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IS THERE A STRONG LONG RUN RELATION BETWEEN OFFICAL AND BLACK MARKET EXCHANGE RATES? PANEL EVIDENCE FROM THE MENA COUNTRIES

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ABSTRACT

Using the Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS), we illustrate that the strong relation between official and black market exchange rates is rejected for 13 Middle East and Northern African Countries (MENA) countries.

Keywords: Black market exchange rates, FMOLS, DOLS.

JEL classification: F31

I. INTRODUCTION

It is well known that illegal or black foreign exchange markets are an important component of economies of many developing countries. Especially, in the late 1980s and throughout the 1990s, black markets have become an important area in economic research. The black market for exchange rates, in particular, has received major attention. Foreign exchange controls continue to be viewed as a viable policy instrument by policymakers in many developing country Therefore, black markets for exchange rates continue to be very active (Baliamoune-Lutz, 2009) and in particular for U.S. dollars, has operated continuously in those countries for the past decades.

Interactions of official market with black market exchange rates have a long tradition in world economies notably for developing ones. Although many papers have focused on the relationship between official and black market exchange rates (see for example Gupta (1981), Akgiray *et al. (*1989), Bahmani-Oskooee et al. (2002), Diamandis and Drakos (2005) and Love and Chandra (2007)) and confirmed this relation, a few papers have

examined the relationship degree except some studies (e.g., [Agenor and Taylor 1993], [Moore and Phylaktis 2000], and [Bahmani-Oskooee et al. 2002]).

Our research question is whether to test the long run elasticity from official to black market exchange rates equal one. To investigate the relationship between official and black market exchange rates, we use monthly observations from 1970M7 to 1998M7 for the MENA countries[1]. Data are taken from the study of Reinhart and Rogoff (2004).

The outline of the paper is as follows. Section 2 presents the results of our empirical model and Section 3 provides conclusions.

II. EMPIRICAL ANALYSIS

In the empirical analysis, we first perform panel unit root tests. We use three types of panel unit root tests. The first is the IPS (Im et al., 2003) test, and the other two are the Fisher type tests developed by Maddala and Wu (1999).

Table 1 reports the findings from three tests for unit roots in panels. Test result suggest that our variables are integrated of order one in all cases. Therefore, we can implement a test for panel cointegration between official and black market exchange rates.

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	4.523	0.271	6.139	-42.180	-39.779	-69.560	-64.849
	(0.748)	(1.000)	(0.606)	(1.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fisher chi-square	23.607	21.946	26.263	8.285	1154.25	1093.69	1857.37	1629.25
(ADF)	(0.598)	(0.691)	(0.448)	(0.999)	(0.000)	(0.000)	(0.000)	(0.000)
Fisher chi-square	18.005	19.007	26.218	7.772	1504.32	1422.66	2146.89	1855.50
(PP)	(0.875)	(0.836)	(0.451)	(0.999)	(0.000)	(0.000)	(0.000)	(0.000)

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

Table 2 shows the outcomes of cointegration tests developed by Pedroni (1999) between the official and black market exchange rates. The results of the test show that the null hypothesis of no cointegration can be rejected at the 1% significance level. Therefore, the official and black market exchange rates appear to be cointegrated at a reasonable significance level.

[1] 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.

Table 2: Panel Cointegration Test Results

Panel Cointegration	Statistics	Group Mean Panel Cointegration	Statistics
Panel v-statistics	13.084		
	(0.000)		
Panel rho-statistics	-213.737	Group rho-statistics	-205.424
	(0.000)		(0.000)
Panel PP-statistics	-66.498	Group PP-statistics	-97.180
	(0.000)		(0.000)
Panel ADF-statistics	-64.441	Group ADF-statistics	-74.249
	(0.000)		(0.000)

Notes: p-values in brackets.

The next step of the analysis is to test whether there is a strong long run relationship between official and black market exchange rates. To this end, we use the between dimension, group-mean panel FMOLS and DOLS estimators that can be used to directly test the condition on the cointegrating vector that is required for strong relations to hold suggested by Pedroni (2001). We focus on the between dimension tests since the between dimension approach allows for greater flexibility in the presence of heterogeneity across the cointegrating vectors where long run elasticity is allowed to vary. Additionally Pedroni (2000) shows that the between dimension FMOLS estimator has a much smaller size distortion than the within-group estimator by Monte Carlo simulation.

In our case we consider regressions the following form for FMOLS and DOLS respectively:

$$BMEX_{it} = \alpha_i + \beta_i OEX_{it} + u_{it} \qquad i = 1,2,..,N \qquad t = 1,2,..,T \tag{1}$$

$$BMEX_{it} = \alpha_i + \beta_i OEX_{it} + \sum_{k=-Ki}^{Ki} \gamma_{ik} \Delta OEX_{it-k} + u_{it} \qquad i = 1,2,..,N \;\; t = 1,2,..,T \tag{2}$$

Where OEX is the logarithm of official exchange rates of country i in year t, BMEX stands for the logarithm of black market exchange rates. For strong relations between OEX and BMEX to hold, we require under the null hypothesis that H_o:$\beta_i=1$ for all *i*.

Table 3 reports the results of individual and panel FMOLS and DOLS[2]. Individual FMOLS and DOLS estimates and the respective t-statistics for H_o:$\beta_i=1$ are provided in the first 13 entries in Table 2, while

[2] See appendix for details on FMOLS and DOLS.

results for the panel estimators with and without common time dummies are shown at the bottom of the table.

