

The Moroccan Foreign Exchange Market and the Dynamics of the Bid-ask Spread of the USD/MAD Quotes

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Abstract

Our aim in this paper is to model the bid-ask spread resulted from the quotes of USD/MAD by the Moroccan central bank, which is the reference on the Moroccan foreign exchange market. In this respect, we discussed the microstructure of the Moroccan foreign exchange market, which is of primary importance for the analysis of the high frequency fluctuations of exchange rate. Two results of this study worth to be highlighted. The high degree of centralization of the Moroccan Forex market and the very high speed by which the current bid-ask spread reverts to its statistical long-run level.

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1 Introduction

Foreign exchange markets are the largest financial markets in the world. They are also completely decoupled from World trade. According to the triennial survey conducted by the Bank of International Settlements (2010, p. 7 [1])⁴, an average daily volume of transactions of \$ 4.0 Trillion was exchanged in these markets in April 2010 compared to a daily turnover of \$ 3.3 trillion in April 2007. Thus, the average daily turnover in foreign exchange markets of April 2010 recorded a 20% increase compared to the daily volume

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⁴The authoritative source of data about the global foreign exchange market is the triennial central bank survey of foreign exchange and derivatives market activity prepared by the BIS triennially. The first BIS survey was conducted in April 1989.

exchanged in April 2007. Recent estimates show that the FX activity may have reached \$5 trillion per day during 2011 (Bech, 2012 [2]).

The size and the economic and financial roles of the Forex exchange market explain why the issues related to this market are of the most debated topics by researchers. The recent rise of works on the microstructure of this market and on the bid-ask spread is eloquent in this case (among others Becker and Sy, 2005 [3], Ding, 2004 [4], Galati, 1999 [5] Maria and all, 1996 [6], Seertan, 2010 [7]).

The aim of this paper is to attempt to explain the dynamics of the spread bid-ask of USD/MAD resulted from the quotes of the Moroccan central bank by a mean reverting model. The period of study spans from 2008 to 2012. The data are daily. This period was characterized by a continuous declining trend of the international reserves of Morocco as a consequence of the dramatic increase of the energetic bill, the reduction of the remittances of the Moroccan abroad and the decrease of the revenues of services, especially tourism, and of Moroccan exportations due to the ongoing crisis in partner countries.

Moroccan central bank interventions are important signals emitted to other participants. In Morocco, the central bank is an active player in the Forex market as buyer and seller of currencies. So, it is important to explore the dynamics of the central bank quoted spreads especially because there are few empirical studies treating the Moroccan case. Furthermore, the research on bid-ask spreads observed in the foreign exchange market is important since they reflect transactions and hedging costs that affect real economic activities such as trade and investment (Tornbjörn and Sy, 2005, p. 3[8], European Commission, 1990, P.63 [9])⁵.

The remaining part of this paper is structured as follows. In the second section, the microstructure of the Moroccan foreign exchange market is presented. The analysis of the microstructure of the foreign exchange market stems from the fact that the details of the functioning of the Foreign exchange markets are important as determinants of the bid-ask spread (See among others Sarno and Taylor, 2001, p. 2 [10]). The third section presents our modelling of the bid-ask spread resulting from the quotes of USD/MAD. The fourth section provides the data and the main results of the calibration of the model to the available data. The last section serves to conclude.

2 The Microstructure of the Moroccan Foreign Exchange Market

In the current literature about the high frequency dynamics of the exchange rate and the determinants of the bid-ask spread the microstructural approach is of prime importance⁶. Our objective in this section is to summarize the main features of the microstructure of the Moroccan foreign exchange market. By "microstructure" we mean the main components and rules that structure/organize the market and therefore influence the process of price formation (Lyons, 2001[11]; Sarno and Taylor, 2001[10]; Sager and Taylor, 2005 [12]).

⁵The European Commission (1990) estimated that the elimination of spreads following the adoption of a single European currency increase savings by 0.4 percent of Community GDP per annum. Furthermore, the estimated total transaction costs incurred by nonfinancial firms were on average 15 percent of their profits on turnover in other EC countries.

