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Remittances and Business Cycle in Morocco

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Abstract

This paper empirically investigates the cyclical properties of remittances in Morocco and examines factors driving their changes (from countercyclical to procyclical). First, by using the time-varying coefficients method for quarterly data from (Q1, 2004) to (Q1, 2015), this paper shows that the cyclical properties of remittances change over time. Second, the paper explores factors causing changes in cyclical properties of remittances, it shows that in the time of crises and depreciation of exchange rate remittances tend to be countercyclical. The paper provides a better understanding of the nature of the relationship between cyclical component of remittances and business cycle fluctuations.

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1 Introduction

Remittances to Morocco are considered to be an important source of external resources. Morocco is, indeed, considered as one of the countries that receive more remittances in the Arab world and Middle East & North Africa (MENA) region. For example, in 2017 personal remittances, received (% of GDP) in Morocco is 6.22% while the average in the Arab world is 2.61% and in the MENA¹ region is 4%. Moreover, according to World Bank data, the average annual growth rate of remittance flows in current US\$ to Morocco for the period 1975-2017 is 6.11%. In 2017, the emigration rate is close to 9%. France, Italy and Spain share more than 70% of Moroccan migrants. In addition all the factors related to migration suggest that remittances will increase in the future². Such an importance of remittances makes them essential for the economy, their response to growth and the economic cycle is an important subject to study.

In this paper, we firstly study the nature of the cyclical properties of remittances. Secondly we explain the changes in cyclical properties. We find that the cyclical properties of remittances change over time. In the case of Morocco no unified conclusion on cyclical properties of remittances actually exist. In fact, in the Moroccan context [Sayan \(2006\)](#) points out that remittances are procyclical with respect to the business cycle, while [Bouhga-Hagbe \(2006\)](#) concludes that they are countercyclical. In view of these two studies, it seems difficult to draw any conclusion about the real nature of the cyclical properties of remittances. Therefore, this paper goes beyond these contradictions in order to provide more details on the empirical nature of business cycles and remittances in Morocco. This paper takes into account this finding by using time-varying coefficients estimation method developed in ([Cai, 2007](#)) to clarify the empirical relationship between the cyclical components of remittances and those of GDP in Morocco. This technique considers the possible coexistence of the two types of results

¹Middle East & North Africa (excluding high income)

²According to (Gallup, 2018) 3.7% of adults plan to migrate to another country in the next 12 months.

The country's Youth unemployment rate is relatively high at 17.8% in 2018 International Labour Organization.

(procyclical and countercyclical). To do so, firstly, the Hodrick-Prescott filter is applied to measure the business cycle and get detrended remittances as in (Ahmed, 2012; Mughal and Ahmed, 2014). Secondly, time-varying coefficients method is applied to take into account possible changes in the behavior of remittances over time. Thirdly, the change in remittance behavior towards the business cycle is explained by economic crises and exchange rate fluctuations and agricultural production. The main results show that the cyclical properties of remittances vis-à-vis business cycle change over time (both behaviors coexist: procyclical and countercyclical). The contribution of this paper compared to the existing economic literature on the cyclical properties of remittances is two-fold: i) Contrary to most studies that give a simple procyclical vs countercyclical conclusion of remittances, this paper finds that cyclical properties change over time. ii) This paper gives possible explanations for the changes in the cyclic properties of the remittances.

The empirical relationship between remittances and business cycle has been widely studied in economic literature see for example (Sayan, 2004, 2006; Mughal and Ahmed, 2014; Sayan and Tekin-Koru, 2012). The assumption that remittances are linked to altruistic behavior suggests that income in the host country positively affects remittances whereas income in the country of origin negatively affects remittances (Schiantarelli, 2005). Investigation reveals that the response of remittances to business cycle in the country of origin is positive during periods of expansion (motivated by investment behavior) and negative in times of economic downturn, in this case, remittances can amplify the fluctuations of economic cycles in the countries of origin. The rest of this paper is organized as follows: Section 2 describes the two main bodies of literature on the cyclical properties of remittances. It broadly categorizes studies that underpin the idea that remittances are procyclical and studies that suggest that remittances are countercyclical. Section 3 investigates the empirical relationship between remittances and business cycle by using classical linear regression and time-varying coefficients technique. Section 4 concludes this paper.

