

Remittances and Financial Development in a Host Economy: The case of the Kingdom of Saudi Arabia

AL-ABDULRAZAG B. A.

King Saud University Saudi Arabia

Email : balabdulrazaq@ksu.edu.sa

A-M. M. ABDEL-RAHMAN

King Saud University Saudi Arabia

Email : abdelma@ksu.edu.sa

Abstract

This paper investigates the possible short-run and long-run causal relationships between foreign workers' remittances and financial development in the Kingdom of Saudi Arabia (KSA) as a major labor-hosting, remittance-sending country. The research methodology utilizes the Johansen Cointegration approach, Vector Error Correction (VECM) mechanisms, and the Toda-Yamamoto to estimate specified and appropriate model to examine the causal relationships between variables appearing in the model using annual data covering the period 1971-2013. The study utilizes three conventional financial indicators as proxies for financial development; respectively being the ratio of broad money to GDP (m_2gdp), the ratio of banks' deposits to GDP ($depgdp$), and the ratio of claims of banks on private sector to GDP ($clpgdp$). The cointegration test results revealed the existence of long-run relationships among variables. The long-run estimation results show that remittances are pro-cyclical increasing during booms and declining during recessions. Interest rates turn out to have the expected inverse relationship with remittances, while results pertaining to financial development indicate that the alternative financial development proxies have similar negative impacts on the flows of remittances from Saudi Arabia. The Toda-Yamamoto causality procedure shows the existence of bidirectional causality between remittances, m_2gdp and $clpgdp$ but unidirectional causality running from remittances to $depgdp$. A policy recommendation derivable from these results is the need for more innovations in the financial sector of KSA to slow the flow of remittances and to direct them towards domestic investment opportunities instead of the current existing competition between domestic financial institutions in offering innovations that would hasten and increase these outflows.

Key Words: KSA, Financial Development, Remittances, Granger Causality, Cointegration Test, Ksa, Toda-Yamamoto Causality.

Introduction

The Kingdom of Saudi Arabia (KSA) possesses one of the largest economies in the Middle East and North Africa (MENA) region. Its Gross Domestic Product (GDP) was about at 627 billion Dollars in the year 2013. One important feature of the Saudi economy is its dependence on oil revenues as the main source of income. Oil revenues make up around 90-95% of total KSA export earnings and around 35-40% of the country's GDP (SAMA, 2014). To meet its development requirements in the absence of an adequate labor force, KSA resort to the employment of foreign workers with a consequent outflow of worker remittances

abroad. The importance of worker remittances to the Saudi economy, which is expected to be linked to oil price fluctuations (George and Ali, 2009), has been emphasized because of the sheer magnitude of the leakages involved on one hand, and the resultant financial pressures on the domestic economy on the other hand. Generally, the importance of remittances stems from their impacts on the major macroeconomic variables in the country. For remittances-sending country, remittances affect foreign reserves in the banking sector. Remittances are responsible for the leakage of money supply from the domestic economy leading to a damping of the multiplier effect. This would require an increase in government expenditures to substitute for the effect of this leakage. As for monetary policy, remittances could affect the money supply. Another important adverse effect of remittances is on investment opportunities in the remittance-sending economy. The motivation for this paper stems from the ongoing debate on the linkage relationship between financial development and workers' remittance flows. The focus of the paper is on the KSA as a major labor-hosting remittance-sending country at the World-level. Studies of workers' remittances usually centered on their effects on the economies of labor-sending countries, while the effects on labor-hosting countries has not received parallel attention despite their – sometimes - large share of the GDP in those countries (Brahim, 2008). Recently, there has been an increased interest in foreign workers' issues in hosting countries due to the large volume of remittance outflows, the increased competition in labor markets between foreign and national labor, and the resultant increase in unemployment rates of nationals.

Some of the literature tended to center on the relationship between financial development and remittances, again, within the context of labor-sending remittance-receiving countries (Alberto, 2015; Dramane, 2015; Shahzad *et al.*, 2014; Lartey, 2013; Aggarwal *et al.*, 2011; Babatunde *et al.*, 2011; Giulia and Zazzar, 2011; Giuliano and Ruiz-Arranz, 2009; Mundaca, 2009;). The main conclusion of these studies is that remittance inflows depend on the development level of the domestic financial sector in the labor-sending country. Virtually, the labor-hosting remittance-sending countries have done little in the opposite case where there is a notable failure of the home financial institutions in retaining and channeling the flow of these remittances to their domestic economies, in what is tantamount to a form of capital flight to abroad. These flows are huge in some host countries like KSA. This is partially because KSA has no controls on capital movements, and hence, workers transfer their remittances mostly through legal banking channels, in addition to that, some sums thought to be substantial transferred in the form of currency swaps and black-market transactions.

Thus by studying the linkage between financial development and the outflow of remittances, this paper complements the existing literature on this issue in remittance-receiving countries. It also investigates the possible financial market failure in remittance-sending countries by focusing on the extent to which remittances could stimulate financial sector development in the sending economy, e.g. Aggarwal *et al.*, 2011; Demirgüç-Kunt *et al.*, 2011; Gupta and Wagh, 2009.

The paper examines whether or not there is a link between financial development and the outflow of remittances from the perspective of KSA as a major labor-hosting remittance-sending country. We address the issue using suitable methodologies including Johansen Cointegration approach (Johansen and Juselius, 1990; Johansen, 1988) and the Vector Error Correction Model (VECM) to estimate the short and long-run dynamic relationships between remittances, financial development variables along with other relevant macroeconomic variables. The research utilizes Toda-Yamamoto (T-Y) procedure to examine the causality among variables. Long-run and short-run effects are considered through the resultant cointegration and VECM results and final conclusions are then drawn.

The organization of the rest of the paper is as follows: Section 2 summarizes and reviews the main findings of previous applied research on the causal relation between financial development and remittances. Section 3 presents the theoretical background. Section 4 discusses the model specification, data and the methodologies used. Section 5 presents and discusses the estimation results obtained. A conclusion and suggested policy implications conclude the paper.

Previous Studies

This section considers some previous studies relevant to the issues in the area of remittances and financial development. Empirically, interest has usually centered on the impact of remittance flows on financial development in labor-sending countries but little attention to the labor-hosting remittance-sending countries case. The question poses an important consideration for these countries specially those who regard the outflow of remittances as a major leakage and drain on their economies. Their financial institutions have so far failed to harness this outflow and to retain it for investment purposes at home through innovative financial products.

Work in this area concentrated mainly on the link between remittances and financial development within the nexus of both to economic growth. Giuliano and Ruiz-Arranz, 2009; Levine and Loayza, 2000; Levine and Zervos, 1998; and Beck, King and Levine, 1993 among others, document how financial development is associated with greater growth across countries. They show that remittances help in promoting growth in financially less developed countries since they alleviate credit constraints and could be a substitute to financial development improving the allocation of capital and accelerating growth. Efficient financial systems enjoy allocative efficiency; hence, they can channel worker remittances towards the most productive investment projects. Testing this substitutability hypothesis Giuliano and Ruiz-Arranz, 2009 found that a high degree of financial development tends to reduce the investment creation role of remittances. Mundaca, 2009 argues that remittances are rather a compliment where financial development potentially leads to better uses of remittances thus fostering growth in a country. He also argues that controlling for financial development in the analysis strengthens the positive impact of remittances and concludes that financial development potentially leads to better use of remittances, thus further boosting growth. Aggarwal *et al.*, 2011 directly address the issue by exploring the impact of remittances on financial sector development as measured by bank deposits and credits to the private sector in labor-sending countries, and discuss whether remittances contribute to increasing the aggregate level of intermediation by the local banking sector. In particular, they find that remittances have a significant and positive impact on bank deposits to GDP thus promoting financial development. They argue that in an economy where people are constrained from financial institutions remittances may not boost deposits and if they transfer their remittances immediately to their homes, then the credit creating role of remittances in the labor-hosting remittance-sending country would be undermined.

