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The impact of exchange rate policy on remittances in Morocco: A Threshold VAR analysis

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Abstract

The aim of this paper is to study the effect of nominal exchange rate movements (MAD to EUR) on remittances in the case of Morocco. It analyses monthly data from 2005 to 2014 using a Threshold Vector Auto Regression (TVAR) model to document the impact of exchange rate policy on remittances to Morocco. The results indicate that there is one best unique threshold at Euro/Moroccan Dirham= 11.2048: under the threshold, the effect of nominal exchange rate appreciation on remittances is positive, and above the threshold the effect is negative. These empirical results provide significant implications for the Central Bank of Morocco.

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1. INTRODUCTION

Remittances have become an important source of financing for developing countries due to their volume as well as their impact on the economies of developing countries. They have increased significantly since the 2000s and are resilient in times of economic crisis in recipient countries (Ratha, 2007). The average annual growth of remittances sent by migrants in the world is 10.32% for the period 1990-2008. The inflow of remittances to Morocco increased at an annual rate of 13.75 % from 2000 to 2008 according to the World Bank data. Morocco is among the major recipients of remittances. Further, Morocco is among the top 15 largest foreign remittance receiving developing countries in the world (Makhlouf and Naamane, 2013). Furthermore, over 19% of remittances in the Arab world are destined for Morocco. This is due to the strategies implemented by the Moroccan authorities. Indeed, Moroccan authorities consider that remittances can be used as one of many tools for development.

This paper focuses on the impact of exchange rate policy on remittances to Morocco. The exchange rate policy remains the important macroeconomic policy in developing countries (Cooper, 1999). In fact, the exchange rate influences the price of goods and services. Exchange rate also exerts a strong influence on remittances (Makhlouf, 2013). Remittances are one of the most visible consequences of the international migration process. They are considered as counter-cyclical with respect to the income in recipient countries (Frankel, 2009). Bettin et al. (2014) find that remittances are negatively correlated with the business cycle in country of origin. Sayan (2006) highlights that remittances can be pro-cyclical or a-cyclical. Sending money is a complex decision involving different variables such as exchange rate and interest rate. Remittances are the result of a mixture of pure altruism and self-interest (Lucas and Stark, 1985). Remittances are generated by individual decisions which are influenced by a macroeconomic environment in the host countries. However, the macroeconomic environment in the home countries also affect the decisions to send money by migrants. Furthermore, several factors explain the behavior of remittances over time and among host countries. Vargas -Silva and Huang (2006) highlight that remittances are more sensitive to shocks operating in the host country than in home countries.

Most studies on remittance behavior are microeconomic (Köksal, 2006). Very little empirical research is interested on the relationship between exchange rate policy and remittances behavior. Further, few studies focus on the behavior of remittance in the Arab Maghreb Union countries (Miotti et al., 2010). In the case of Morocco, there is no research on remittance behavior. It should be noted that the behavior in terms of migrant remittances may vary depending on the sensitivity of remittances on the exchange rate. Similarly, the uncertainties related to the business cycle affect the behavior of remittances (Mughal and Makhlouf, 2011). For example, in times of natural disasters remittances may increase, because they are motivated by altruistic behavior. They are considered counter-cyclical and stable (Ratha, 2007). In addition, remittances play a significant role in reducing the amplitude of business cycles in the country of origin (Mughal and Makhlouf, 2011).

The Moroccan government has implemented policies that include mobilizing and channeling savings of its migrants to the local economy to promote the development of the country (Bouoiyour, 2006). The Moroccan government also aims to simplify the procedures for remitting money. These initiatives are very interesting because they can help Moroccan migrants to stay connected with their country of origin and participating in its development. Remittances occupy a prominent place in the economic policies of most developing countries (Agunias, 2006). In this sense, since the 1960s, the Moroccan government encourages emigration policies (MPI, 2005). Indeed, the Moroccan migration policies have been designed to strengthen the links between Moroccans living abroad and Morocco (Bouoiyour, 2006). The remainder of this paper is organized

as follow: section two provides a brief discussion on the relationship between remittances and exchange rate; furthermore, section three talks about econometric methodology and provides the empirical results; finally, section four concludes this paper by providing some policy implications of this study.