2 Empirical Debate On Cyclical Properties of Remittances

Two broad strands of research can be distinguished :

1-Remittances are countercyclical

According to the World Bank,

"Remittances may move countercyclically relative to the economic cycle of the recipient country. Remittances may rise when the recipient economy suffers a downturn in activity or macroeconomic shocks due to financial crisis, natural disaster, or political conflict, because migrants may send more funds during hard times to help their families and friends. Remittances may thus smooth consumption and contribute to the stability of recipient economies by compensating for foreign exchange losses due to macroeconomic shocks."([Schiantarelli, 2005](#), P. 99).

Several studies share this view. They have found a countercyclical relationship between remittances and business cycle in the country of origin and usually explain this result by the altruism of migrants. For example, [Ahmed \(2012\)](#) shows that migrant's remittances are countercyclical with respect to home output and households consumption in Pakistan. [Vargas-Silva \(2008\)](#) emphasizes that in the case of Mexico, remittances are countercyclical, while Foreign Direct Investment is procyclical. As we mentioned [Bouhga-Hagbe \(2006\)](#) shows that altruism is the main determinant of remittances and he concludes that remittances are countercyclical. Using a panel data between 1980 and 2006, [Karpestam et al. \(2011\)](#) estimate the equation of consumption and they added remittances as an explanatory variable, they note that altruistic behavior is more important than insurance behavior. [Frankel \(2011\)](#) confirms the assumption that remittances are countercyclical and procyclical with respect to income in the host country.

By studying the cyclical properties of remittances in 4 countries (India, Pakistan, Bangladesh and Sri Lanka) (Mughal and Ahmed, 2014) find that remittances to India and Pakistan are countercyclical. (Akkoyunlu and Kholodilin, 2006) conclude that remittances are countercyclical in the case of Mexico. (De et al., 2016) find that remittances do not appear to systemically co-move with business cycle fluctuations and they are stable during episodes of sharp business cycle volatility.

2-Remittances are procyclical

Other studies do not share the World Bank's view on the cyclical properties of remittances. In this perspective, Sayan (2006) highlights that remittances are procyclical. In the same study cited in the previous subsection of (Mughal and Ahmed, 2014) remittances to Bangladesh and Sri Lanka are found to be procyclical. Sayan (2004) by analyzing business cycle properties of remittances in Turkey, he finds that the correlation of cyclical component of remittances and the cyclical component of GDP is positive which means that remittances are procyclical. In this line Sayan and Tekin-Koru (2012) reveal that remittance from Germany to Turkey react procyclically with the output in Turkey. Table 1 summarizes the main empirical relationship between detrended remittances and business cycle. Table gives also filters used for detrending remittances and GDP.

Table 1: Relationship Between Detrended Remittances and Business Cycle

Authors	Filter	Data	Estimation	Finding
Chami et al. (2008)	H-P	Annual 1970-2005	Regression	Counter-Cyclical
Akkoyunlu and Kholodilin (2006)	H-P	Annual 1962-2004	Correlation	A-cyclical
Vargas-Silva (2008)	B-K	Quarterly 1981-2006	Correlation	Counter-Cyclical
Sayan and Tekin-Koru (2012)	H-P and Polynomial	Quarterly 1987-2003	Correlation	Pro-Cyclical
Sayan (2006)	Polynomial	Annual 1973-2003	Correlations	Procyclical for Morocco
Ahmed (2012)	H-P, B-K	Annual 1973-2010	Correlation	Counter-Cyclical
Mughal and Ahmed (2014)	H-P, B-K and O-C	Annual 1975-2011	SVAR	countercyclical
Mughal and Ahmed (2014)	H-P, B-K and O-C	Annual 1975-2011	SVAR	Pro-Cyclical

