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The unbiased forward exchange rate (UFER) hypothesis which hard core insists on the fact that the forward foreign exchange rate is an unbiased predictor of the corresponding spot exchange rate has been the linchpin of relentless waves of studies since the seventh century. By casting a glance on the empirical studies concentrated on this issue, the first conclusion that all lecturers can draw is that the UFER Hypothesis is denied: most of the studies that test the unbiased hypothesis reject it and they generally agree on the fact that the spot exchange rate moves on average in the opposite direction from what was predicted (Froot & Thaler, 1990) giving, hence, rise to the forward premium puzzle (Fama, 1984).

This stunning result has been proven and reproved many times by relying only on major currencies without throwing any light on currencies of developing countries. But it is fair to mention that only the recent work which was published in 2010 by Frankel and Poonawala has made of these often forgotten currencies a crucial part in their study of the old and hot topic of the UFER's hypothesis; it focused on a comparison between currencies of developed countries and emergent ones during the eight-year span from 1996 to 2004.

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Nevertheless, these two researchers have not included in their set of data Maghrebian currencies since they were not represented by considerable forward markets before 2004.

"The Forward Market in Emerging Currencies: Less Biased than in Major Currencies" was the title chosen by Frankel and Poonawla (2010) for their study which has been the key instigator behind running our research centered especially on studying the UFER hypothesis in the Arab Maghreb countries. For that reason, this work can be considered as an extension of the above cited study and an attempt to focus our whole attention only on these emergent countries for four years from 2004 to 2008. However, until 2004, Algeria, Libya and Mauritania have not had considerable foreign exchange markets. Hence, only Moroccan and Tunisian currencies can form our data sample.

In other words, the aim of this paper is to prove the findings of Frankel and Poonawala (2010) for the Arab Maghreb countries: will the forward premium bias survive in these two countries? Is this bias so severe as in developed countries?

This objective has been achieved; our results corroborate previous ones found by Frankel & Poonawala (2010) and do not lure the forward premium puzzle to its doom; this bias appears less pronounced for emergent countries, and particularly for Morocco and Tunisia, than for developed ones despite the continuous rejection of the UFER hypothesis.

The outline of the remainder of this paper is as follows. Section 2 will throw some light on previous studies interested in the UFER hypothesis and the main conclusions they have extracted particularly by using "level regressions" and "first difference regressions" without forgetting to point out the circumstances that have surrounded the emergence of the forward premium anomaly. The focus of Section 3 is to lay out this work's trump card by highlighting our empirical results obtained using Seemingly Unrelated regression and checking if the forward premium anomaly is doomed to failure in these emergent countries. Finally, Section 4 summarizes and concludes.

A bird's eye view of empirical literature

By casting a glance at anterior studies focusing on the relationship between the spot and forward rates, it seems clear that it has fueled many debates and that testing the UFER hypothesis has been the beating heart of hundreds of studies; it has been tested using numerous econometric techniques with different degrees of sophistication such as Ordinary Least Squares (OLS), Instrumental Variables (IV), Seemingly unrelated regression (SUR), Vector error correction model (VECM) (Claida & Taylor, 1997), Markov-switching VECM (Clarida *et al.*, 2003) and Smooth Transition Regression (STR) (Bonga-Bonga, 2009).

The first well known equation tying the future spot rate to the forward one is called “naïve regression” or “Levels regression”, it was widely studied by Cornell (1977), Beljer & Khan (1980), Frankel (1981), Fama (1984), Barnhart and Szakmary (1991), McCallum (1994), Hai *et al.* (1997), Roll & Yan (2000), Chakraborty & Haynes (2008), Chakraborty & Evans (2008), Thornton (2007), and so on…

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This "forward rate version" as called by McCallum (1994) consists in regressing the natural logarithm of the observed spot rate at time (t+k) s_{t+k} on the natural logarithm of the forward rate at time t for k-periods ahead f_t :

$$s_{t+k} = \alpha + \beta . f_t + u_{t+k} \qquad (1)$$

It serves to test the null hypothesis $H_0: \{\alpha = 0; \beta = 1\}$ and should generate, via its estimation through the famous econometric technique: the Ordinary Least Squares (OLS), an estimated constant $\hat{\alpha}$ not significantly different from zero and an estimated coefficient on the forward rate $\hat{\beta}$ not significantly different from one, without forgetting that the error term should have a conditional mean of zero ($E_t[\mu_{t+k}] = 0$), in order to be able to qualify the forward rate as the best predictor of the future spot rate and hence validate the UFER hypothesis. This aim was often achieved by plenty of authors like Frankel (1981), Edwards (1982), Roll & Yan (2000), Zhou & Kutan (2005), Chakraborty & Haynes (2008), and so on…