2. REMITTANCES AND EXCHANGE RATE: AN OVERVIEW

The relationship between remittances and exchange rate is bi-causal. This section is divided into two parts. The first part addresses the impact of remittances on exchange rate. The second part highlights the impact of exchange rate on remittances.

A) THE IMPACT OF REMITTANCES ON EXCHANGE RATE

Bourdet and Falck (2006) study the impact of remittances on exchange rate in Cape Verde, their results show that remittances cause the real effective exchange rate to appreciate. Using panel data, Lartey et al. (2012) note that remittances prompt an appreciation of exchange rate. Makhoulf and Mughal (2013) using Bayesian techniques, show that remittances appreciate the real exchange rate in Pakistan. In another study Makhoulf and Chnaina (2011) by using a vector correction error model (VCEM), find that a 1% increase in the ratio of remittances to GDP causes an appreciation of the real equilibrium exchange rate by 0.38% in Tunisia. Barajas et al. (2010), using the technique of cointegration in panel data, find that a shock of remittances causes an appreciation of the real effective exchange rate. In contrast, the results of Mongardini and Rayner (2009), from a study of Sub-Saharan Africa countries, indicate that remittances do not cause the appreciation of the equilibrium real exchange rate. Rajan and Subramanian (2005) observed no relationship between remittances and exchange rate. It should be noted that remittances have a different impact depending on the exchange rate regime. Indeed, Singer (2008) is convinced that remittances from migrants are putting pressure on the choice of exchange rate regime. Table 1 summarizes various effects of remittances on the exchange rate.

TABLE 1: THE IMPACT OF REMITTANCES ON THE EXCHANGE RATE

Authors		Authors	
Amuedo-Dorantes and Pozo (2004)	+	Acosta et al. (2009)	+
Petri and Saadi-Sedik (2006)	+	Lartey et al., (2012)	+
Bourdet and Falck (2006)	+	Mongardini et Rayner (2009)	-
Izquierdo and Montiel (2006)	*	Sy and Tabarraei (2009)	+
Vargas-Silva (2009)	+	Beja (2011)	+
Lopez, Molina and Bussolo (2007)	+	Fayad (2011)	(*)
<i>(-): negative effect, (+):positive effect, (*):no evidence</i>			

B) THE IMPACT OF EXCHANGE RATE ON REMITTANCES

Some macroeconomic factors such as inflation and exchange rate may affect the flow of remittances. This part is specifically interested in how previous studies investigated the impact of exchange rate on remittances. El-Sakka and McNabb (1999) show that both exchange rate and interest rate are an important determinant of remittances in the case of Egypt. The volatility of the exchange rate may also influence the

decision of migrants to remit money (Barro et al., 2007). According to Faini (2007), changes in the real exchange rate causes two main effects: income and substitution effects. Conversely, Straubhaar (1986) notes that remittances are not affected by changes in exchange rates in the case of Turkey. A depreciation of the Indian currency leads to an increase in remittances in short term, but in the long term, it leads to a decrease of the remittances (Sirkeci et al., 2012). Yang (2008) notes that in the case of the Philippines, remittances increase as a result of depreciation of the Peso. Table 2 summarizes various effects of exchange rate on remittances

TABLE 2: THE IMPACT OF EXCHANGE RATE ON REMITTANCES

Authors		Authors	
Russell (1986)	*	IMF(2005)	-
Elbadawi and Rocha (1992)	-	Aydas et al. (2006)	-
Faini (1994)	+	Lueth et Ruiz-Arranz (2007)	-
Lianos (1997)	-	Freund et Spatafora (2008)	-
Buch et al. (2002)	*	Singh et al. (2009)	-
Gupta (2005)	*	Bouoiyour, (2013)	+
<i>(-): negative effect, (+):positive effect, (*):no evidence</i>			

3. EMPIRICAL ANALYSIS

This section assesses the impact of exchange rate on remittances. A threshold VAR model was established in this section. As mentioned in section 2, the relationship between exchange rate and remittances is bi-directional. Since both variables are endogenous, to study the interrelationships between those variables, the VAR model is considered as an optimal model (Joiner, 2001). Indeed, remittances are influenced by the variation of exchange rate and the exchange rate is also impacted by remittances (Singer, 2008). The idea here is to use a nonlinear estimations approach to explain the impact of devaluation and revaluation of the Moroccan exchange rate (MAD/ Euro) on remittances. Most of empirical studies modeling the impact of exchange rate on remittances assume that the relationship between those variables is linear. However, the genuine effect can be nonlinear. In this study, a high exchange rate means depreciation of the Moroccan Dirham. And a low exchange rate means appreciation of the Moroccan Dirham.