⁶For an updated view about the microstructure approach and the recent transformations of the Forex market see (Sager and Taylor, 2005)

Among these features, three have a particular importance and for this reason will be discussed. These features are *i.* market participants, *ii.* operations authorized to be performed in this market, and *iii.* Transactions rules.

2.1 Market Participants

Three groups of participants operate in the Moroccan foreign exchange market. The first group runs the retail market. It includes agents that transmit "customer orders" to banks for the purchase or sale of foreign currencies⁷. The second group of agents is represented by Bank Al-Maghrib (Moroccan Central Bank), which is the big player in the Moroccan Forex market. Indeed, beside the fact that it sets up the corridor within which the exchange rate must be negotiated, it regulates fluctuations in the foreign exchange market, according to its macroeconomic targets, i.e. targeted exchange rate, and its objective to ensure compliance with regulations in place. We have to remark here that BAM is, de facto, a market maker especially on sales and purchases of foreign currencies against MAD (Guimarães and Karacadag, 2004, [13]).

The third family includes the operators, qualified by Moroccan regulations as *approved intermediaries*.

This class of operators ensures the daily smooth functioning of the market, so they are with Bank Al-Maghrib, the only agents authorized to carry, through their dealing rooms, operations in foreign currencies on the foreign exchange market (Office des changes, 2011, pp. 72 and the followings [14]). These intermediaries play two roles. First, traders who work for such institutions bring together supply and demand of their customers and exchange currencies via their accounts in corresponding foreign banks through international compensation systems. Second, interbank traders (dealers) exchange, on wholesale market, currencies between them directly or through brokers⁸, which in turn play an intermediary role between interbank traders⁹.

2.2 Authorised Operations in the Moroccan Foreign Exchange Market

We have to note first that the Moroccan foreign exchange market was created in June 1996¹⁰. It was opened, since January 1997, to international capital markets by allowing banks to exchange foreign currencies with their foreign correspondents¹¹. Indeed, given the progressive reforms introduced since then, it has become a continuous market. It is

⁷These customers are mainly investors, exporters, importers, and travelers.

⁸In Morocco, there are no companies specialized in brokerage. When the Moroccan banks intervene in foreign exchange markets they use the services of brokers installed in other countries.

⁹The choice between these two types of orders is, in fact, a compromise between the qualities of speed and certainty for the first kind, and the qualities of discretion and price for the second one. For further discussion of this aspect, see for example Lyons (2001). At international transactions, the brokered market has been conducted by voice through direct telephone. Currently, this market is conducted by electronic screen brokering system. See among others: (Sarno and Taylor, 2001, p. 5).

¹⁰It was established by the Circular n°1633 of the "Office des changes" of April 1st and its implementing circular n°61/DA/1996 of Bank Al-Maghrib.

¹¹Any purchase or sale of foreign currencies against foreign currencies from foreign banks for an amount exceeding the equivalent of 5 million MAD must be daily reported to Bank Al-Maghrib. See: (Bank Al-Maghrib, 2011, p. 472)

also a fragmented market. Consequently, the quotations are not available in a consolidated format and therefore not observable by all participants. This market is a quotes-driven market; so agents should send their bid-ask orders to a dealer who will then ensure the counterparty¹².

The microstructure of the Moroccan foreign exchange market may also be considered through the nature of performed transactions. Four main operations can be distinguished. First, intermediaries are authorized to perform spot transactions both for their own account and for customers with two days date delivery or exchange¹³. The second category of currency trading is represented by forward transactions. Forward transactions between approved intermediaries are freely determined, especially as Bank Al-Maghrib doesn't publish forward exchange rates and doesn't bear counterparty to these transactions (Bank Al-Maghrib, 2011, p. 473[15]).

In addition, approved intermediaries have the opportunity to perform with each other and with customers; operations of fixed term deposit with maturity and remuneration decided by mutual agreement. They can also make, since 2007, deposits with Bank Al-Maghrib (Bank Al-Maghrib, 2011, p. 474[16]). They can also make for their own account (since 2002) or on behalf of some residents (since 2008)¹⁴, foreign currency' deposits and acquire government securities, multilateral financial institutions securities and financial instruments listed or traded on a regulated market. Finally, approved intermediaries are allowed to perform hedging transactions, including foreign exchange options and swaps transactions¹⁵.