It is worthy to note that equation (1) has been tested using different estimation methods and particularly OLS, IV and SUR as it was listed by Baillie & McMahon (1990, 170-1) in their book "The Foreign Exchange Market - Theory and Econometric Evidence" devoted to improving the understanding of foreign exchange markets. As prime examples, we note that the naïve regression (equation 1) has been estimated, according to Baillie and McMahon (1990), after the collapse of Bretton Woods system, many times by Frenkel (1981) via OLS and IV, by Baillie (1981) and Baillie *et al.* (1983) via OLS and by Bailey *et al.* (1984) via OLS and SUR and all these studies concluded that the UFER hypothesis cannot be rejected.

However, this impressive edifice is unfortunately not exempt from limits since it has been demonstrated by many researchers such as Meese & Singleton (1982) that both spot and forward rates are non-stationary, which accuses these OLS estimators of being biased and inconsistent. This problem was not undecipherable since these two variables are first difference-stationary (Hakkio & Rush, 1989) and henceforth, to study the UFER hypothesis; the equation that should be estimated is:

$$s_{t+k} - s_t = \alpha + \beta . (f_t - s_t) + u_{t+k} \qquad (2)$$

where $(f_t - s_t)$ is the forward premium and $s_{t+k} - s_t$ is the change in future spot rate. Similar to equation (1), the null hypothesis is $H_0: \{\alpha = 0; \beta = 1\}$. This second equation has won more weight and has been the core of numerous studies established by pioneers like Bilson (1981), Fama (1984), Boothe & Longworth (1986), Frankel & Froot (1989), McCallum (1994), and so on… who used different currencies coupled to a large continuum

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of periods in order to finish all by agreeing about one important feature: estimates of β are markedly different from one, even worse, they are negative.

This result has thrown doubts on the UFER hypothesis which seems to be rejected in the light of the quite majority of studies employing frequently OLS regressions for estimating the second equation.

Nevertheless, unlike the first equation, equation (2) has been rarely tested using IV or SUR. In fact, to our knowledge, only Spagnolo *et al.* (2005) have used Instrumental Variables (IV) to estimate the UFER hypothesis through the test of equation (2): for this instance, they have chosen $(f_{t-1} - s_{t-1})$, $(f_{t-2} - s_{t-2})$ and $(f_{t-3} - s_{t-3})$ as instruments and finished by concluding that the forward premium puzzle is not vanished, it persists since estimates of β still far from their theoretical value, the unity.

Besides, despite the efficiency gains guaranteed by the use of the SUR, not numerous are the studies using it for testing the UFER hypothesis (Bilson, 1981; Fama, 1984; Cornell, 1989 and Frankel & Poonawala, 2010).

Empirical investigation

After this bird's eye view on the forward premium puzzle, a particular focus on the data sample's features is compulsory.

First of all, it is crucial to remind all readers that the first aim of this research is to test the UFER hypothesis for a set of emergent market currencies: the Arab Maghreb currencies for the four-year span from 2004 to 2008. However, until 2004, Algeria, Libya and Mauritania have not had considerable foreign exchange markets which makes us urged to include only Moroccan Dirham and Tunisian Dinar in our study.

In this work, we seem to be on the feet of Frankel & Poonawala (2010) not only by choosing the one month horizon for the forward exchange rate but also by using the SUR procedure useful "to correct for the likely correlation of the error term across currencies" (Frankel & Poonawala, 2010).

Weekly data for these two emergent countries (Morocco and Tunisia) from April 1st, 2004 to October 16th, 2008 are extracted from DataStream and hence, we have 234 observations for each series which will enable us to run Seemingly Unrelated regression (SUR) as an estimation methodology of equation 2.

We choose to use the SUR procedure to test the UFER hypothesis. This method allows us to analyze a system of multiple equations and to take into account the correlation between error terms as it was mentioned by Zellner (1962) who added that this procedure is an excellent tool to estimate simultaneously the coefficients in all equations and that these coefficient estimators are more efficient than single-equation least-squares estimators.