3.1. DATA

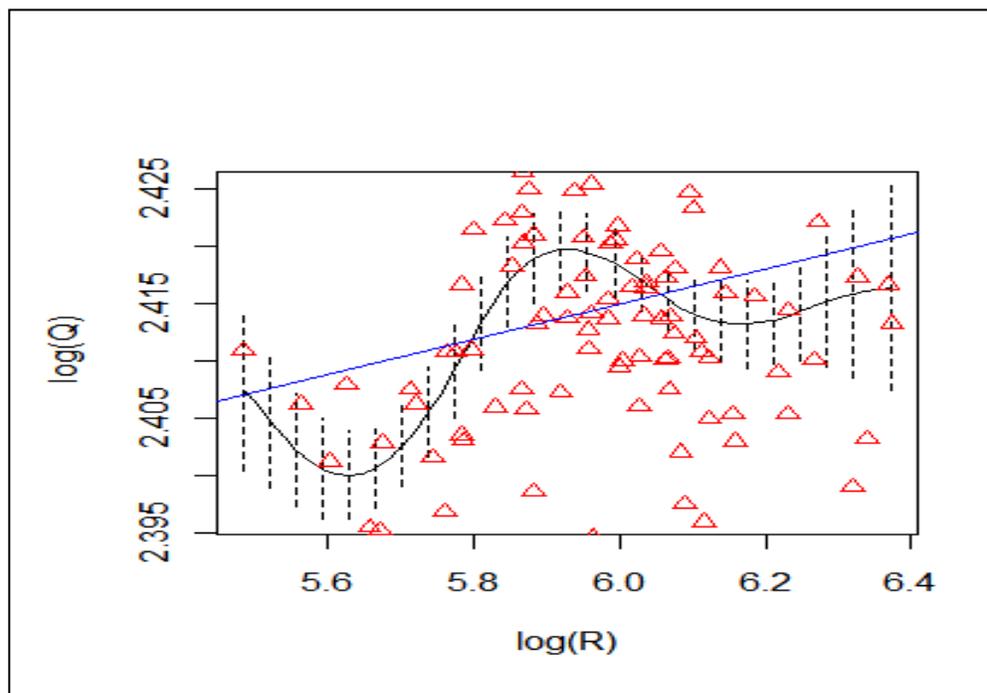
Monthly data used in this paper span from January 2005 to June 2014. Monthly average exchange Rate between Eurozone and Morocco is considered. Most Moroccan migrants are in the Europe. More than 80% of remittances are from Europe (Makhlouf, 2013). Remittances are measured in Euro. A shock of the exchange rate is defined as devaluation of the exchange rate by the Central Bank of Morocco. It represents a positive variation of exchange rate. Note that the Bank of Morocco can use the exchange rate as a tool to boost remittances.

Table 3 gives a summary statistics. For example, table 3 shows that exchange rate varies from 1€ =10.93 MAD to 1€ =11.49MAD.

TABLE 3 : DESCRIPTIVE STATISTICS

	Exchange rate MAD/EUR (Q)	Remittances in Millions (R)
Min.	10.93	240.747
1st Quintile	11.09	353.249
Median	11.18	389.796
Mean	11.18	397.181
3 rd Quintile	11.27	435.305
Max	11.49	586.297
Source	Banque de France (2014)	World Bank WDI (2014)

To explore whether the relationship between Q and R is linear or not figure 1 illustrates a scatter plot of remittances and exchange rate. Figure 1 clearly shows that the relationship between exchange rate and remittances is not monotone. The blue line represents the linear relationship between exchange rate and remittances, and the black line represents the kernel regression. The possibility of a non-linear propagation of remittances according to changes in exchange rate is investigated. The TVAR model captures a non-linearity such as asymmetric reactions of remittances to shocks.