H-P: Hodrick-Prescott
B-K: Baxter and King
O-C: Ouliaris and Corbae
SVAR: Structural Vector Autoregression
Source: Makhoul (2013) and updated authors

Empirical studies do not provide a relevant response on the genuine relationship between remittances and business cycle, due to assumption on the stability of the relationship between remittances and business cycle. The disparate results on the cyclical properties of remittances in general and specifically in the

case of Morocco might be due to the fact that they are based on fixed parameters over time. Unlike to what we do in this paper, previous studies on the cyclical properties of remittances consider that the relationship does not change over time as a result. This supposition is taken into account in this paper by introducing a model time-varying coefficients method developed by (Cai, 2007).

3 Empirical Study

Data

We focus our investigations on quarterly data for remittances (Nominal Domestic Currency in Millions) and GDP (Nominal, Domestic Currency in Billions). Summary statistics are given in table 2 (annex). Data are obtained from IMF for GDP and “*Office des Changes de Maroc*”³ for remittances.

As shown in Table 1, most studies on the cyclical properties of remittances use the Hodrick Prescott filter, so we use the same filter to detrend remittances and GDP. Cyclical component of GDP and remittances are given in annex: figure 4.1 and 4.2. Remittance cycles and GDP cycles are stationary $I(0)$ ⁴. The figure 3.1 below shows the evolution of remittance cycles in blue line and business cycle in red line. The chart clearly illustrates that in some sub-periods, countercyclical behavior of remittances dominates which means remittances fall during times of general prosperity and increase during economic crisis. Figure 3.1 also shows that in some sub-periods the procyclical behavior of remittances dominates. For example, figure 3.1 clearly shows that remittances are countercyclical in early 2004 and at the end of 2004 of the same year they become procyclical.

The correlation or regression models that are based on fixed parameters used in literature (see Table 1) to detect the nature of the relationship between detrended remittances and business cycle are not able to detect changes in the

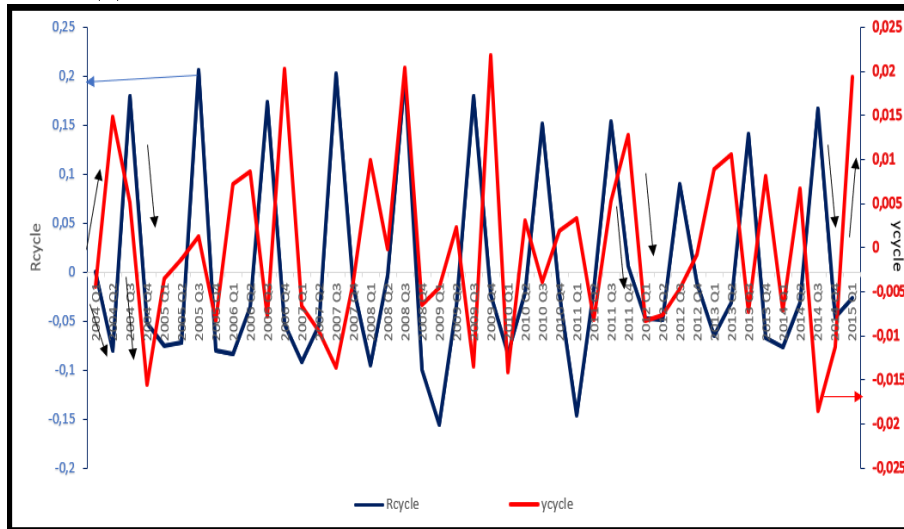
³<https://www.oc.gov.ma/en>

⁴Augmented Dickey-Fuller Test

data:y Dickey-Fuller = -7.839, Lag order = 3, p-value = 0.01

data: R Dickey-Fuller = -7.5296, Lag order = 3, p-value = 0.01

Figure 3.1: Co-Movement Between Detrended Remittances (R) and Business Cycles (y)



behavior of detrended remittances (from procyclical to countercyclical).

