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Long Run Tendencies and Short Run Adjustments Between Official and Black Market Exchange Rates in MENA Countries

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ABSTRACT: This study makes an attempt to examine the long run relationship between the official and black market exchange rates using monthly data for a sample of 13 Middle East and Northern African (MENA) countries from 1970 to 1998. Using the Pool Mean Group framework, the article provides evidence on proportional long run relationship between black and official market exchange rates in sample countries. The positive common long run official exchange rates (OEX) elasticity is statistically significant and slightly greater than one. The hypothesis of portfolio balance model is confirmed, implying that there exists a proportional long run equilibrium relationship between official exchange rates and black market exchange rates. However, the short run dynamics remain heterogeneous across countries.

Keywords: Black market exchange rate; official exchange rates; Panel data; Panel cointegration; MENA countries
JEL Classifications: C23; F31

1. Introduction

Illegal or black foreign exchange markets are a significant element of economies of various developing countries. Government restrictions on free trading of foreign currencies create a dual (black and official) foreign exchange rate system. The resulting differentiation in official and black market exchange rates creates incentives for diverting export revenues from the official to the black market (Kutan, 1998:54). Barro and Lee (1993) illustrate that black markets with significant premiums, measured by the spread between black and official rates, considerably reduce the economic growth. With the possibility of adverse effects on economic growth, many countries have implemented either legal or tolerated black market.

This is completed by creating a legal or semi-legal parallel market and allowing it to run strongly with the official market. Under this parallel market regime, current account transactions are settled at the government-controlled official rate and the parallel rate is used for capital account transactions (Kutan, 1998).

Many authors have used black market exchange rate in the studies. For example, Odekun (1996) examined black market exchange rate behaviour for 18 African countries and found that domestic interest rate cause domestic currency to depreciate in the black market while expected world inflation; domestic real GDP, and availability of foreign reserves have opposite effects. Speight and

McMillan (2001) examined the efficiency of dollar exchange rate black-markets for the currencies of six formerly socialist countries of Eastern Europe. They found evidence of volatility spillovers in conditional mean affecting only the markets for the Bulgarian Lev and Rumanian Lei. McMillan and Speight (2001) examined the evidence for nonlinear dependence in the monthly black market exchange returns of the Polish zloty, 1955–1990. They concluded that a competing variance- in- mean model consistent with a time- varying risk premium.

There are three models to explain the behaviour of the black market exchange rates in the literature (Love and Chandra, 2007). The first model is known as the "smuggling or trade models" in which the demand for foreign currency arises to pay for illegal imports, and the supply of foreign exchange is based on smuggling and under invoicing of exports. The second group is known as the "monetary approach models". In these types of models, the demand for foreign exchange arises due to the need to modify the composition of assets and not for carrying out current account transactions, which, in turn, are supposed to be satisfied by the official market. On the other hand, "portfolio balance models" is the last category of models. In this model, the flow characteristic of the trade models with the asset characteristic of the monetary models is combined together.

Portfolio-balance model (Dornbusch et al., 1983) implied a proportional equilibrium relationship between the official and black market exchange rates is frequently used to provide an economic interpretation of the relationship between the two types of exchange rates (Caporale and Cerrato, 2008). In these models, it is aimed to explain the short run and the long run behavior of black market rate (Phylaktis and Kassimatis, 1994) and implied that the black market rate depreciates in the same proportion as the official rate in the long-run giving a constant or stationary black market premium (Moore and Phylaktis, 2000).

Although interactions of official market with black market exchange rates have a long tradition in world economies notably for developing ones, a few papers have focused on the relationship between official and black market exchange rates[1].

The aim of this study is to establish the dynamic properties of the relationship between official and black market exchange rates for the selected 13 Middle East and Northern African (MENA) countries over the 1970-1998 periods. The motivation for selecting these countries can be explained as follows: These countries had well-developed black markets and there is no study which focus on the relation from black markets to official by analyzing with short and long run dynamics.

In particular, we are interested in the following questions: Are official and black market exchange rates linked by a long run relationship? Is the long term elasticity between official and black market exchange rates equal one, as implied by the portfolio-balance model? Are there cross country homogeneity or differences in the speed of adjustment?

The outline of the paper is as follows. The following section provides an overview of the empirical literature. Section 3 presents the empirical analysis and results. Section 4 provides conclusions.

2. Literature Review

Gupta (1981) examined Korea, Taiwan and India. On the basis of cross-correlations between changes in the black market rate and changes in the official rate are anticipated as much as thirteen months ahead. Thus, the black market exchange rates in Taiwan and South Korea anticipate changes in the official exchange rate but not in the case of India. Akgiray *et al.* (1989) found the adjustment process to be relatively rapid and not to be observed in weekly or monthly data by using Granger causality test between black and official exchange rates for the case of Turkey. In another study for Turkey, Booth and Mustafa (1991) examined the relationship between Turkish Lira, the US dollar and German mark. Although they found that these currencies are informationally efficient and behave independently of each other, they arrived at the opposite conclusion for black and official rates. Agenor and Taylor (1993) examined the causal relationship between official and parallel Exchange rates in 19 developing countries, using a methodological approach based on the statistical theory of cointegration and Granger-causality tests. They illustrated that cointegration was found in 14 cases of 19 developing countries.