FIGURE 1: SCATTER PLOT OF REMITTANCES AND EXCHANGE RATE

3.2. TVAR MODEL

The use of a nonlinear framework with regime switching determined by exchange rate was motivated by the capacity of exchange rate to stimulate and to shorten remittances. The use of monthly data is a relevant contribution in this context. We assume that « bad times » as periods of an appreciation of exchange rate and

a “good times” as periods of depreciation of exchange rate. Bad times blunt purchasing power of remittances. Conversely good times increasing the purchasing power of remittances. The value of remittances to Morocco might be influenced by the appreciation of the Dirham against the Euro. Appreciation of a local currency erodes the purchasing power of remittances to Morocco, and vice versa. The threshold VAR can be specified as follows:

$$Y_t = B^1(L)Y_{t-1} + (B^2(L)Y_{t-1})I[Q_{t-d} > \gamma] + U_t \quad (1)$$

Where Y_t is a vector of endogenous variables (R and Q) and I is an indicator function that takes the value of 1 if the value of exchange rate is higher than the threshold value γ and 0 otherwise. $B^1(L)$ and $B^2(L)$ are lag polynomial matrices. Q is the exchange rate, whereas d the delay parameter is assumed to be less than or equal to lag 1. Estimation of equation 1 can be done directly by CLS (Conditional Least Squares). To estimate the TVAR¹ we use Conditional least Square (CLS) technique which is implemented in “tsDyn” package in R software.

VAR LAG ORDER SELECTION

Information criteria such as AIC , HQ, SC and EPE are used to choose a lag length for the unrestricted VAR-model. Max lag=10. Table 3 gives the optimal lag = 1.

TABLE 3: OPTIMAL LAG

lag length	1	2	3	4	5	6	7	8	9	10
AIC(n)	-14.07*	-14.02	-14.00	-13.98	-13.91	-13.85	-13.87	-13.82	-13.77	-13.73
HQ(n)	-14.01*	-13.92	-13.86	-13.79	-13.69	-13.58	-13.56	-13.47	-13.38	-13.30
SC(n)	-13.92*	-13.77	-13.64	-13.52	-13.36	-13.19	-13.11	-12.96	-12.81	-12.67
FPE(n)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.3. EMPIRICAL RESULTS