For example, ordinary least squares - see Table 3 in annex- gives us a negative and non-significant parameter on the relationship between detrended remittances and business cycle over the full period. However, Figure 3.1 tells us that the relationship is not negative over the whole period. The majority of studies on the cyclical properties of remittances focus on the average relationship over the full period and assuming that the relationship is stable over time. These studies provide essential but limited information as the behavior of remittances in respect of economic activity in the country of origin changes over time (Makhlouf, 2013). Another econometric technique could be an alternative that concerns time-varying coefficients models can detect changes in the relationship between remittances and GDP. In this paper, we suppose that the behavior of remittance cycles is not stable over time, as shown in Figure 4.1. Time-Varying Coefficients method is the adequate technique to take this hypothesis into consideration. This technique is important for exploring the dynamics of the link between remittances and business cycles. Due to its flexibility, this technique allows a better understanding of the dynamics of remittances. Unlike OLS

this technique does not give an estimated parameter average one by one but it gives a parameter value for each period noted $\hat{\beta}_t$. Time-Varying Coefficients can be written as follows:

$$y_t = \beta_t R_t + \mu_t \quad (1) \quad t = 1, 2, \dots, T$$

$\beta_t = f(t/T)$ unknown function. Using the method developed in (Cai, 2007) the parameter Beta(t) can be estimated by using non parametric estimation as the following:

$$\hat{B}_t = \frac{\sum_1^T R_t(t_i-t)K_h(t_i-t) y_t}{\sum_1^T R_t^2(t_i-t)K_h(t_i-t)}$$

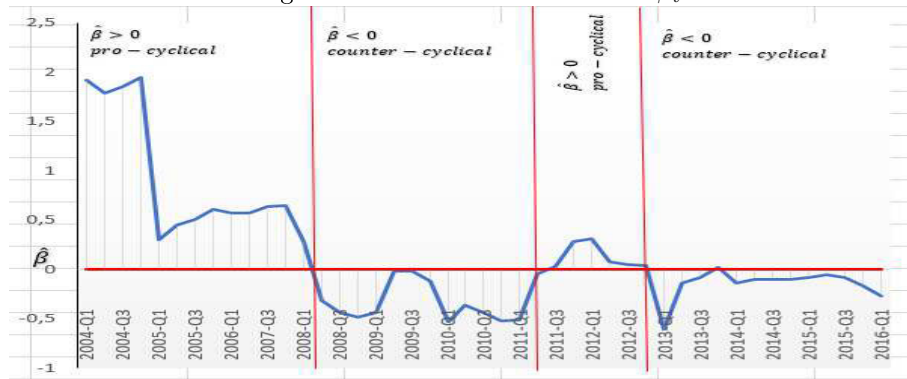
$$K_h(t_i - t) = \frac{1}{h} K\left(\frac{(t_i-t)}{h}\right) \quad K \text{ is kernel function and } t_i = \frac{i}{T}; i = 1, 2, \dots, T.$$

The results of the model (1) are given in Table 4 and Figure 3.2. the quality of fit is better with the model (1) than OLS. The results of the model (1) given in the figure 3.2 and in the table 4 in annex show that beta coefficient changes sign which means that the relationship between detrended remittances and business cycle can be procyclical or countercyclical. This result explains well the ambiguity of the empirical relationship between remittances and the business cycle found in the economic literature. Our Results are in line with (De et al., 2016) who find that remittances do not appear to systemically co-move with business cycle fluctuations and they are stable during episodes of sharp business cycle volatility.

Remittances can be seen as savings transfers during periods of expansion, in this case remittances can be considered as an investment. For example to buy houses or create small business. In the case of Cuba, Hansing and Orozco (2014) find that a significant part of remittances is oriented towards the creation of small businesses, in this case, remittances could be procyclical. Conversely, in times of economic downturn or recession remittances can be different from periods of expansion. During times of contraction, migrants look to help and aid their families and friends. Evidence shows that higher remittances are often associated with periods of economic downturn. During times of economic downturn the quality of financial institutions deteriorates causing a decrease of migrants' investments. Results clearly show that both behaviors coexist (pro-

cyclical and countercyclical).