Table 3. FMOLS and DOLS Results

Country	FMOLS	t-statistics	DOLS	t-statistics
Iran	0.85	-1.38	0.86	-1.27
Iraq	11.81	1.36	19.46	2.09*
Saudi Arabia	1.03	1.64	1.05	2.39*
Turkey	0.99	-3.57**	0.98	-5.57**
Israel	0.98	-6.27**	0.98	-6.02**
Jordon	1.02	1.40	1.02	1.99*
Lebanon	1.01	3.23**	1.01	3.79**
Syria	1.95	8.71**	1.96	9.47**
Algeria	1.03	0.59	1.03	0.46
Egypt	0.64	-8.17**	0.65	-7.93**
Libya	2.30	1.74*	2.10	1.51
Morocco	0.96	-3.52**	0.96	-3.28**
Tunisia	0.97	-1.76*	0.97	-1.51
Panel Results				
Without Time Dummies	1.99	-1.60**	2.81	-0.86**
With Time Dummies	0.76	2.44**	0.75	1.93**

Notes: *,** indicate 10%, 1% rejection levels respectively.

Both panel tests reject the null hypothesis of strong relation between official and black market exchange rates for full sample. As for the individual countries, in 8-9 out of 13 cases one finds rejection of the null. Also note that both FMOLS and DOLS test results are in agreement in most cases.

III. CONCLUSION

This paper has studied the long run relations between official and black market exchange rates of 13 MENA countries. We apply two classes of test and used between-group FMOLS and DOLS estimators. Our findings do not support the strong relation between official and black market exchange rates.

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APPENDIX

Following from equation 1, let $\xi_{it}=(\hat{u}_{it},\Delta OEX_{it})$ be a stationary vector including the estimated residuals and differences in OEX. Also let, $\Omega_{it}=\lim_{T\to\infty}E\left[T^{-1}(\sum_{t=1}^{T}\xi_{iT})(\sum_{t=1}^{T}\xi_{iT})'\right]$ be the long run covariance for this vector process which can be decomposed into $\Omega_i=\Omega_i^0+\Gamma_i+\Gamma_i^{'}$ where Ω_i^0 is the contemporaneous covariance and Γ_i is a weighted sum of autocovariances.

Group mean FMOLS estimators is given as

$$\hat{\beta}_{GMF}^{*}=N^{-1}\sum_{1}^{N}\left[\sum_{t=1}^{T}(OEX_{it}-\overline{OEX}_i)^2\right]^{-1}\left[\sum_{t=1}^{T}(OEX_{it}-\overline{OEX}_i)BMEX_{it}^{*}-T\hat{\gamma}_i\right]$$

where $BMEX_{it}^{*}=(BMEX_{it}-\overline{BMEX}_i)-\frac{\hat{\Omega}_{21i}}{\hat{\Omega}_{22i}}\Delta OEX_{it}$ and $\hat{\gamma}_i=+\hat{\Gamma}_{21i}+\hat{\Omega}_{21i}^{0}-\frac{\hat{\Omega}_{21i}}{\hat{\Omega}_{22i}}(\hat{\Gamma}_{22i}+\hat{\Omega}_{22i}^{0})$. Between dimension estimator is

$\hat{\beta}_{GMF}^{*}=N^{-1}\sum_{i=1}^{N}\beta_{CFM,i}^{*}$ where $\beta_{CFM,i}^{*}$ is conventional FMOLS estimator applied to i[th] country of the panel. t-statistics are calculated as

$t_{\hat{\beta}_{GMF}^{*}}=N^{-0.5}\sum_{i=1}^{N}t_{\beta_{CFM,i}^{*}}$ where $t_{\hat{\beta}_{CFM,i}^{*}}=(\beta_{CFM,i}^{*}-\beta_o)\left[\Omega_{11i}^{-1}\sum_{t=1}^{T}(OEX_{it}-\overline{OEX}_{it})^2\right]^{0.5}$.

From equation 2, we construct the group mean panel DOLS estimator as,

$$\hat{\beta}_{GMD}^{*}=N^{-1}\sum_{1}^{N}\left[\sum_{t=1}^{T}Z_{it}Z_{it}^{'}\right]^{-1}\left[\sum_{t=1}^{T}Z_{it}\tilde{\tilde{BMEX}}_{it}\right]$$

where Z_{it} is a $2(K+1)1$ vector of regressors $Z_{it}=OEX_{it}-\overline{OEX}_{it},\Delta OEX_{it-K},..,\Delta OEX_{it+K}$ and $\tilde{\tilde{BMEX}}_{it}=BMEX_{it}-\overline{BMEX}_{it}$. Between dimension DOLS estimator can be constructed as:

$\hat{\beta}^{*}_{GMD}=N^{-1}\sum_{i=1}^{N}\beta^{*}_{CD,i}$ where $\beta^{*}_{CD,i}$ is conventional DOLS estimator applied to i[th] country of the panel. t-statistics are $t_{\hat{\beta}^{*}_{GMD}}=N^{-0.5}\sum_{i=1}^{N}t_{\beta^{*}_{CD,i}}$ where $t_{\hat{\beta}^{*}_{CD,i}}=(\beta^{*}_{CD,i}-\beta_{o})\left[\hat{\sigma}_{i}^{-2}\sum_{t=1}^{T}(OEX_{it}-\overline{OEX}_{it})^{2}\right]^{0.5}$ and the long-run variance of the residuals from the DOLS regression $\sigma_{i}^{2}=\lim_{T\to\infty}E\left[T^{-1}(\sum_{t=1}^{T}\mu_{it})^{2}\right]$.