Other few studies considered the relationship between remittances and financial development within the context of remittance-sending countries. Terry and Wilson, 2005 reason that a complementarity relationship could exist in that increased financial development would help migrants to transfer funds home more easily. Furthermore, remittances help unbanked people like low-wage foreign workers in the remittance-sending country to gain access to financial services. Levine, 2005 shows that remittance transfers increase significantly if the domestic financial system is able to increase its ability to perform its basic functions in terms of mobilizing foreign workers' savings within the host country through risk and transaction cost reduction. Thus improving the allocation of capital, e.g. Mookerjee and Roberts, 2011; Freund and Spatafora, 2008; Orozco and Fedewa, 2005, while Bettin and Zazzar, 2012; address the notion that remittances can lead to financial development as money transferred through financial institutions paves the way for recipients to demand and gain access to other financial products and services in the host country. At the same time providing remittance transfer services aids banks in collecting information about unbanked recipients or recipients with limited financial intermediation and helps in innovating services suitable to them; thus addressing a possible market failure of the financial system. Some studies have recognized that immigrants hold assets both at home and abroad, e.g. Amuedo-Dorantes and Pozo, 2013. Gammage, 2007 show that remittances respond to cross-country differences in portfolio values, in turn highlighting the necessity for developing financial innovations capable of satisfying these demands in host countries. Bang *et al.*, 2015 indicate that an increase in economic freedom in the financial sphere as captured by the relaxation of directed credit policies, credit ceilings, and reduction of state presence in the banking sector, has an immediate positive impact on the remittance share of GDP. Similarly, an

improvement in the robustness of the financial sector, as captured by the development of security markets, improvement in the quality of banking supervision, and removal of stringent restrictions on interest rates and capital, could reduce the remittance share of GDP in remittance-sending countries. The net effect of both freedom and robustness aspects reveals that financial development may, in fact, have a negative long run impact on remittances; Beine *et al.*, 2012 investigate these issues and find strong statistical and economic effects of remittances on financial openness.

Work on issues relating to the impact of remittances on the economies of the Gulf Cooperation Council (GCC)¹ region did not study the relationship between remittances and financial development *per se* but mainly addressed other issues. For example, Haddad and Choukir, 2015; Taghavi, 2012; Razgallah, 2008, and Abdel-Rahman, 2006 were interested in the determinants and macroeconomic impacts of remittances on the domestic GCC economies, whereas Alkhatlan, 2013; and Hahi and Shendi, 2008 were interested in issues pertaining to growth. Termos *et al.*, 2013 considers the relationship between remittances and inflation within the context of the GCC economies. However, there was no study as such on the links between financial development and remittances in the GCC region.

Theoretical Background

As far as the effects of financial development on remittances in a worker-hosting country is concerned, differences in the portfolio variables to which foreign workers respond exist as would be expected in dealing with agents of diverse backgrounds, regions of origin, incomes, and motives for emigrating. A positive relationship would exist between remittances and financial development where worker remittances channeled through host financial channels would increase the demand for other banking services either before or during transfers. They would increase information on and demand for deposits, savings and other banking services while at the same time would provide valuable information for the bank on the type of depositors, their incomes and their backgrounds thus enabling the bank to respond by suitable innovations directed at the provision of additional services.

Remitting patterns change with the level of workers' income where high-income workers may look for investment opportunities in the domestic economy instead of remitting abroad. Because remittances are typically lumpy, recipients might have a need for financial products that allow for the safe storage and transfer of these funds. In the case of foreign workers who receive their incomes through banks, there exists a potential to learn about and demand other bank products. However, bank deposits may not rise if workers' incomes are immediately consumed – an important consideration in the GCC countries in view of the relatively low incomes of foreign workers - or if remittance senders 'distrust' domestic financial institutions and prefer other ways to handle these funds. Duration of migration spells also plays a role with the time period spent in the host country being a crucial factor, where the foreign worker is more likely to 'invest' his savings domestically as his period of stay lengthens and he becomes acquainted with the domestic financial system and the products it provides. Remittances sent home for portfolio considerations are also likely to be kept to later stages of their 'stay' as the immediate needs of home families are addressed, and asset accumulation and investment considerations become more important.

As far as the financial institutions in the GCC countries, they are not overly interested in workers' remittances. Workers incomes, their savings and hence their remittances are mostly small in magnitude on a per worker basis and hence it may not be viewed as cost-effective for the bank to tap them. Looked at this way, they will not affect the volume of bank deposits markedly. But looking at them on an aggregate basis they are usually huge and the failure to retain them within domestic financial institutions' portfolios points to a significant market failure on part of the respective financial systems. In the KSA for example, it is

¹ This is a group of six countries, which are the Kingdom of Saudi Arabia, the United Arab Emirates, Kuwait, Qatar, Oman and Bahrain.

noted that the major commercial banks do not show much interest in attracting low-income foreign worker's savings – and remittances – to their deposits. Few financial products are geared towards satisfying these foreign workers' demands. Of those few commercial banks that deal with foreign workers on a large scale the interest usually centers on providing the easiest and fastest way to remit abroad instead of developing financial innovations and products that would entice workers to retain whatever savings they have – or part of them at least - in the domestic economy. The lack of appropriate financial channels to absorb workers' savings also leads to workers searching for alternative unofficial channels for their savings, e.g. "Hwala" type transfers. These alternative channels are unrecorded but thought to be large.

Empirically, endogeneity biases and reverse causality may arise in studying the relationships between remittances and financial development in worker-hosting remittance-sending economies since better financial development might lead to larger measured remittances either because financial development enables remittance flows more efficiently or because a larger percentage of remittances are measured when those remittances are channeled through formal and developed institutional channels. In addition, financial development might lower the cost of transferring remittances, leading to an increase in such flows. In this way, it is seen that financial development in a labor-hosting remittance-sending country like the KSA may affect the volume of remittances markedly. Yet on the other hand, remittances might have a positive impact on credit market development if banks become more receptive of foreign workers remittances, increasing their deposits in due process and hence become more willing to extend credit to them. Overall the volume of credit in the economy would also increase if banks' loanable funds surge as a result of deposits linked to remittance flows.

Model Specification and Data

This section presents the model used to study the relationship between foreign workers' remittances and financial development in the economy of Saudi Arabia.

The Model

The general model used to explain the causal relationships between the KSA's workers' remittances and financial development is as follows:

$$remit_t = f(gdp_t, int_t, findev_t) + \varepsilon_t \quad (1)$$

Where:

<i>remit</i>	total worker remittances in US dollars
<i>gdp</i>	real KSA GDP in US dollars
<i>int</i>	domestic interest rate
<i>findev</i>	vector of financial development variables (ratio of M ₂ /GDP, ratio of claims on private sector to GDP, and ratio of deposits to GDP).
ε_t	random error

Variables on remittances and GDP are real and used in log form.