2.3 Transaction Rules

Morocco is pursuing an intermediate fixed-parity exchange rate regime which pegs the national currency to a basket of currencies (80% Euro and 20% US dollar) within fluctuating margins less than +/- 0.6% on either side of the central rate. The Moroccan dirham (MAD) is quoted using the following formula:

$$1 \text{ USD} = \frac{1}{\frac{1}{\text{reference price USD}} \cdot 20\% + \frac{1}{\text{reference price Euro}} \cdot 80\% * \text{Euro/USD}} \text{ MAD}$$

¹²There are two forms of markets. Order-driven markets called also auction market and dealer market called also quotes-driven markets.

¹³Note that a quotation is an immediate commitment unless the parties agree to an indicative one. Banks may also agree for another date. Failure to date value by one party entitles the counterparty to require compensation and interest. See Bank Al-Maghrib (1997), circular n°473/DAI/97.

¹⁴Insurance and reinsurance companies, pension funds, and mutual funds.

¹⁵Lyons argues, however, that forex swaps (swaps exchange rate) don't influence the volume of orders in the foreign exchange market; see Lyons (2001, p. 51)

In this context, Bank Al-Maghrib performs from 8.30 a.m to 15.30 p.m via a multi-fixing system the daily quotation of 16 currencies¹⁶ against MAD and commits to negotiate with Moroccan banks in the domestic foreign exchange market. It publishes at mid-day, but only as reference, quotes of major currencies or of currencies belonging to countries with which Morocco has significant trade relations¹⁷. However, Bank Al-Maghrib reserves the right to quote other foreign currencies or limit its intervention to some currencies only. The exchange rates offered by dealers (Banks) to customers must include, in addition, a commission of 1 ‰¹⁸ collected by Bank Al-Maghrib on behalf of the foreign exchange bureau (office des changes)¹⁹. Cross transactions (currency against currency) are exempt from this commission.

Exchange rates are published simultaneously on three separate media (website of the Central Bank, Reuters and Bloomberg). Any transaction processed on the foreign exchange market should be immediately confirmed by telex or Swift reporting all the features of the transaction.

According to the IMF's 2001 survey on Foreign exchange markets organization (Canales-Kriljenko, 2004 [17]), there were in Morocco 15 foreign exchange intermediaries in 2001. They were all banks (Table 5, p. 32). The survey reported that there are limits on net open foreign currencies' positions in Morocco. It should be noted that intermediaries must not have a net long or short position of more than 20% of their regulatory capital according to all currencies and 10% for each currency (Ministry of finances, 1998, [18]). The predominant used electronic dealing system in Morocco is the Reuters' dealing system (Canales-Kriljenko, 2004, Table 8, p. 36 [17]). In 2012, three banks performed approximately 80%-90% of the transactions executed on the Moroccan foreign exchange market.

¹⁶EUR, USD, CAD, GBP, DKK, NOK, SEK, CHF, JPY, DZD, TND, LYD, MRO, KWD, SAR and AED

¹⁷Currently Currencies quoted by Bank Al-Maghrib are: BRL, RUB, INR, CNY, AUD, ZAR, TRY, EGP, JOD, BHD, OMR, QAR and CFA

¹⁸Note that in the wake of the international crisis this exchange commission was reduced from 2 to 1 ‰ in June 2009. Otherwise, international organizations have consistently criticized this commission which prevents deepening of local foreign exchange market. See in this respect for example: (IMF, Morocco Article IV Consultation—Staff Report 2006)

¹⁹It is a public organism whose principal missions are the control of foreign exchange operations and the implementation of related regulations.