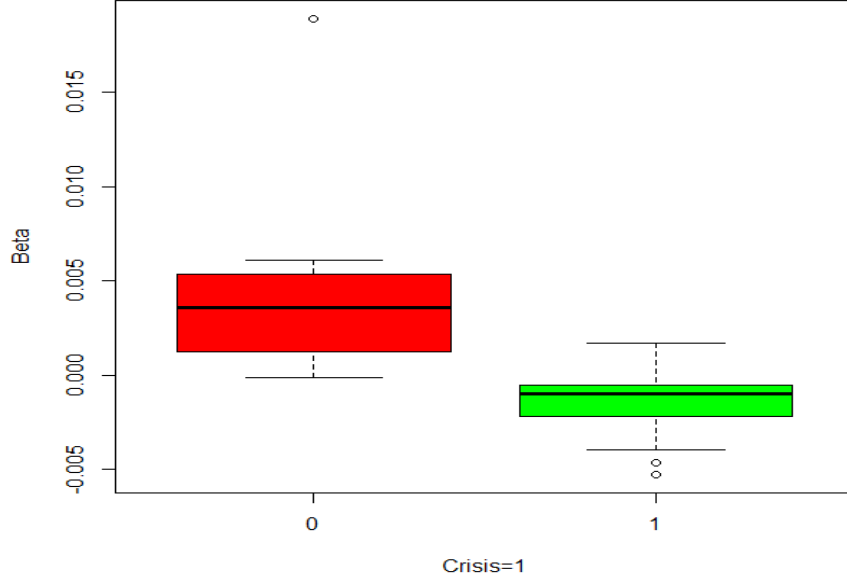
Figure 3.2: Plot of the Coefficient $\hat{\beta}_t$



Explain Changes from Pro-cyclicity to Counter-cyclicity

In this sub-section, we will try to understand the factors that cause the change in remittance behavior. Figure 3.3 highlights that the value of beta (the coefficient between remittances and business cycle) is negative in the 2008 financial crisis, which means that the relationship is countercyclical. The main idea from this graph is that detrended remittance behavior tends to be countercyclical in times of economic difficulty. Plotting the coefficient $\hat{\beta}_t$ illustrates how the relationship between detrended remittances and business cycle changes with time. From a positive relationship to a negative one. Others factors can also influence the behavior of remittances. [Wahba \(1991\)](#) distinguishes between two kinds of remittances: remittances used for helping families and remittances used in investment. We consider these factors in model (2)

Figure 3.3: Box Plot ($\hat{\beta}_t \sim Crisis$)



We take the exchange rate, inflation in Morocco and the 2008 financial crisis as the main exogenous factors that might influence the empirical relationship between remittances and business cycle. The exchange rate⁵ and inflation are taken from the IMF IFS database. The model that explains the evolution of the $\hat{\beta}_t$ of the model (1) can be written as follows:

$$\hat{\beta}_t = f(X_t) + \epsilon_t \quad (2)$$

where:

X : NEER (exchange rate; inflation; financial crisis 2008 and the agricultural added value. [Bouhga-Hagbe \(2006\)](#) uses agricultural GDP to explain the motivations for remittances in the Moroccan case. The results of the model (2) are given in the table 5 (annex).

Results in Table 5 (annex) show that exchange rate depreciation, and increase in income and agricultural production in home country tend to change the relationship between remittances and the business cycle so that this relation-

⁵Exchange Rates, Domestic Currency Per US Dollar, End of Period, Rate

ship will have a countercyclical pattern. In addition, during periods of economic crisis remittances tend to be countercyclical. An increase in inflation tends to encourage the procyclical character of remittances. Several factors may affect the changing cyclical properties of remittances, namely the change in the profile of migrants (seasonal vs. permanent). Permanent migrants tend to smooth their remittances and adopt investment strategies and are more sensitive to macroeconomic variations in the country of origin than seasonal migrants. Education can also play a role on the cyclical properties of remittances. The skilled migrant will have an unskilled migrant strategy. The structures of host country economies can also influence the characteristics of remittance cycles. When remittances are countercyclical, they can replace traditional insurance mechanisms in countries that do not have systems of insurance sufficiently efficient. They can also play a significant role in the health and education of children. In this way, macroeconomic context in Morocco may influence the behavior of remittances. As [Taylor \(1999\)](#) states in the case of Mexico, our results support the idea that they may also consider as a shock absorber.