Data on variables used in the study covering the period 1971 – 2013 are obtained from various domestic and foreign sources. These include the Ministry of Economy and Planning (MoEP) - Central Department of Statistics and Information (CDSI), the Ministry of Labor, and the Saudi Arabian Monetary Agency (SAMA) in the KSA. Foreign sources of data include the International Monetary Fund (IMF) - International Financial Statistics (IFS), and the World Bank (WB) - World Development Indicators (WDI). Data used are thus from primary official sources which list remittances made through official channels only due to the virtual absence of information and data on unofficial types of transactions related to remittances. Prior expectations on the responses of the variables are that the relationship between workers' remittances (*remit*) and economic activity (*gdp*) could, a priori, flow either way since with added economic activity

projected onto higher GDP, incomes – including those of foreign workers - would rise leading to higher remittance flows abroad. But on the other hand, with added economic activity, rising GDP and may be rising returns and profit opportunities in the local economy, workers may be enticed to retain and invest their incomes – or a considerable portion of them - domestically instead of transferring them abroad; whereby their response would be negative through this second channel.

The interest rate variable (*int*) used is the nominal Repurchase Agreement (REPO) money-market instrument which is a form of short-term borrowing rate for dealers in KSA’s government securities. It is safe to argue that the response to this variable would be negative whereby higher domestic returns in the labor-hosting economy would encourage workers to invest and deposit their incomes – or whatever that is saved from them - locally instead of remitting abroad, thus depressing the overall level of remittances abroad.

Financial development is measured by the standard measures of financial depth as in King and Levine (1993), including the ratio of money supply (M_2) to GDP (*m2gdp*), the ratio of credit to the private sector to GDP (*clpgdp*), or the ratio of bank deposits to GDP (*depgdp*).

Summary Statistics

The summary statistics on the variables appearing in the model are presented in table (1) below covering the whole sample period:

Table (1) Remittances and Financial Development variables: Summary Statistics (1971-2013)

	<i>remit</i>	<i>gdp</i>	<i>int</i>	<i>m2gdp</i>	<i>depgdp</i>	<i>clpgdp</i>
Mean	11.721	246.425	6.428	38.648	25.779	20.818
Median	13.560	225.790	5.830	44.650	28.690	20.910
Maximum	34.980	519.890	17.630	64.570	48.990	45.630
Minimum	0.210	72.550	0.690	6.120	3.210	2.770
Std. Dev.	8.891	105.329	3.932	16.111	12.255	12.298
Skewness	0.627	1.013	0.631	-0.705	-0.319	0.186
Kurtosis	2.818	3.484	3.251	2.049	2.015	2.015
C.V.	0.759	0.427	0.612	0.417	0.475	0.591

Std. Dev. is the Standard Deviation of the variable, C.V. is its Coefficient of Variation

The results for the whole sample period 1971 – 2013 show that mean remittances are 11.7 billion dollars with some substantial variations as shown by the standard deviation and coefficient of variation (C.V.). Compared to mean real GDP, remittances can be seen as an important leakage of the KSA economy amounting to 4.8% of GDP. Interest rates assumed a mean of 6.4% during the sample period, again with some considerable fluctuations. As far as the financial development ratios are concerned, *m2gdp* was a relatively 38.6% high while both *depgdp* and *clpgdp* were of lower mean magnitudes.

Because of the noted variations in the variables over the whole sample period, we also present results pertaining to the more recent sub-period 2001 – 2013. Results for this later sub-period show mean remittances to be 21.1 billion dollars, again with some notable variations as measured by the standard deviation and the C.V. This is much higher than the mean of the whole sample period and is attributed to the fact that this sub-period witnessed an increasing performance of the Saudi economy coupled with some substantial volatility as reflected by the impacts of the financial crisis shocks of 2008 and the following world-wide recession on the domestic Saudi economy. These are provided in the table (2) below:

Table (2): Worker Remittances in the KSA: Summary Statistics (2001-2013)

	<i>remit</i>	<i>gdp</i>	<i>int</i>	<i>m₂gdp</i>	<i>depgdp</i>	<i>clpgdp</i>
<i>Mean</i>	21.093	375.833	2.360	51.670	38.806	35.552
<i>Median</i>	16.450	367.560	1.730	50.990	38.010	35.420
<i>Maximum</i>	34.980	519.890	5.020	64.570	48.990	45.630
<i>Minimum</i>	13.560	260.030	0.690	44.650	32.940	27.260
<i>Std. Dev.</i>	7.283	88.737	1.615	5.074	4.406	5.647
<i>Skewness</i>	0.552	0.216	0.499	1.144	0.823	0.269
<i>Kurtosis</i>	1.840	1.812	1.730	4.293	3.323	2.311
<i>C.V.</i>	0.345	0.236	0.684	0.098	0.114	0.159

Mean real GDP was 375.8 billion dollars – again with large variations within the sample due to the above mentioned causes. The share of remittances for this sub-period amounted to 5.6% of GDP on average. Interest rates were generally lower at a mean value of 2.4% in reflection of the general trend for interest rates world-wide after the financial crisis. Financial development indicators have risen noticeably as compared to the whole sample period where mean *m₂gdp* increased remarkably to 51.7% and both *depgdp* and *clpgdp* registered higher mean ratios of 38.8% and 35.6% respectively in reflection of the continuous improvements and developments occurring in the financial sector of the Kingdom over time.

Methodology

This study utilizes the Johansen cointegration approach to examine the existence of a long-run relationship between the variables appearing in the model. The number of cointegrating relationships found will result in a corresponding number of residual series, and hence a Vector Error Correction Model (VECM) can be developed to be used in the subsequent analysis.

To draw the causal relationships between financial development indicators and a set of macroeconomic variables, the Toda-Yamamoto (1995) methodology was implemented to test for the existence of long-run causality. This approach has the advantage of being simple and possesses the ability to overcome the shortcomings of alternative procedures such as traditional Granger-Causality test. Traditional Granger-Causality has some limitations. First, Granger-Causality test is sensitive to number of lags and model specifications. Second, it is well known in economic theory that time series data are often non-stationary, this may cause the problem of spurious regression, and if the variables are integrated, the F-test procedure is not valid since the test statistics do not have a standard distribution. Hence, one may not be able to conduct the F-statistic to jointly test for Granger Causality (Santos & Chris, 2013). To overcome these limitations, Toda and Yamamoto (1995) approach is employed to examine Granger-non causality among model's variables.

The main advantage of Toda-Yamamoto approach over the traditional Granger-Causality is that it does not require the variables to be integrated of the same order or to be I(0) or I(1). Therefore, T-Y causality model is applicable without checking for the integration and co-integration of the variables (Fawad, 2013; Arshia & Bruno, 2012; and Zapata and Rambaldi, 1997).

The Toda-Yamamoto (1995) approach rests on the application of a Vector autoregressive (VAR) model and is considered an improvement over the conventional Granger-Causality test since it limits all problems associated with the conventional cointegration tests (Selim *et al.*, 2010). As Umore & Tizhe (2014) stated that "Toda and Yamamoto (1995) proposed the estimation of an augmented VAR system which guarantees the asymptotic distribution of the Wald statistic in compliance to an asymptotic χ^2 -distribution, since the testing procedure is robust to the integration and cointegration properties of the process".