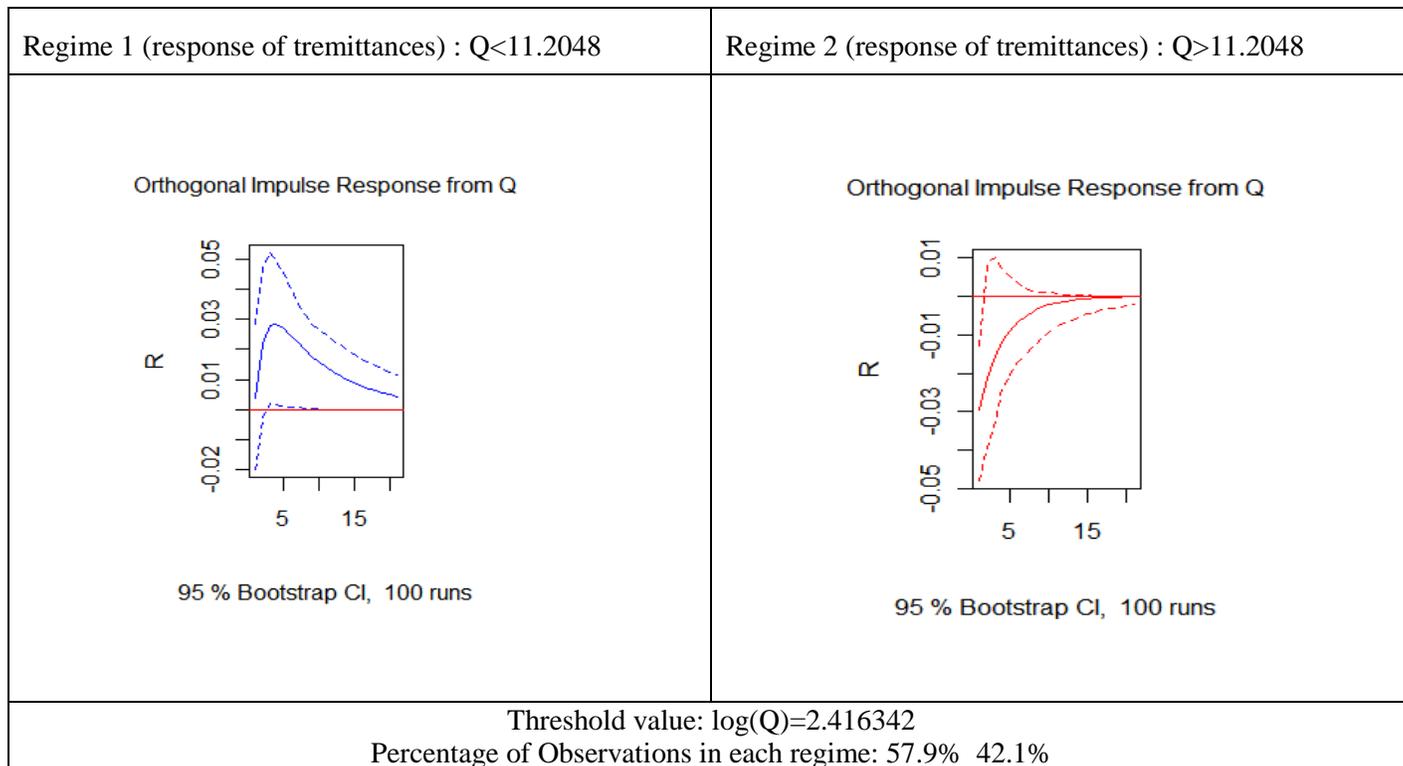
Figure 3 shows the results of the impulse response functions from TVAR model. Results report two regimes: the lower regime (exchange rate < 1€= 11.2048 MAD) and the upper regime for (Q>11.1048). The impulse response functions show that the responses of remittances after a shock in exchange rate are asymmetric. In the lower regime, the impact of devaluation of exchange rate is positive. Conversely, in the regime 2, a positive shock in the exchange rate leads to decrease of remittances. Hence, a movement in the change in the exchange rate causes two effects namely: an income and substitution effect. If altruistic motivations dominate the self-interest motivations, a policy of devaluation does not drain more remittances. When remittances for investments are more important than those for consumption, in this situation, a policy of devaluation can attract more remittances. The changes in remittances resulting from changes in exchange rate depend on threshold value.

Devaluation of the exchange rate pushes migrants to send more money in the short run. This can be explained by the substitution effect. The exchange rate is a way that could allow migrants to compare their purchasing power between the host and the home country. The non-linearity of the relationship proves the coexistence of two effects simultaneously (substitution and revenue). However, other factors can play an important role in the variation of remittances, such as economic conditions. The response of remittances does not happen immediately. This can be explained by the coexistence of two types of behavior. The first is

¹ <http://cran.r-project.org/web/packages/tsDyn/tsDyn.pdf>

altruism in which remittances are intended to meet the basic consumption needs of migrant families. This first type of remittances caused by the needs of migrant families. In this case remittances should not be influenced by other variables. The second case concerns remittances that are used for investments. In this case, other factors may play an important role in the determination of remittances.

FIGURE 2 : IMPULSE-RESPONSE FUNCTION



4. CONCLUSION

A threshold value is estimated endogenously. The exchange rate of 11.2048 acts as a threshold between a positive and a negative effect. Results can help policy makers. The Central Bank of Morocco should take into consideration the exchange rate as a tool to increase remittances. Indeed, reducing exchange rate volatility can stabilize the real value of remittances. The government also can use the exchange rate policy in order to direct or influence remittances. It is obvious that other economic factors may influence the volume of remittances. Remittance decisions are complex. Indeed, remitting behavior varies depending on age, education, gender, size of the household, etc. Remittances have arisen and given their large size, the government of Morocco can use these to promote development. The government should establish policies targeting maximization remittances. Finally, some variables such as interest rates, migrant stock, etc. have not been considered due to their unavailability. However, despite these shortcomings we believe that we have yielded interesting results that can be useful to policymakers.

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