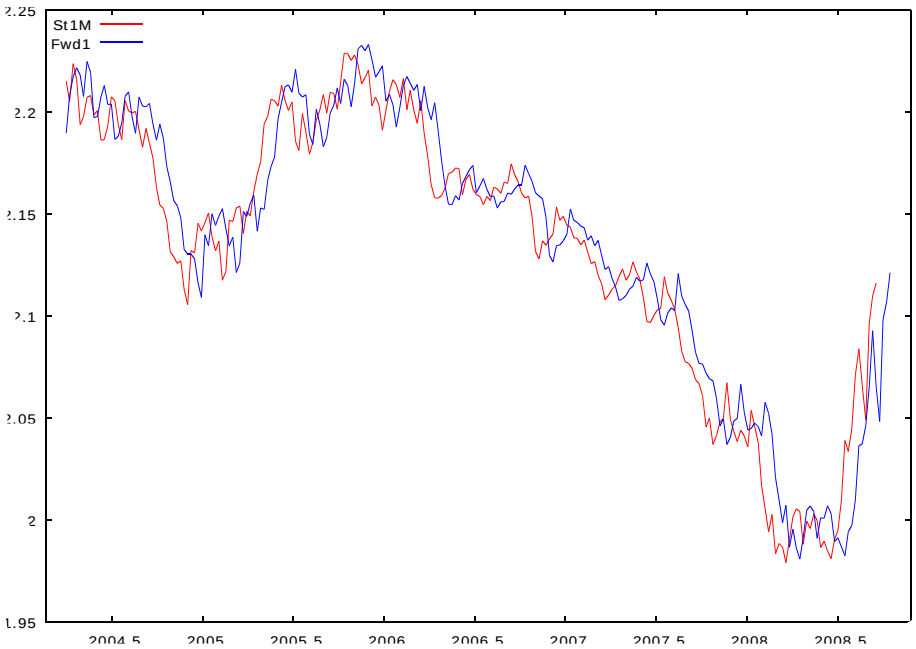
The Zellner's Seemingly Unrelated Regression method was widely used in finance (Brooks, 2008) and plenty of researchers employed it to test the famous FRUH - such as Bilson (1981), Fama (1984), Cornell (1989), Evans & Lewis (1995) and Frenkel & Poonawala (2010) – since there has been a set of arrangements for exchange rate co-ordination and because of the shocks which are influencing all foreign exchange markets (Bilson, 1981).

It has been revealed that β is always different from one and less than zero. Will this conclusion hold if the UFER hypothesis is estimated for emergent market currencies during the four-year span from 2004 to 2008 using the SUR?

As a preliminary diagnostic of the main variables, we start by giving an idea about the paths followed by the spot and forward rates for these emergent countries.

Figure 1: The Moroccan Dirham

Spot versus Forward Rates (1month horizon)



Source: Author's creation based on Data from DataStream

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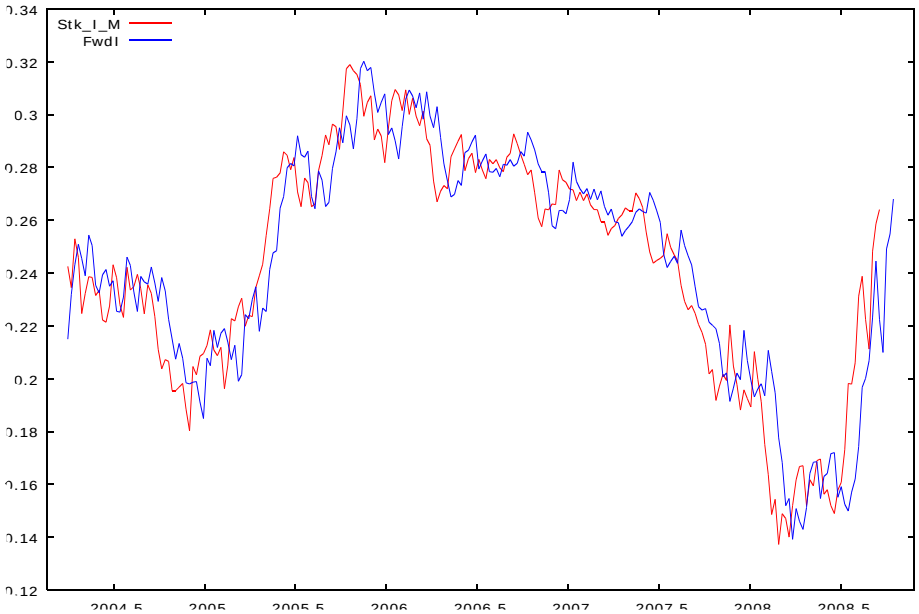
Figure 2: The Tunisian Dinar

Spot versus Forward Rates (1month horizon)



Source: Author's creation based on Data from DataStream

These figures show that the spot exchange rate is, a priori, well forecasted by the one-month forward exchange rate both in Morocco and Tunisia.