Table 1: Data about the Moroccan Foreign exchange market

Averages (Millions of MAD)	2008	2009	2010	2011	2012
Currencies purchased from custmors	7 944,8	8 611,5	23 834,1	43 144,8	51 840,7
Currencies sold to custmors	36 569,8	28 177,3	38 600,9	56 221,6	54 569,5
Purchases/sales local interbanks (Currencies/MAD)	6 970,4	5 672,1	11 122,5	10 257,5	9 965,2
Loans and borrowings of currencies	16 665,3	22 332,0	32 947,1	32 873,2	32 358,9
Forward purchases of foreign currencies	8 546,0	6 734,8	8 140,8	9 295,1	8 222,3
Forward sales of foreign currencies	948,9	1 440,5	1 800,5	2 467,6	3 969,7
Investment abroad (foreign currencies)	9 612,8	6 269,6	5 339,0	5 969,9	6 168,4
Purchases / sales of foreign currencies with foreign correspondents	56 018,2	45 721,1	114 685,4	144 967,3	58 293,9
Purchases of foreign currencies by BAM from banks	-	2,8	-	-	-
Sales of foreign currencies by BAM to banks	3 590,0	4 208,2	1 823,8	4 801,6	5 328,0

Source: compiled from the BAM site web: www.bkam.ma

Furthermore, we can assert, according to our discussion with operators, that the Moroccan foreign exchange market is essentially an onshore spot market for the USD and the Euro. The table below summarizes some data about the Moroccan foreign exchange market during the five last years. It shows, in particular, the dominance of transactions with foreign correspondents and the narrowness of the local market.

The overall data about the evolution of the Moroccan foreign exchange market reveals two main features. First, banks sell practically no currencies to the Moroccan central bank which means that they have no incentives to do it. This may be viewed as strong link with international markets even if the flows of capital are heavily regulated by Moroccan authorities. Second, the purchases and sales of currencies with foreign correspondents are very important even if we had observed a dramatic decrease of these operations in 2012 probably as a consequence of the crisis.

3 A Mean Reverting Model of the USD/MAD Ask-bid Spread Quoted by BAM

There is a solid empirical fact behind our choice of the mean-reverting model to capture the dynamics of bid-ask spread. Indeed, we do observe that even if the spread oscillates in the short-term it is pulled, up and down, toward a long term equilibrium level μ which is determined by fundamental variables²⁰. It is possible to refine a bit more our analysis and

²⁰It should be noted that on the theoretical view; there are two approaches for explaining the dynamic of exchange rate. The first, represented by conventional macro-economic models, explains exchange rate movements by a set of macro-economic variables. However, this approach

suppose that the equilibrium bid-ask spread is not constant and it shifts to a new value in each regime. This last possibility will not be explored here.

In this paper, we will suppose that the level of the bid-ask spread S_t does not impact its volatility. Thus, we assume that the bid-ask spread S_t is described by a mean-reverting model or an Ornstein-Uhlenbeck (OU) process. The stochastic differential equation (SDE) that governs this process is:

$$dS_t = \lambda (\mu - S_t) dt + \sigma dW_t \tag{1}$$

The initial value of S is known and is denoted S_0 . The mean reversion level and the speed of reversion are respectively μ and λ . As in classic models, W_t is a standard Brownian motion so that $dW_t = \varepsilon_t(dt)^{1/2}$, with $\varepsilon_t \sim$ i.i.d $N(0,1)$. This Gaussian stochastic process represents the shocks to current bid-ask spread S_t . Remark that equation (1) states that the volatility σ of the bid-ask spread is independent of its level S_t . Because we begin at $t=0$, so t periods spanned since the observation of the initial value S_0 .

Remark first that:

$$d(e^{\lambda t} S_t) = S_t \lambda e^{\lambda t} dt + e^{\lambda t} dS_t \tag{2}$$

This implies that:

$$e^{\lambda t} dS_t = d(e^{\lambda t} S_t) - S_t \lambda e^{\lambda t} dt \tag{3}$$

Let us now multiply each side of equation (1) by $e^{\lambda t}$ to get:

$$e^{\lambda t} dS_t = e^{\lambda t} \lambda (\mu - S_t) dt + e^{\lambda t} \sigma dW_t \tag{4}$$

Combining equations (3) and (4), we get:

$$d(e^{\lambda t} S_t) = \lambda \mu e^{\lambda t} dt + e^{\lambda t} \sigma dW_t \tag{5}$$

We can rewrite this SDE by introducing the initial value S_0 :

$$e^{\lambda t} S_t = S_0 + \int_0^t \lambda e^{\lambda s} \mu ds + \int_0^t e^{\lambda s} \sigma dW_s \tag{6}$$