To implement the Toda-Yamamoto (1995) version of Granger non-causality, the 4 variables: remittances, GDP, financial development indicator, and the interest rate are presented in the following VAR ($k+d_{max}$) system: ²

$$\begin{aligned}
 lremit_t &= \alpha_0 + \sum_{i=1}^{k+d_{max}} \alpha_{1i} lremit_{t-i} + \sum_{j=1}^{k+d_{max}} \alpha_{2j} lgdp_{t-j} + \sum_{i=1}^{k+d_{max}} \alpha_{3i} findev_{t-i} + \sum_{j=1}^{k+d_{max}} \alpha_{4j} int_{t-j} + \varepsilon_{1t} \\
 lgdp_t &= \beta_0 + \sum_{i=1}^{k+d_{max}} \beta_{1i} lremit_{t-i} + \sum_{j=1}^{k+d_{max}} \beta_{2j} lgdp_{t-j} + \sum_{i=1}^{k+d_{max}} \beta_{3i} findev_{t-i} + \sum_{j=1}^{k+d_{max}} \beta_{4j} int_{t-j} + \varepsilon_{2t} \\
 findev_t &= \gamma_0 + \sum_{i=1}^{k+d_{max}} \gamma_{1i} lremit_{t-i} + \sum_{j=1}^{k+d_{max}} \gamma_{2j} lgdp_{t-j} + \sum_{i=1}^{k+d_{max}} \gamma_{3i} findev_{t-i} + \sum_{j=1}^{k+d_{max}} \gamma_{4j} int_{t-j} + \varepsilon_{3t} \\
 int_t &= \phi_0 + \sum_{i=1}^{k+d_{max}} \phi_{1i} lremit_{t-i} + \sum_{j=1}^{k+d_{max}} \phi_{2j} lgdp_{t-j} + \sum_{i=1}^{k+d_{max}} \phi_{3i} findev_{t-i} + \sum_{j=1}^{k+d_{max}} \phi_{4j} int_{t-j} + \varepsilon_{4t}
 \end{aligned}$$

Where d_{max} is the maximal order of integration of the variables included in the model, k is the optimal lag length of the variables, errors are assumed to have zero mean, constant variance, and free of autocorrelation problem.

The Toda-Yamamoto procedure uses the modified Wald (MWALD) test to impose restrictions on the parameters of the VAR(k) model and it has asymptotic Chi-square with (k) degrees of freedom (Meriem, et al., 2014).

The significance of the modified Wald statistics (MWALD) Chi-Square statistics is to test whether the k lags are equal to zero. For example, to test for granger causality from *findev* to *lremit* implies the null hypothesis: H_0 : *findev* does not Granger cause *lremit*, if $(\sum_{i=1}^k \alpha_{3i} = 0, \text{ for } i = 1, \dots, k)$, against the alternative hypothesis: H_1 : *findev* does not Granger cause *lremit*, if $(\sum_{i=1}^k \alpha_{3i} \neq 0, \text{ for } i = 1, \dots, k)$. As for the second hypothesis, H_0 : *lremit* does not Granger cause *findev*, if $(\sum_{i=1}^k \gamma_{1i} = 0, \text{ for } i = 1, \dots, k)$, against the alternative hypothesis, H_1 : *lremit* does not Granger cause *findev*, if $(\sum_{i=1}^k \gamma_{1i} \neq 0, \text{ for } i = 1, \dots, k)$. The same methodology can be applied to test causality between other variables. The d_{max} lags are not included in the Wald test, as Arshia and Burno (2012) quoted Wolde-Rufael (2004) who stated that "The main idea of this method is "to artificially augment the correct VAR order, k, by the maximal order of integration, say d_{max} ". Then, a $(k + d_{max})$ th VAR order is calculated and the coefficients of the last lagged d_{max} vector are ignored".

Accepting the former null hypothesis and rejecting the latter, then we conclude that *lremit* changes are Granger caused by a change in *findev* and there is unidirectional causality runs from *findev* to *lremit*. Unidirectional causality exists if either of the null hypotheses is rejected. Bidirectional causality exists if both null hypotheses are rejected and no causality exists if neither null hypothesis is rejected.

There are few steps required in carrying out the T-Y causality test. The first step is to determine the optimal lag length in the VAR model (k), by using an information criterion. Umoro and Tizhe, 2014 indicated that this step aims at choosing a lag length which improves the explanatory power of the estimated VAR model by choosing the smallest information criteria which enhances the model estimates. The model selection criteria used are the conventional Akaike Information Criterion (AIC), Schwartz Criterion (SC), Final Prediction Error (FPE), and Hannan-Quinn (HQ) Criterion. These will be utilized to determine the appropriate lag order of the VAR model. In our case, the AIC is used to select the appropriate lag. The following step is the determination of the maximum order of integration (d_{max}) for all series by using unit

² For more theoretical and application of Toda-Yamamoto, see Rambaldi, Alicia & Howard Doran. (1996). Testing for Granger Non-Causality in Cointegrated System made Easy. Department of Econometrics, University of New England, Working Paper, 88.

root tests. The third step involves the estimation of the VAR in level form with the modified order of VAR ($k+d_{max}$) where k indicates the optimal lag-length of the level VAR which is determined by application of the appropriate lag selection criterion – in this case the AIC, and (d_{max}) is the maximal order of integration of the series. The final step in the application of the test procedure is running the Wald test for Granger causality (Fawad, 2013).

Empirical Results

We examine the causal link between financial development and remittances in the KSA over the period 1971-2013 by applying the Johansen cointegration approach and Toda-Yamamoto causality method. The following section presents the empirical results related to the model.

Stationarity

The study requires building the specified model towards the Johansen representation of the relationships. This proceeds through a number of steps starting with investigating the stationarity properties of the variables appearing in the model. This is affected here through the use of the conventional Augmented Dickey-Fuller (ADF) test for unit roots.

Table (3) below reports the ADF unit root results for both the levels and first differences of the variables indicated:

Table (3): ADF Unit Roots Test Results

<i>variable</i>	<i>Level</i>	<i>First-difference</i>
<i>lremit</i>	-3.006 (0.143)	-3.769 (0.029)
<i>lgdp</i>	-3.231 (0.092)	-5.473 (0.001)
<i>int</i>	-1.735 (0.406)	-5.636 (0.000)
<i>exch</i>	-2.632 (0.095)	-4.024 (0.003)
<i>m₂gdp</i>	-1.969 (0.601)	-6.261 (0.000)
<i>depgdp</i>	-2.787 (0.210)	-6.908 (0.000)
<i>clpgdp</i>	-0.082 (0.945)	-6.442 (0.000)

- An *l* preceding a variable indicates that the variable is in logarithmic form.
- Lag lengths are selected according to the Schwarz Information Criterion (SC)
- Tests for the *inf*, *int*, and *clpgdp* variables included an intercept term while those on the *lremit*, *lgdp*, *m₂gdp*, *depgdp* variables included intercept and trend terms because of obvious trends.
- MacKinnon (1996) *p*-values for the test at 5% level are shown in parentheses below test statistic

The results indicate that the *lremit*, *lrgdp*, *int*, *m₂gdp*, *depgdp* and *clpgdp* variables are non-stationary at their levels, but become stationary in their first difference form, i.e. they are integrated of order one, I(1).

Cointegration

Since the variables are found to be I(1) the following step is to find whether or not they are cointegrated. The Johansen (1988) and Johansen and Juselius (1990) cointegration procedure is employed here to test for the number of cointegrating relationships for each of the three cases of financial development indicators.