4 Conclusion

This paper analyses the remittances reaction to Morocco's business cycle during ten years using quarterly data. It proposes a new technique compared to those used in the economic literature to measure the relationship between remittances and the business cycle in Morocco. It uses time-varying coefficients and illustrates that the cyclical properties of remittances change over time. Remittances are countercyclical in times of recession. The main finding of this paper has shown that remittances are driven by dynamics factors and the response to the state of economic activity in the countries of origin change with time.

The implications of this empirical finding in this paper for macroeconomic policy are twofold: firstly, in the light of the importance of remittances to smooth business cycle and macroeconomic stability, and secondly macroeconomic sta-

bility, in home country, by itself does not guarantee stability of remittances. Governments in migrant sending countries can encourage both kind of remittances (investment and aid) by various measures such as exchange rate premium and tax facilities for migrant investments. The government can use investment incentives for migrants during periods of expansion to increase remittances.

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Annex

Table 2: Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Remit	45	13,055.590	2,348.798	8,367.902	11,807.000	14,382.000	17,656.000
GDP	45	178.941	34.296	124.360	149.300	205.570	240.720

Figure 4.1: Cyclical Component of GDP.

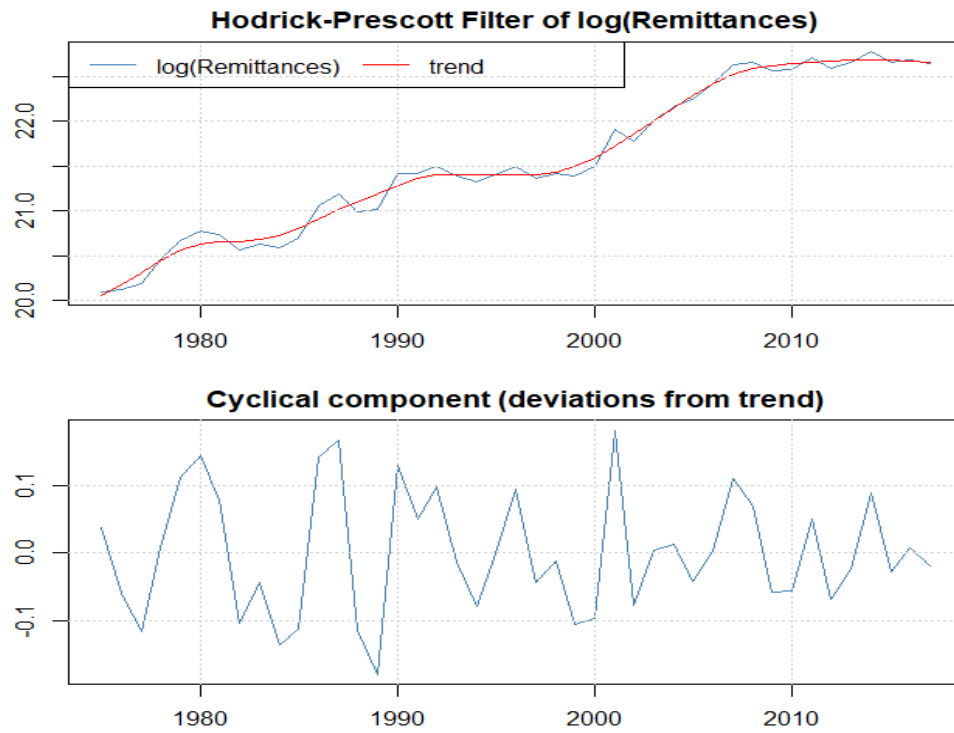


Figure 4.2: Cyclical Component of Remittances.