Multiplying each side of the precedent equation by $e^{-\lambda t}$ leads to the equivalent following equation:

$$S_t = S_0 e^{-\lambda t} + \int_0^t \lambda e^{-\lambda(t-s)} \mu ds + \sigma \int_0^t e^{-\lambda(t-s)} dW_s \tag{7}$$

This means that at any moment, the bid-ask spread is the sum of three terms. The first is $S_0 e^{-\lambda t}$, the second is the first integral which is equal to $\mu(1 - e^{-\lambda t})$, and the third component of S_t is a normally distributed quantity with a zero expected value and a variance:

is relevant only in the long term perspective. The second approach, called financial market microstructure theory, explains within the short term the exchange rate dynamic according to the inside market features, such as operating costs, asymmetric information and inventory costs. For a further discussion of this point, see for example: (Lyons 2001, p. 2 and the followings).

$$E\left[\left(\int_0^t e^{-\lambda(t-s)} \sigma dW_s\right)^2\right]$$

Using Ito's Isometry (Kopp, 2011 and the references therein, [19]) we get:

$$\begin{aligned} E\left[\left(\int_0^t e^{-\lambda(t-s)} \sigma dW_s\right)^2\right] &= \int_0^t (e^{-\lambda(t-s)} \sigma)^2 ds \\ &= \frac{\sigma^2}{2\lambda} (1 - e^{-2\lambda t}) \end{aligned} \quad (8)$$

Thus, conditional on S_0 , the bid-ask spread S_t is a normal variable with an expected value at t that depends upon S_0 , μ , and λ . Indeed, the value of S_t conditional on S_0 is as follows:

$$S_t = \mu + (S_0 - \mu)e^{-\lambda t} + \sigma \int_0^t e^{-\lambda(t-s)} dW_s \quad (9)$$

This result is very intuitive. Indeed, the value of S_t at any moment is equal to its long run equilibrium value plus the remaining part of the initial deviation of S_0 from its equilibrium value μ . The third component of S_t is of a stochastic nature. The value of S_t , conditional on its initial value, contains a deterministic part and a stochastic part. We can determine, conditional on S_0 , the expected value of S_t and its variance. The latter is equal to the variance of the stochastic component of S_t . More precisely we have:

$$E(S_t|S_0) = \mu + (S_0 - \mu)e^{-\lambda t}, \text{ and } Var(S_t|S_0) = \frac{\sigma^2}{2\lambda} (1 - e^{-2\lambda t}).$$

We must observe that if the speed of adjustment of S_t to μ is very small, i.e. λ close to zero, we will have a volatility of S_t that goes to infinity which is practically equivalent to say that the spread never returns to its long-term mean. It is important to discuss the determinant of the three parameters characterizing the behaviour of the bid-ask spread. Concerning the bid-ask spread equilibrium value, it is determined by the structure of the market. In the long-run, this value is determined by fundamentals such as the costs and the power of the market maker (Khemraj and pasha, 2008, [20]).

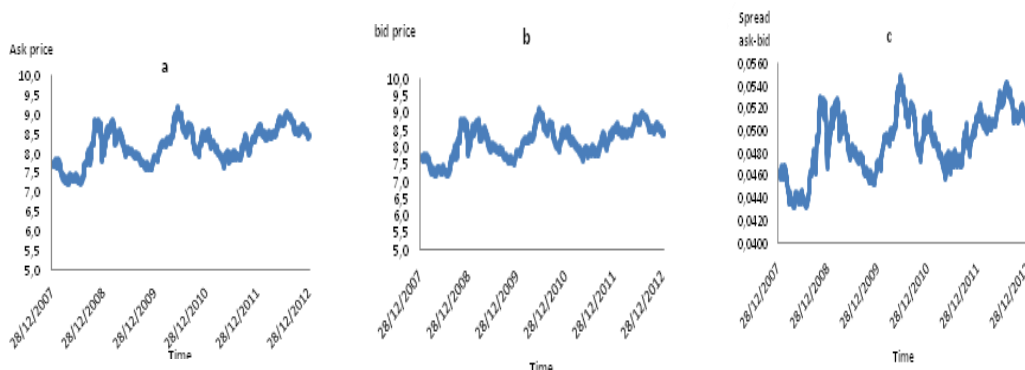
We can argue that the cost of providing immediacy and of running an activity of trade in foreign exchange market and of maintaining an inventory are the determinant of this basic component of a bid-ask spread²¹. As a profitable trade, we can say that this equilibrium value will be just sufficient to be an incentive for profit seeking agents to provide the vital service of the presence of a market maker as provider of currencies in predictable terms as explained by Demesetz (1968) [21]. So, in a very competitive market with less power of dealers (market makers) this value will be very low. The speed of reversion to μ will be more quickly if the market is efficient and, in the case of Morocco, it depends also on the effectiveness of central bank interventions. Regardless the nature of exchange rate regime,