[1] See Baliamoune-Lutz (2010) for detailed literature.

Moore and Phylaktis (2000) have examined the relationship between black and official exchange rates for seven countries with two categories by examining short and long run dynamics. Although it is found that there is no drift in the short run dynamics for the first group countries (Korea, Malaysia, Singapore and Thailand), the drift is found for the short-run dynamics in the second group countries (Philippines, Indonesia and Taiwan). The speed of adjustment following a shock is slow. The rate of adjustment is approximately 50% per period for three of the countries (Malaysia, Singapore and Thailand), and 8% for the Korea. The adjustment to long run disequilibrium takes place at a rate of approximately one-tenth per period for both Indonesia and the Philippines. On the other hand, Milas and Otero (2003) examined the long run relationship between the parallel and the official exchange rate in Colombia over two regimes; a crawling peg period and a more flexible crawling band one. The short-run adjustment process of the parallel rate is examined both in a linear and a non-linear context. They found that the change from the crawling peg to the crawling band regime did not affect the long-run relationship between the official and parallel exchange rates, but altered the short-run dynamics.

Bahmani-Oskooee et al. (2002) analyzed the long-run relationship between black market and official exchange rates using time-series annual data over the 1973–1990 period from 49 countries by panel unit root testing and panel cointegration techniques. They have provided that any comprehensive foreign exchange control or direct control only have a short-run impact of causing the black market rate to deviate from the official rate. The official and black markets for foreign currency in four Latin America countries (Argentina, Brazil, Chile, and Mexico) are examined by Diamandis and Drakos (2005). A stable statistically significant long-run relationship between the two exchange rates is found with a coefficient of unity, implying a constant black-market premium for each country and it has been illustrated that the black-market premium approaches its long-run equilibrium following a shock from 2 to 5 months depending on the specific country.

Love and Chandra (2007) examined the long-term dynamics between the black and official exchange rates for the period 1953–1993 in India by using Johansen's cointegration approach. They found that while there is a long-term relationship between the two rates, the direction of causality is from the black rate to the official exchange rate. They suggested that this is plausible in the Indian context where policy has generally lagged behind events in the black market. Caporale and Cerrato (2008) examined the relationship between black market and official exchange rates in six emerging economies (Iran, India, Indonesia, Korea, Pakistan, and Thailand) and concluded that there is the evidence of slow reversion to the long-run equilibrium.

3. Empirical Analysis and Results

To investigate the relationship between official and black market exchange rates, we use monthly observations from 1970M7 to 1998M7 for the selected 13 MENA countries[2]. Data are taken from the study of Reinhart and Rogoff (2004). We consider a long-run relationship of the following form:

$$BMEX_{it} = \theta_{0i} + \theta_{1i} OEX_{it} + u_{it} \quad i = 1,2,..,N \qquad t = 1,2,..,T \qquad (1)$$

Where OEX is the logarithm of official exchange rates of country i in year t, and BEX stands for the logarithm of black market exchange rates.

In the empirical analysis, we first perform IPS (Im et al., 2003) panel unit root test. The panel unit root test results are presented in Table 1. Panel unit root test results suggest that our variables are integrated of order one in all cases.

Consequently, we use cointegration techniques for the purpose of estimation. This paper uses residual-based tests of the null hypothesis of no cointegration developed by Pedroni (1999). Table 2 reports the panel cointegration test results. As it can be seen, test statistics clearly indicate cointegration, implying that there exists a long-run relationship between official and black market exchange rates.

[2] The 13 MENA countries considered in this study are Algeria, Egypt, Iran, Iraq, Israel, Jordan, Lebanon, Libya, Morocco, Saudi Arabia, Syria, Tunisia and Turkey. This sample of countries is dictated by data availability. The black market exchange rate data ends in the 1998. Thus, time period of study ends in 1998.

Table 1. Panel Unit Root Test Results

	Level				First Differences			
	OEX		BMEX		OEX		BMEX	
Method	**With Trend**	**Without Trend**	**With Trend**	**Without Trend**	**With Trend**	**Without Trend**	**With Trend**	**Without Trend**
IPS	0.669 (0.748)	4.523 (1.000)	0.271 (0.606)	6.139 (1.000)	-42.180 (0.000)	-39.779 (0.000)	-69.560 (0.000)	-64.849 (0.000)

Notes: p-values in brackets. Optimal lag lengths were chosen by Schwarz Information Criterion (BIC).

Table 2. Panel Cointegration Test Results

Panel Cointegration	Statistics	Group Mean Panel Cointegration	Statistics
Panel v-statistics	13.08 (0.000)		
Panel rho-statistics	-213.737 (0.000)	Group rho-statistics	-205.42 (0.000)
Panel PP-statistics	-66.49 (0.000)	Group PP-statistics	-97.18 (0.000)
Panel ADF-statistics	-66.44 (0.000)	Group ADF-statistics	-74.24 (0.000)

Notes: p-values are in brackets.

