | | (1.56) | | |
| L M2t-1 | 0.07 | | | | | | 0.14 | | |
| | (1.29) | | | | | | (1.89)* | | |
| L M2t-2 | 0.03 | | | | | | 0.17 | | |
| | (0.59) | | | | | | (1.05) | | |
| F-stat | 1.16 | | | | | | 5.61* | | |
| **Model 7** | | | | | | | | | |
| a0 | 1.78 | | | | | | | 2.67 | |
| | (1.45) | | | | | | | (1.79)* | |
| g1 | -0.46 | | | | | | | | |
| | (-2.46)* | | | | | | | | |
| g2 | | | | | | | | -0.19 | |
| | | | | | | | | (-1.45) | |
| LWrt-1 | 0.15 | | | | | | | 0.08 | |
| | (1.85)* | | | | | | | (1.78)* | |

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| Regression Equation | $LWr_t$ | $LCx_t$ | $LIx_t$ | $LGx_t$ | LXt | LImt | LM2 | $LEXr_t$ | $LGDP_t$ |
|---|---|---|---|---|---|---|---|---|---|
| LWrt-2 | 0.08 | | | | | | | 0.02 | |
| | (0.98) | | | | | | | (1.63) | |
| LEXt-1 | 0.31 | | | | | | | 1.14 | |
| | (1.13) | | | | | | | (2.34)* | |
| LEXt-2 | 0.25 | | | | | | | 1.23 | |
| | (0.59) | | | | | | | (1.35)* | |
| F-stat | 1.95 | | | | | | | 6.01* | |
| **Model 8** | | | | | | | | | |
| a0 | 1.65 | | | | | | | | 2.1 |
| | (2.39)* | | | | | | | | (1.05) |
| g1 | -0.12 | | | | | | | | |
| | (-2.15)* | | | | | | | | |
| g2 | | | | | | | | | -0.22 |
| | | | | | | | | | (-2.36)* |
| LWrt-1 | 0.03 | | | | | | | | 0.18 |
| | (0.734) | | | | | | | | (2.6)* |
| LWrt-2 | 0.97 | | | | | | | | 2.27 |
| | (5.8)* | | | | | | | | (1.44) |
| LGDPt-1 | 0.39 | | | | | | | | 1.26 |
| | (2.09)* | | | | | | | | (5.3)* |
| LGDPt-2 | 0.27 | | | | | | | | 0.28 |
| | (0.43) | | | | | | | | (1.06) |
| F-stat | 2.98* | | | | | | | | 4.13* |

*significant at 5%&10%, Values in brackets are t-ratio

**Table 6** Pairwise Granger Causality Test

| Causes Effects | $LWr_t$ | $LCx_t$ | $LIx_t$ | $LGx_t$ | LXt | LImt | LM2 | $LEXr_t$ | $LGDP_t$ |
|---|---|---|---|---|---|---|---|---|---|
| $LWr_t$ | | 4.31* | 4.57* | 3.97* | -5.77* | 8.8* | 4.65* | 3.98* | 3.74* |
| | | (0.01)** | (0.1) | (0.19) | (0.06) | (0.01) | (0.12) | (0.03) | (0.15) |
| $LCx_t$ | 3.98* | | | | | | | | |
| | (0.28) | | | | | | | | |
| $LIx_t$ | 0.57 | | | | | | | | |
| | (0.75) | | | | | | | | |
| $LGx_t$ | 3.52* | | | | | | | | |
| | (0.28) | | | | | | | | |
| LXt | -0.04 | | | | | | | | |
| | (0.98) | | | | | | | | |
| LImt | 1.2 | | | | | | | | |
| | (0.58) | | | | | | | | |
| LM2 | 1.04 | | | | | | | | |
| | (0.6) | | | | | | | | |
| $LEXr_t$ | 0.45 | | | | | | | | |
| | (0.26) | | | | | | | | |
| $LGDP_t$ | 3.51* | | | | | | | | |
| | (0.01) | | | | | | | | |

-Numbers shows the value of F-stat& * significant at 5%&** Values in brackets are Probability

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