²¹Remark that we consider the spread as composed of two components. The stable part which is the long-run equilibrium spread and a random component ε which may be a certain quantity that we can suppose is more frequently positive. That is: $P(\varepsilon > 0) > P(\varepsilon < 0)$. This probability P is increasing with order flow and the power of the market makers.

the parameter of volatility will be low if the market is resilient and arrival of information is gradually integrated in the bid and ask prices. In the following section we will calibrate the data set about the bid-ask spreads to this Ornstein-Uhlenbeck model.

4 The dynamics of the bid-ask spread USD/MAD of the quotes of BAM

Our sample spans from January, 2^d 2008 to December, 31th 2012. The data are daily. There are five days in a week. The number of observations is 1249. The graph bellow gives, in panel c, us an idea about the evolution of the bid-ask spread USD/MAD. It exhibits a pattern that is going up and down. Furthermore we can asserts that the bid-ask spread is evolving with a return to a certain mean μ with a certain speed λ . For a given t , this bid-ask spread is a random variable and so it has a volatility σ .



The range of observations is [0.0432, 0.0549]. The average spread is 0.04909. The standard deviation of the series is 0.002675. The coefficient of variation is 0.0544. The skewness indicator is negative (-0.2661). This implies that observations are frequently below the average. That means that the empirical distribution of the spread is skewed to the left. The kurtosis indicator is equals to 2.3048. As a consequence, the empirical distribution of the spread is more peaked around its mean comparatively to the normal distribution.

Table 2: Descriptive statistics of daily bid-ask spreads USD/MAD (2008-2012)

Number Observations	1249
Average	0,0490
Standard deviation	0,00267588
Maximum	0,0549
Minimum	0,0432
Coefficient of Skewness	-0,2661
Coefficiant of Kurtosis	2.3048

Available studies about foreign exchange markets using high frequency data documented that dealers' spreads are clustered at a limited levels/values (Poskitt, 2005, p. 564, [21]). For example, Bollerslev and Melvin found in a sample of 300000 quotes of the

Deutshmark/Dollar that “the four spread values of 5, 7, 10, and 15 basis points account for 97 percent of the quotes observed over the 3-month period” (Bollerslev and Melvin, 1994, p. 370, [22]). In this paper we will use a classic measure of the degree of data clustering. The formula used is :

$$C = \sqrt{\frac{m}{m-1} \sum_{j=1}^m (p_j - E(p_j))^2}$$

The quantities m , p_j , $E(p_j)$ are respectively the number of classes, the proportion of spreads included in class j , and $E(p_j)$ is the proportion of spreads included in class j if the spreads are distributed uniformly. This measure of clustering takes the pure uniform case as a benchmark. It is between 0 and 1. If C is near 1 then the spreads are highly clustered. In our case, we divide the dataset into 12 classes. If the observations are divided equally between the classes (an uniform distribution) we will found that each class will contains a proportion of 0.083 observations. The table in the annex provides the empirical distribution of the 1249 observations. We use the previous formula to calculate the clustering coefficient. We found a clustering coefficient equal to 0.154. That means that we have, contrary to what is frequently observed in other foreign exchange markets, a rather low degree of clustering in the distribution of the spreads. Our result could be explained by the analyzed period which is long compared to the periods studied by other researchers such as Bollerslev and Melvin (1994) and Poskit (2005).