Model (1): *m₂gdp*

To examine the existence of a long-run equilibrium relationship for the model using *m₂gdp* as a financial development indicator, the number of lags to be included in the Johansen cointegration approach is firstly

determined. A VAR model was estimated, and the number of optimal lags using the AIC lag selection method was found to be 2 as shown in Table (4) below:

Table (4): Lag Selection Procedure

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-	NA	12.019	13.838	14.175	13.960
1	-94.052	296.991	0.004	5.903	6.916*	6.269
2	-66.303	41.625*	0.002*	5.315*	7.004	5.926*
3	-51.017	19.871	0.003	5.351	7.715	6.206

LogL is the Log-Likelihood, LR is the Likelihood Ratio, FPE is the Finite Prediction Error,

AIC is the Akaike Information Criterion, while HQ is the Hannan-Quinn one. However, using the lag exclusion procedure, the number of lags became 1 or 2 lags as shown in Table (5) below. Based on these results, we choose two lags for the cointegration procedure in model 1.

Table (5): Lags Exclusion Test

Chi-Squared test statistics for lag exclusion					
Number In [] are p-values					
	LRMIT	LRGDP	M ₂ gdp	INT	Joint
Lag 1	54.611 [3.92e-11]	57.271 [1.09e-11]	31.462 [2.46e-06]	63.282 [5.92e-13]	186.820 [0.00000]
Lag2	12.006 [0.017]	6.010 [0.198]	3.938 [0.414]	16.522 [0.002]	34.708 [0.004]
df	4	4	4	4	4

Table (6) reports the number of cointegrating relationships among the variables for the first model (1):

Table (6): The Cointegration Test Results

Hypothesis	Max-Eigenvalue	Trace Statistics	0.05 C. V.	p-value	Max-Eigenvalue	0.05 C.V.	p-value
None*	0.557	61.033	47.856	0.001	32.558	27.584	0.011
At most 1	0.408	28.475	29.797	0.070	20.987	21.132	0.052
At most 2	0.169	7.488	15.495	0.522	7.437	14.264	0.439
At most 3	0.001	0.051	3.841	0.822	0.051	3.841	0.822

Results of both the Trace statistics and the Maximum Eigenvalue test suggest the presence of one cointegrating relationship at the 0.05 level. The empirical relationship containing the I(1) variables was:

$$lremit_t = -2.755 + \underset{(0.337)}{1.141} lgdpt - \underset{(0.013)}{0.014} m_2gdpt - \underset{(0.041)}{0.131} int_t$$

where standard errors appear in parentheses. The financial development variable m_2gdp appears here with a negative sign, but it appears to be a non-significant determinant of remittances in the long-run.

Model (2): depgdp

The second model tried uses $depgdp$ as a financial development indicator. Based on the VAR estimation of this model, table (7) reports the AIC lag selection results which indicate 2 lags to be included in the cointegration estimation.

Table (7): Lag Selection Procedure

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-253.619	NA	5.63935	13.0809	13.4187	13.2031
1	-77.144	300.008	0.00187	5.05718	6.07051*	5.42357
2	-50.4034	40.1109*	0.00113*	4.52015*	6.20903	5.13080*
3	-37.3404	16.9814	0.00142	4.66703	7.03146	5.52193

While table (8) reports the lag exclusion results which indicate 1 or 2 lags.

Table (8): Lag exclusion

Chi-Squared test statistics for lag exclusion					
Number In [] are p-values					
	LRMIT	LRGDP	DEPGDP	INT	Joint
Lag 1	51.0285 [2.20e-10]	50.5433 [2.078e-10]	25.9297 [5.63e-10]	58.6388 [5.63e-12]	174.399 [0.00000]
Lag2	11.0105 [0.02645]	5.67346 [0.22489]	3.51133 [3.27e-5]	15.3731 [0.00399]	33.1051 [0.00716]
df	4	4	4	4	4

The cointegration test uses 2 lags to be included. Table (9) reports the cointegration tests results using the ratio of deposits to GDP financial development variable:

Table (9): The Cointegration Test

Hypothesis	Eigenvalue	Trace Statistics	0.05 C. V.	p-value	Max-Eigenvalue	0.05 C. V.	p-value
None*	0.530	56.529	47.856	0.006	30.160	27.584	0.023
At most 1	0.373	26.370	29.797	0.118	18.718	21.132	0.105
At most 2	0.173	7.652	15.495	0.503	7.600	14.265	0.421
At most 3	0.001	0.052	3.841	0.820	0.052	3.841	0.820

Results here also indicate the presence of one cointegrating relationship between the respective variables. The estimated long-run cointegrating relationship is:

$$lremit_t = 3.327 + \underset{(0.626)}{1.534} lgdp_t - \underset{(0.029)}{0.055} depgdp_t - \underset{(0.060)}{0.235} int_t$$

Results are similar to those obtained for the previous financial development measure in terms of direction, but the significance of the *depgdp* is higher with a t-statistic value of 1.90. In this respect this second measure of financial development, *depgdp*, seems to exert a more significant negative influence on the level of remittances in KSA. Hence accordingly the more financial development in the form of deposits we have in the Kingdom, the less will be the capital flight in the form of remittances from its labor-hosting economy.

Model (3): clpgdp

This third model uses the ratio of credit to the private sector to GDP (*clpgdp*) as a proxy for financial development in the KSA. To determine the max number of lags to be included in the Johansen cointegration test, the VAR model was estimated. The lag selection procedure based on AIC shown in table (10) indicates 2 lags.

Table (10): Lag Selection Procedure

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-	NA	5.84605	13.1169	13.4547	13.2391
1	-77.423	300.756	0.00189	5.07118	6.08480*	5.43756
2	-	42.0777*	0.00107*	4.46858	6.15746	5.07923*
3	-	21.5896	0.00113	4.43822*	6.80265	5.29312

Furthermore, the lag exclusion test suggests 1 or 2 lags as reported in table (11). Therefore, the lag number to be used in the cointegration test will be 2.

Table (11): Lag exclusion selection

Chi-Squared test statistics for lag exclusion					
Number In [] are p-values					
	LRMIT	LRGDP	CLPGDP	INT	Joint
Lag 1	44.5489 [4.93e-09]	48.1701 [8.70e-10]	22.1223 [0.00002]	49.7776 [4.02e-10]	169.834 [0.00000]
Lag2	9.50121 [0.04972]	7.30553 [0.12059]	1.07891 [0.89761]	15.3335 [0.00406]	32.4434 [0.00875]
df	4	4	4	4	4

Using the claims on private sector variable, *clpgdp*, for financial development, the cointegration analysis results are as given in Table (12) below:

Table (12): The Cointegration Test

Hypothesis	Eigenvalue	Trace Statistics	0.05 C.V.	p-value	Max-Eigenvalue	0.05 C. V.	p-value
None*	0.563	60.266	47.856	0.002	33.141	27.584	0.008
At most 1	0.338	27.125	29.797	0.099	18.777	21.132	0.104
At most 2	0.185	8.349	15.495	0.429	8.163	14.265	0.362
At most 3	0.005	0.185	3.841	0.667	0.185	3.841	0.667

Where both trace and max-eigenvalue tests indicate the presence of two cointegrating equations at the 0.05 level. The form of the relationship is:

$$lremit_t = 4.194 \underset{(1.246)}{lgdp_t} - 0.186 \underset{(0.049)}{clpgdp_t} - 0.419 \underset{(0.096)}{int_t}$$

Where in this financial development proxy has a significant negative effect on remittances.