Having tested for cointegration, the next step of the analysis is to estimate long run relationship between official and black market exchange rates. To this end, we use the pool mean group (PMG) estimators suggested by (Pesaran et al., 1999). When we take the maximum lag as being 1[3]; an autoregressive distributed lag (ARDL) (1, 1) equation is as follow:

$$BMEX_{it}=u_i+\delta_{10i}OEX_{it}+\delta_{11i}OEX_{i,t-1}+\lambda_i OEX_{i,t-1}+\varepsilon_{it} \quad (2)$$

The error correction equation is:

$$\Delta BMEX_{it}=\theta_i(OEX_{i,t-1}-\theta_{0i}-\theta_{1i}OEX_{it})-\delta_{11i}\Delta OEX_{it}+\varepsilon_{it} \quad (3)$$

Where $\theta_{0i}=\frac{u_i}{1-\lambda_i}$, $\theta_{1i}=\frac{\delta_{10i}+\delta_{11i}}{1-\lambda_i}$, $\theta_i=-(1-\lambda_i)$.

As discussed in the study of Pesaran et al. (1999), mean group (MG) estimator which assumes that each country has different long run coefficients seems to be suitable to estimate ARDL models. However, when the heterogeneity of the long run coefficient is violated, MG will produce inefficient estimation. Then we employ a Hausman test on the difference between MG and PMG estimates of long-run coefficients to test for long run heterogeneity. Note that as long as the Hausman test statistics indicate that the restriction of long-run homogeneity of all long-run coefficients cannot be rejected in our estimations, we report the only PMG estimation results.

Table 3 presents the estimates of the long run and short run coefficients based on the PMG estimator. The positive common long run OEX elasticity is statistically significant and a little upper than unit. The hypothesis of long run coefficient equal to the unit also cannot be rejected. These results implying that there exists a proportional long run equilibrium relationship between OEX and BMEX as implied by the portfolio balance model. We observe that the short run coefficient is positive and statistically significant. Thus, the OEX has also a short run effect on the BMEX.

[3] PMG estimations require selecting the appropriate lag length for the individual country equations. Individual lag selection was made using the BIC in this study.

Table 3. PMG Estimation Results

Long run coefficient	1.004 (0.000)
The test of long run OEX elasticity	1.65[a] (0.198)
Error correction coefficient	-0.129 (0.003)
Short run coefficient	0.414 (0.002)
Hausman test results	1.11[b] (0.292)

Notes: [a] and [b] show the $\chi^2(1)$ test results correspond to the $\theta_1=1$ and the long run homogeneity restriction respectively. p-values are in brackets. The error correction coefficient measures the speed of adjustment and is computed as the average of each country speed of adjustment.

The adjustment coefficient implies the short run dynamics. It shows the speed of adjustments of the variables in response to a standard deviation from long run equilibrium. The average speed of adjustment of OEX to its long term relation is 1.3 months, but there are significant differences across countries.

As it can be seen in Table 4, the adjustment coefficients meet the requirement to be negative for all countries except Syria, but for five countries (Algeria, Egypt, Iran, Iraq and Lebanon) the coefficient is insignificant. This may be mainly due to poor data in these counties. However, the speed of adjustment is relatively fast in the Saudi Arabia, Libya Morocco and Tunisia, while it is relatively slow in Jordon, Israel and Turkey.

Table 4. Country-specific estimates of the adjustment coefficients

Country	Error correction coefficients	Standard error
Algeria	-0.009 (0.277)	0.008
Egypt	-0.009 (0.228)	0.007
Iran	-0.000 (0.880)	0.003
Iraq	-0.004 (0.137)	0.003
Israel	-0.105 (0.000)	0.027
Jordon	-0.140 (0.000)	0.033
Lebanon	-0.003 (0.593)	0.006
Libya	-0.287 (0.000)	0.038
Morocco	-0.287 (0.000)	0.038
Saudi Arabia	-0.454 (0.000)	0.048
Syria	0.005 (0.168)	0.003
Tunisia	-0.227 (0.000)	0.035
Turkey	-0.085 (0.002)	0.027

Note: p-values are in brackets.

Short run dynamics leads to the conclusion that countries share common long run dynamics (as verified by the PMG specification), while country specific factors apply in the short run.

4. Conclusion

This paper has provided an estimation of the long and short run relation between official and black market exchange rates across 13 selected MENA countries. The estimation of the dynamic relation between the two variables by means of the pool mean group (PMG) estimators shows that the long run relationship between the official and black market exchange rates is equal across the sample countries. The positive common long run official exchange rates (OEX) elasticity is statistically significant and a little upper than unit. The hypothesis of long run coefficient equal to the unit also cannot be rejected. These results implying that there exists a proportional long run equilibrium relationship between official exchange rates (OEX) and black market exchange rates (BMEX) as implied by the portfolio balance model. We observe that the short run coefficient is positive and statistically significant. Thus, the OEX has also a short run effect on the BMEX. In addition, the black market rate depreciates in the same proportion as the official rate in the long run. However, short run homogeneity is rejected, indicating that countries have only partially converged in terms of financial structures.

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