The calibration of the O-U model to our dataset by the maximum likelihood method provides the following estimators of the three parameters (for detailed steps for obtaining this result see Zoglat et al. (2013) [23]).

$$\left\{ \begin{array}{l} \hat{\lambda} = \ln(T \sum_{t=1}^T S_{t-1}^2 - [\sum_{t=1}^T S_{t-1}]^2) - \ln(T \sum_{t=1}^T S_t S_{t-1} - \sum_{t=1}^T S_t \sum_{t=1}^T S_{t-1}) \\ \hat{\mu} = \frac{1}{1 - e^{-\hat{\lambda}}} \frac{1}{T} \sum_{t=1}^T (S_t - S_{t-1} e^{-\hat{\lambda}}) \\ \hat{\sigma}^2 = \frac{2\hat{\lambda}}{1 - e^{-2\hat{\lambda}}} \frac{1}{T} \sum_{t=1}^T [S_t - \hat{\mu} - (S_{t-1} - \hat{\mu}) e^{-\hat{\lambda}}]^2 \end{array} \right.$$

The use of our dataset yields the following estimates of the three parameters of the Ornstein–Uhlenbeck model. The speed of reversion of the current bid-ask spread to its long-run equilibrium level is equal to 0.2235. The meaning of this figure is that any deviation from the long-run value of the bid-ask spread is absorbed in approximately $1/0.2235 = 4.47$ days. This is a rather fast process of adjustment. This result reflects the efficiency of Bank Al-Maghrib interventions. Remember that Morocco is pursuing an intermediate fixed parity exchange rate regime. Consequently, Bank Al-Maghrib has to intervene frequently in order to stabilize the national currency with respect to the movements of the Euro and the USD.

The value to which the observed S_t is pulled up and down is equal to 0.0490. We remark that this long-run equilibrium value is practically equal to the simple mean which is

0.04909. We can state that in this regulated market the average long-run cost of providing immediacy in the sense of Demsetz (1968) is estimated to be 0.0490.

The variance of the bid-ask spread quoted by Bank Al-Maghrib is equal to 0.000243. So the conditional standard deviation of the bid-ask spread is equal to 0.015. We must remark that the unconditional variance of the bid-ask spread during the period 2008-2012 is 0.002676.

5 Concluding Remarks

It is clear that the fixed exchange rate regime and distortions characterizing the Moroccan foreign exchange market (commission of 1 %) prevents the development of a deep local market. Consequently banks intervene more on the international foreign exchange market. Indeed, the range inside which the central bank's spread evolves is very limited [0.0432, 0.0549] not exceeding 1 basis point during the period, while its level is close to the overall margin in which intermediary banks are required to negotiate their exchange rate (0.6% of each side of the central rate).

We presume that the bid-ask spread returns to its long-run value quickly not due to competition or efficiency of the local market, but due to the intervention of the central bank in order to stabilize the exchange rate. Indeed, and pending the establishment of the necessary prerequisites for moving to a more flexible exchange rate, it could be important to broaden, in the short term, the central bank spread in order to encourage the development of interbank foreign exchange transactions. The IMF suggests for example to broaden it from 0.6 percent to at least 2 percent (IMF, Article IV, 2011, p. 9 [24]).

This deepening would permit to the microstructure of the exchange market to play a major role in the dynamics of the bid-ask spread. Indeed, the knowledge of transactors' roles and possibilities, the mechanisms of trading and the rules of trading are of primary importance for the determination of the volume traded and of the buying and selling prices. As highlighted by Lyons (2001), the I's (information and institutions) are the key elements of price determination especially in the short-run.

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Appendix

	Effectifs	Relative frequency	Cumulative relative frequency
[0,0430-0,0440[	59	4,7	4,7
[0,0440-0,0450[	50	4,0	8,7
[0,0450-0,0460[	49	3,9	12,7
[0,0460-0,0470[	118	9,4	22,1
[0,0470-0,0480[	162	13,0	35,1
[0,0480-0,0490[	122	9,8	44,8
[0,0490-0,0500[	156	12,5	57,3
[0,0500-0,0510[	179	14,3	71,7
[0,0510-0,0520[	166	13,3	84,9
[0,0520-0,0530[	113	9,0	94,0
[0,0530-0,0540[	62	5,0	99,0
[0,0540-0,0550[	13	1,0	100,0
Total	1249	100,0	