Table (13) provides a summary of the cointegration results as related to the three models connecting remittances, financial development and the other control variables.

Table (13): The Long-run Cointegration Results

Variable	Model (1)	Model (2)	Model (3)
constant	-2.755	-3.327	4.194
lgdp	1.141 (0.337)	1.534 (2.480)	4.194 (3.366)
Int	-0.131 (3.207)	-0.235 (3.933)	-0.419 (4.361)
m ₂ gdp	-0.014 (1.077)	-	-
depgdp		-0.055 (1.914)	-
clpgdp		-	-0.186 (3.807)
log-likelihood	-65.255	-50.525	-46.327

The results thus obtained for the long-run relation indicate that the effects of all variables are as *a priori* conjectured. GDP activity has positive effects on remittances while interest rates have a negative coefficient - again as expected. Financial development exerts a negative influence on spurring remittances from the Kingdom regardless of the variable used as a proxy but with differences in levels of significance. With the process of financial development in the Kingdom underway and with the number of foreign workers in the Kingdom stabilizing lesser remittance flows to the outside world should be expected. Foreign workers may be enticed by the innovations that more financial development provides to invest their savings - or parts of them - in the KSA economy and hence remittance flows to the outside world could be lessened. This result adds further impetus for the argument on the necessity of further targeted financial development through innovations directed at harnessing the flows of remittances of foreign workers to the outside world.

As the cointegration tests for the three models revealed the existence of long-run relationships among the respective variables, the following step is to estimate the Vector Error Correction Model (VECM) containing the short-run dynamic parameters by application of Ordinary Least Squares (OLS) to the resultant Error Correction (EC) representations of the following form:

$$\Delta remit_t = \alpha + \sum_1^q \gamma_i \Delta remit_{t-i} + \sum_1^{k_1} \phi_i \Delta l g d p_{t-i} + \sum_1^{k_2} \varphi_i \Delta f i n d e v_{t-i} + \sum_1^{k_3} \eta_i \Delta i n t_{t-i} + \delta e c_{t-1} + u_t$$

Where the short-run parameters $\gamma_i, \phi_i, \varphi_i, \eta_i$ measure the convergence of the model to its equilibrium, whereas δ is the adjustment parameter on the *EC* term (*ec*). In this final specification the variables are cointegrated if the parameters of the *EC* term are negative and statistically significant which shows that the models would eventually revert to their long-run equilibrium following short-term shocks.

Accordingly, estimates of the parameters of the short-run dynamic VECM parameter estimates are as seen in Table (14) below:

Table (14): The VECM Results (OLS Standard Errors)

Variable	ECM Short-run Estimates Model (1)	ECM Short-run Estimates Model (2)	ECM Short-run Estimates Model (3)
constant	0.374	0.224	0.111
$\Delta l g d p(-1)$	-1.128 (2.078)	-0.955 (1.807)	-0.656 (1.345)
$\Delta l g d p(-2)$	0.498 (0.890)	0.771 (1.421)	0.996 (2.140)
$\Delta i n t(-1)$	0.012 (1.062)	0.014 (1.162)	0.014 (1.134)
$\Delta i n t(-2)$	-0.003 (0.271)	-0.003 (0.255)	-0.007 (0.056)
$\Delta m 2 g d p(-1)$	-0.004 (0.675)	-	-
$\Delta m 2 g d p(-2)$	-0.001 (0.142)	-	-
$\Delta d e p g d p(-1)$	-	-0.004 (0.483)	-
$\Delta d e p g d p(-2)$	-	0.002 (0.233)	-
$\Delta c l p g d p(-1)$			-0.002 (0.188)
$\Delta c l p g d p(-2)$			0.004 (0.526)
$\Delta r e m i t(-1)$	0.319 (1.980)	0.336 (2.037)	0.354 (2.093)
$\Delta r e m i t(-2)$	0.058 (0.365)	0.058 (0.354)	0.037 (0.219)
exch	-0.003 (1.326)	-0.001 (0.781)	-0.001 (0.347)

$ecm(-1)$	-0.117 (2.249)	-0.006 (0.430)	-0.029 (1.265)
R^2	0.575	0.551	0.524
\bar{R}^2	0.428	0.397	0.359
$\hat{\sigma}$	0.132	0.135	0.139
F	3.924	3.564	3.187
AIC	-0.991	-0.937	-0.877

- Error Correction Representation selected based on SC
- R^2 is the coefficient of determination and \bar{R}^2 is its adjusted form, $\hat{\sigma}$ is the standard error of the regression,
- F is the conventional F-statistic.

The explanatory powers of the equations are high and their F-statistics are significant. Testing the stability of the VECM model requires that all roots have moduli less than one and that they should lie inside the unit circle. Figures (1; a,b,c) report the graphs of the autoregressive (AR) component roots, and show that all the moduli are inside the unit circle. Therefore, the VECM models are stable.

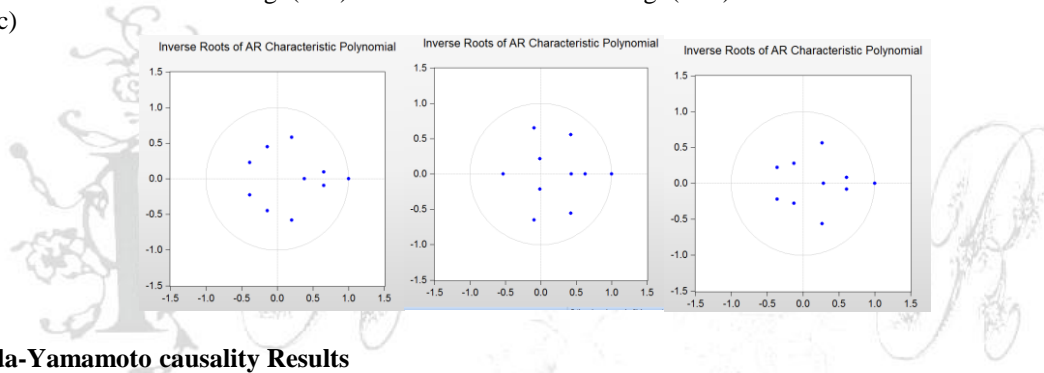
Fig (1): AR roots test for VEC stability

Fig. (1- a)

Fig. (1- b)

Fig.

(1- c)



Toda-Yamamoto causality Results

In this section, we examine pair-wise causality between workers' remittances and other variables appearing in the model including output, interest rates and the financial development variables in the KSA economy within the relevant sample period. Causality between remittances and the GDP output variable could flow either way. For, on the one hand, activity in the economy as measured by output levels clearly spurs remittance outflows through income effects (the activity hypothesis). But on the other hand and since remittances are leakages from the income stream of the domestic economy (the leakage hypothesis) they will serve to reduce domestic savings, dampen investments and output levels and hence stifle growth; which would establish causation in the opposite direction. Evidence on links between remittances and domestic interest rates (*int*) remains mixed. Higher domestic interest rates will serve to discourage remittances abroad but large remittance transfers will lead to pressures on the domestic interest rates to rise. As far as the connection between remittances and financial development is concerned, again theoretically it could flow either way. Most labor-sending remittance-receiving countries are developing countries where further financial development is necessary for the economic development efforts. On the other hand, most labor-receiving remittance-sending countries with the exception of major oil exporting countries tend to be developed countries where the financial sector is already developed. Reverse causality from financial development to remittances is expected, since financial development may spur higher remittance flows through the effects of lower risk and transaction costs; but on the other hand financial development may retard these flows through savings and investments effects as argued above and the question of causality may remain an empirical one in this regard.