To have a clearer idea about these exchange rates, we report, in Table 1, the descriptive statistics of the dataset.

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Table 1
Descriptive statistics

Descriptive Statistics	Tunisia		Morocco	
	Spot rate ((1month	Forward rate ((1month	Spot rate ((1month	Forward rate ((1 month
Number of Observations	234	238	234	238
Mean	0.24267	0.24363	2.1334	2.1360
Median	0.24743	0.24805	2.1478	2.1516
Minimum	0.13724	0.13920	1.9789	1.9807
Maximum	0.31893	0.32020	2.2287	2.2329
Standard Deviation	0.043746	0.042938	0.067925	0.068187
Coefficient of Variation	0.18027	0.17624	0.031839	0.031923
Skewness	0.47937-	0.48688-	0.73992-	0.70605-
Excess Kurtosis	0.61225-	0.54952-	0.45960-	0.50019-

Source: Author's creation based on Data from DataStream

A glance thrown on these digits reveals that there is a clear similarity between the spot and one-month forward rates' paths in both markets. Such a remark gives a first signal in favor of the validity of the UFER hypothesis and a hope to resolve the forward rate puzzle.

To check if the forward premium puzzle continues to exist using the SUR employed by Frankel & Poonawala (2010), we report in table 2 the results' estimation.

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Table 2

Estimates of Equation 2 (SUR)

$$s_{t+1} - s_t = \alpha + \beta (f_t - s_t) + \varepsilon_t$$

Countries	**N**	***SUR***	
		α	***β***
Morroco	234	-0.00286709 (0.0264)	0.667719 (6.64e-06)
Tunisia	234	-0.000987580 (0.3910)	1.01714 (0.0002)

Source: Author's creation based on Data from DataStream

These features show clearly that the intercept α is so close to zero for both countries and that β is surprisingly significantly (1%) converging to its theoretical value for Tunisia. For Morocco, the coefficient β is significantly less than unity. Such a result can be considered as a new witness in favor of the findings of Frankel & Poonawala (2010) since the forward exchange premium remains a biased predictor of subsequent movements of spot rates, but the bias is actually different from the usual coefficients obtained by researchers interested in the major currencies as Fama (1984): both for Morocco and Tunisia, the coefficient β is different from the unity but it is not less than zero; it exceeds the unity (1.01714) for the Tunisian Dinar and is less than unity (0.667719) for the Moroccan Dirham. So that, the forward premium bias exists but it is not extremely severe since β is not negative as it was commonly demonstrated in previous studies: the average coefficient reported by McCallum (1994) is of -4; by Thaler & Froot (1995) of -0.88; by Sercu and Vinaimon (2006) of -0.66 and Frankel & Poonawala (2010) of 0.0033 for emerging countries and of -4.3331 for advanced countries.

By testing the joint hypothesis that $\alpha = 0$ and $\beta = 1$, we obtain a Wald P-value of 0.0000; it witnesses that the UFER hypothesis is rejected.

As a summary, the forward premium bias is not cleared, it persists such it was mentioned by Aggarwal *et al.* (2008): "the puzzle continues!" and the UFER hypothesis continues to be rejected for these countries and as an attempt to combine our results to Frankel & Poonawala's (2010) findings, we succeed to conclude that despite the continuing rejection of the UFER hypothesis in emerging countries, it is so clear that the forward premium puzzle is not so pronounced as in advanced countries.

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Conclusion

This study which employs the SUR for two emergent countries for the period spanning from 2004 to 2008 can be considered as an extension to the Frankel & Poonawala's (2010) paper; it gives an extra proof to their findings: unlike major currencies which are marked by a negative coefficient β, the forward premium puzzle is not so severe in these two emergent countries, Morocco and Tunisia: the coefficient β is significantly less than unity for the Moroccan Dinar but not less than zero and it significantly exceeds its theoretical value for the Tunisian Dinar. So, the UFER hypothesis is still rejected for emergent countries as it was previously found by Frankel & Poonawala's (2010). Hence, it appears clearly that emergent market currencies do not lure the forward premium anomaly but succeed to soften it.

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