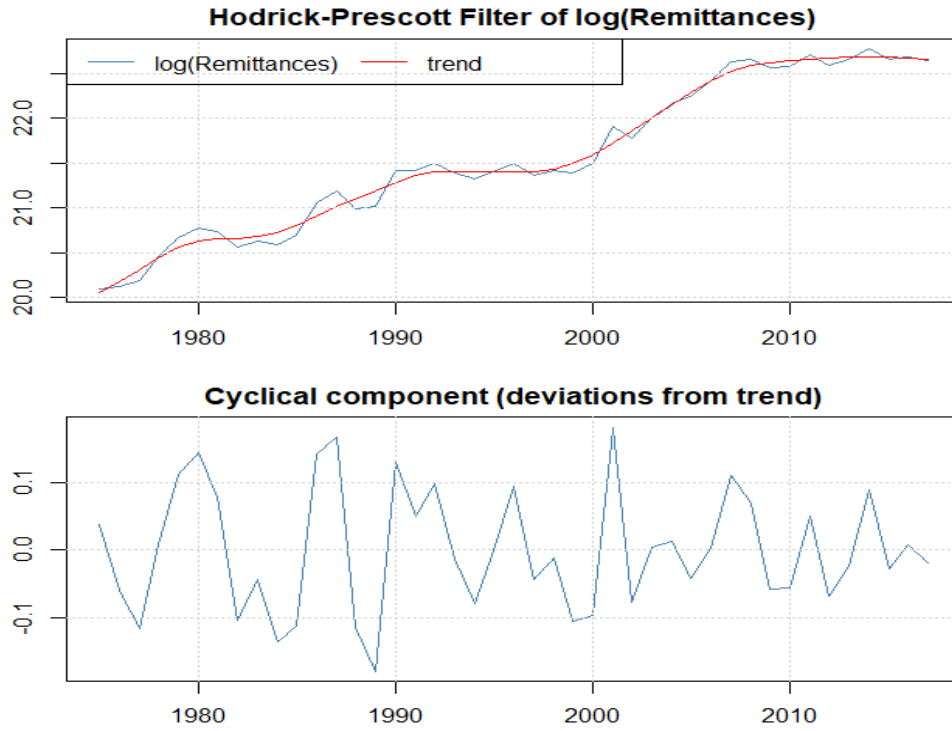


Table 3: OLS Results

<i>Dependent variable: Detrended Remittances</i>	
	R
y	-1.738 (1.460)
Observations	45
R ²	0.031
Adjusted R ²	0.009
Residual Std. Error	0.059 (df = 44)
F Statistic	1.417 (df = 1; 44)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 4: Summary of Time-Varying Estimated Coefficients

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=====
                                Y
Min.    -0.0060272
1st Qu. -0.0016441
Median  -0.0004301
Mean     0.0014998
3rd Qu.  0.0031032
Max.     0.0194512
Bandwidth: 0.3
Pseudo R-squared, assuming independence: 0.9898
  
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Table 5: Determinants of $\hat{\beta}_t$ variation

	Dependent variable: $\hat{\beta}_t$				
	(1)	(2)	Beta (3)	(4)	(5)
Crisis	-1.089*** (0.378)				
log(Agr)		-3.550*** (0.759)			
Q			-0.738** (0.366)		
Inflation				0.324** (0.159)	
lag(log(GDP), 1)					-4.184*** (0.774)
Constant	-1.282*** (0.303)	8.984*** (2.351)	4.237 (3.088)	-2.515*** (0.322)	19.638*** (4.002)
Observations	45	45	45	45	45
R ²	0.162	0.337	0.087	0.088	0.405
Adjusted R ²	0.142	0.322	0.065	0.067	0.391
Residual Std. Error (df = 43)	1.213	1.079	1.266	1.265	1.022
F Statistic (df = 1, 43)	8.306***	21.864***	4.073**	4.155**	29.228***

Note:

*p<0.1; **p<0.05; ***p<0.01