Causality flows in this paper are determined by application of Toda-Yamamoto (T-Y) techniques to the respective variables. The application of the procedure requires the determination of the order of integration to specify the maximum order of integration. The determination of the integration order is the most important step towards processing the causality test (Fawad, 2013). This is done by utilizing the Augmented Dickey-Fuller (1978, 1981) unit root test. As table (3) above indicated all variables are integrated at first differences. Therefore, the maximum (d_{max}) order of integration is 1. After specifying d_{max} , the next step in T-Y causality is the selection of the optimal lag length in the VAR model. This requires running VAR models in levels, and using the AIC to select the optimal lag length (k) for each of the three financial development models.

Since the focus of the paper is to examine the causal link between financial development and remittances, the analysis will be only on the T-Y results pertaining to these two variables. The estimation results of the T-Y method obtained for the cases of financial development variables - m_2gdp , $depdp$, and $clpgdp$ - appear respectively column-wise in table (15) below.

M₂gdp

In this case the optimal lag length determined by the AIC for m_2gdp was 2; consequently the augmented VAR ($k+d_{max}$) will be of order 3. The above specifications are then estimated with m_2gdp in place of $findev$, and tested using a modified Wald procedure. The results are shown in Table (15) using the three financial development variables:

Table (15): Causality (T-Y procedure) SUR estimation

Null	$m_2gdp -$		$Depdp -$		$Clpgdp -$	
	χ^2	p-	χ^2	p-value	χ^2	p-value
$lremit \nrightarrow lgdp$	62.6	0.000	80.808	0.000	7.9	0.048
$lgdp \nrightarrow lremit$	20.21	0.000	21.806	0.0006	10.18	0.017
$lremit \nrightarrow int$	12.31	0.013	29.351	0.0000	2.040	0.56
$int \nrightarrow lremit$	12.31	0.015	4.837	0.4361	4.360	0.226
$lremit \nrightarrow findev$	14.94	0.004	20.461	0.0010	9.799	0.0204
$findev \nrightarrow lremit$	13.58	0.008	26.412	0.0001	2.889	0.409
$lgdp \nrightarrow int$	10.17	0.038	27.547	0.0000	19.12	0.0003
$int \nrightarrow lgdp$	18.63	0.000	24.569	0.0002	11.46	0.009
$lgdp \nrightarrow findev$	5.10	0.28	20.918	0.0008	2.943	0.400
$findev \nrightarrow lgdp$	7.95	0.094	14.316	0.0138	3.98	0.264
$int \nrightarrow findev$	10.64	0.031	14.319	0.0137	1.083	0.781
$findev \nrightarrow int$	4.06	0.39	11.668	0.0429	2.053	0.561

• \nrightarrow does not T-Y cause (no causality)

The results show that the null of no causality from the financial development variable m_2gdp to the remittances variable $lremit$ is rejected and that from $lremit$ to financial development is also rejected at 1% significance levels. As a result, there is bidirectional causality (feedback) between the financial development variable m_2gdp and the remittances variable $lremit$ in the case of the KSA.

Depgdp

Table (15) above also provides results using the second financial development variable *depgdp* where the optimal lag length for the *depgdp* variable as determined by the AIC was 4, and hence the respective AR in the system was of order 5. Results of the T-Y test show that the null hypothesis of no causality from the financial development variable *depgdp* to the remittances variable *lremit* is rejected at 1% level in further corroboration of the effect of financial development on remittances. Also, the null hypothesis of no causality from remittances *lremit* to financial development is rejected at 1% significance level. These results also indicate bidirectional causality between the two variables.

Clpgdp

Results on the third financial development variable relating to the ratio of claims of the private sector to GDP, *clpgdp*, using a VAR(3) version, are also reported in the same Table (15) above. These results show that the null hypothesis of no causality from the financial development variable *clpgdp* to the remittances variable *lremit* is not rejected at level 5% while that of no causality from remittances to financial development is rejected. This result implies unidirectional causality running from remittances to the financial development variable *clpgdp*.

Summing up these results, nonexistence of T-Y causality is rejected clearly in both of the models which use *m₂gdp* and *depgdp* as their financial development indicator. In the third class of models which uses *clpgdp* as the financial development variable, nonexistence of T-Y causality is rejected only when causality flows from financial development to remittances, but not in the reverse direction.

Conclusion

The present paper focused on the relationship between foreign workers' remittances and financial development within the context of a major labor-hosting remittance-sending country - the Kingdom of Saudi Arabia. The importance of the study stems from the fact that most works relating to the issue has dealt with it from the perspective of labor-sending remittance-receiving countries. But in many labor-hosting remittance-sending countries like the Oil-rich GCC countries a marked market shortcoming is noted through the failure of the domestic financial market sectors to restrain and benefit from these huge transfers of money abroad in their domestic economies. The present paper examines the issue in relation to the KSA economy using annual data for the period 1971-2013 within the context of cointegration, VECM, and Toda-Yamamoto causality procedures. Variables used in the study are remittances, real GDP, the interest rate, and three alternative proxies for the financial development variable.

Results obtained generally point to a number of facts. There is a significant positive relationship between the level of GDP variable and that of remittances from the KSA indicating that remittances are pro-cyclical with booms and rising incomes spurring higher remittances, while recessions and declining incomes generally slowing the pace of remittances flows to the outside world. Nominal interest rates had the expected negative signs. The three variables used to represent financial development in the study had similar negative impacts on remittances.

This lends support to the argument that the level of financial development in the KSA could still be developed in terms of dealing with foreign workers and their remittances. The development of targeted financial innovations may serve to restrain and lessen the flow of remittances outside the Kingdom. As far as causation between workers' remittances and the relevant financial development variable is concerned, the results on the application of a Toda-Yamamoto method showed the existence of bidirectional (feedback) causality between remittances and *m₂gdp* and *clpgdp*, while causality was unidirectional from remittance to *depgdp*.

References

- Abdel-Rahman, A-M. M. .2006. The determinants of foreign worker remittances in the Kingdom of Saudi Arabia, *Journal of King Saud Univ., Administrative Sciences*, 18 (2): 93-121.
- Aggarawal, R., Demirguc-Kurt, A. and M. S. M. Peria .2011. Do workers' remittances promote financial development? *Journal of Development Economics*, 96(2): 255–264.
- Alberto Posso .2015. Remittances and financial institutions: is there a causal linkage? *BE J. Macroecon*, 15(2): 769–789.
- Alkhathlan K.A. .2013. The nexus between remittance outflows and growth: A study of Saudi Arabia. *Economic Modelling*, 33: 695-700.
- Amuedo-Dorantes, C. and S. Pozo .2015. Remittances and portfolio values: An inquiry using immigrants from Africa, Europe, and the Americas. *World Development*, 41: 83–95.
- Arshia Amiri, Bruno Ventelou. (2012). Granger Causality between Total Expenditure on Health and GDP in OECD: Evidence from the Toda–Yamamoto Approach. *Economics Letters*, 116: 541–544.
- Babatunde O. O., Olayinka M. U., and Okwy P. O. .2011. Impact of workers' remittances on financial development in Nigeria. *International Business Research*, 4(4).
- Bang, J. T., A. Mitra and P. V. Wunnava .2013. Financial liberalization and remittances: Recent panel evidence. Discussion paper No. 7407, *The Institute for the Study of Labor (IZA)*, Bonn. <http://ftp.iza.org/dp7497.pdf>
- Beck, Thorsten, Ross Levine and Norman Loayza .2000. Finance and the sources of growth. *Journal of financial economics*, 58: 261-300.
- Beine, M., E. Lodigiani, and R. Vermeulen .2012. Remittances and financial openness. *Regional Science and Urban Economics* 42, 5: 844–857
- Bettin, G., R. Lucchetti, and A. Zazzaro .2012. Financial development and remittances: Microeconomic evidence. *Economics Letters*, 115(2): 184-186.
- Brahim Razgallah .2008. The macroeconomics of workers' remittances in GCC countries. *Economic Research Forum*, Working Paper Series, No. 410.
- Demirgüç -Kunt Asli, Ernest, L. Cordova, Maria S. M. Perfa and Christopher Woodruff .2011. Remittances and banking Sector breadth and depth: Evidence from Mexico. *Journal of Development Economics*, 95: 229-241.
- Dickey, D. and W. Fuller .1979. Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74: 427-31.
- Dickey, D. and W. Fuller .1981. Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49: 1057-1072.
- Dramane, Coulibaly .2015. Remittances and financial development in Sub-Saharan African countries: A system approach. *Economic Modelling*, 45: 249–258.
- Fawad, A. .2013. The effect of oil prices on unemployment: Evidence from Pakistan. *Business and Economics Research Journal*, 4(1): 43-57.
- Freund, C. and N. Spatafora .2008. Remittances, transaction costs, and informality. *Journal of Development Economics*, 86 (2): 356-366.
- Gammage, S. .2007. Gender and transnational asset accumulation in El Salvador. In C. Moser, (ed.) *Reducing Global Poverty: The Case for Asset Accumulation*. Washington D.C. Brookings Institution Press, 255-272.
- George S. Naufal and Ali Termos .2009. “The responsiveness of remittances to price of oil: The case of GCC”, *OPEC Energy Review*, September.
- Giulia Bettin and Alberto Zazzar .2012. Remittances and financial development: Substitutes or complements in economic growth? *Bulletin of Economic Research*, 64(4): 3370-3378.
- Giuliano, P. and M. Ruiz-Arranz .2009. Remittances, financial development, and growth. *Journal of Development Economics*, 90 (1): 144-152.
- Gupta, S., C. P., and S. Wagh .2009. Effect of remittances on poverty and financial development in Sub-Saharan Africa. *World Development*, 37(1): 104-115.

- Haddad, H.B. and J. Choukir .2015. The time-varying responses of Saudi Arabian economy to workers remittance outflows shocks. *Arabian Journal of Business and Management Review*, 5(6).
- Ilahi, N. and R. Shendy .2008. Do the Gulf Oil-Producing Countries influence regional growth? The Impact of financial and remittance flows. *International Monetary Fund (IMF Working paper) (WP/08/167)*.
- Johansen, S. .1988. Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, 12(2-3): 231–254.
- Johansen, s. and k. Juselius .1990. Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52(2): 169–210.
- King, Robert G. and Ross Levine .1993. Finance entrepreneurship and growth. *Journal of Monetary Economics*, 32 (3): 513–542.
- Lartey, E.K.K. .2013. Remittances, investment and growth in sub-Saharan Africa. *Journal of International Trade and Economic Development*, 22(7): 1038-1058.
- Levine, Ross and Sara Zervos .1998. Stock markets, banks, and economic growth. *The American Economic Review*, 88(3): 537-552.
- Levine, Ross .2005. Finance and growth. *Handbook of Economic Growth*. Elsevier.
- Meriem Bel Haj M., Sami S., and Abdeljelil F. (2014). Testing the Causal Relationship between Exports and Imports Using a Toda-Yamamoto Approach: Evidence from Tunisia. *International Conference on Business, Economics, marketing & and management Research*, 2: 75-80.
- Mookerjee, R. and J. Roberts .2011. Banking services, transaction costs and international remittance flows. *Applied Economic Letters*, 18 (3): 199-205.
- Mundaca, G. .2009.. Remittances, financial market development, and economic growth: The case of Latin America and the Caribbean. *Review of Development Economics*, 13(2): 288-303.
- Orzoco, Manuel and Rachel Fedewa .2006. Leveraging effort on remittances and financial intermediation. Working paper no. 24. Inter-American development bank.
- Rambaldi, Alicia & Howard Doran. (1996). Testing for Granger Non-Causality in Cointegrated System made Easy. Department of Econometrics, University of New England, Working Paper, 88.
- Razgallah, B. .2008. *The macroeconomics of workers' remittances in GCC countries*. Working Paper No. 410, Arab Monetary Fund.
- Santos R. A. & Chris C. Ofonyelu. (2013). Toda-Yamamoto Causality Test between Money Market Interest Rate and Expected Inflation: The Fisher Hypothesis Revisited. *European Scientific Journal*, 9 (7): 125-142.
- Saudi Arabian Monetary Agency .2014. Annual Report, The latest Economic Developments. *Research and Statistics department*.
- Shahzad Syed J. H., Noureen A., Sajid Ali, Naveed R. .2014. Impact of remittances on financia development in South Asia. *Review of Economic & Business Studies*, 17(2): pp 11-29.
- Selim K., U. Adiguzel, T. Bayat and F. Lebe .2010. Causality relationship between real GDP and electricity consumption in Romania (2001-2010). *Romanian Journal of Economic Forecasting*, 4.
- Taghavi, M. .2012. The Impact of workers' remittance on macro indicators: The case of the Gulf Cooperation Council. *Topics in Middle Eastern and African Economies*, 14: 49-73.
- Termos A, G. Naufal and I. Genc .2013. Remittance Outflows and Inflation: The case of the GCC countries. *Economics Letters*, 120: 45-47.
- Terry, D.F., and S.R. Wilson (Eds) .2005. Beyond small change: Migrants' remittances and economic development. *Inter-American development bank*, Washington, DC.
- Toda, H. and P. Phillips .1993. Vector Autoregressions and causality. *Econometrica*, 61(6): 1367-1393.
- Toda, H. Y. and T. Yamamoto .1995. 'Statistical inference in vector auto-regressions with possibly integrated processes. *Journal of Econometrics*, 66: 225-250.
- Umoru, D., A. N. Tizhe .2014. Causality dynamics between money supply and inflation in Nigeria: A Toda-Yamamoto Test and Error Correction Analysis. *Journal of Empirical Economics*, 3(2): 63-75.
- Wolde-Rufael, Y. (2004). Disaggregated Industrial Energy Consumption and GDP: The Case of Shanghai, 1952–1999. *Energy Economics*, 26 (1): 69–75.
- World Bank. .2012. World Development Indicators. Washington, DC: Retrieved from <http://devdata.worldbank.org/data-query>.

Zapata, H. O. and A. N. Rambaldi .1997. Monte Carlo Evidence on Cointegration and Causation. *Oxford Bulletin of Economics and Statistics*, 59(2): 285-98.

