Measuring the Level of International Capital Mobility for MENA Countries

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ABSTRACT

To achieve sustainable development, it is vitally important to sustain macroeconomic stability, which is closely related to the extent of capital mobility allowed by a country. This paper attempts to measure the level of international capital mobility empirically by estimating the Feldstein-Horioka coefficients employing the panel data for the MENA countries over the period 1963-2007. In empirical analysis, time series properties of the data are examined using recently developed techniques of panel unit root. Having obtained that variables of the model are stationary variables, we use the fixed effect panel model in the analysis of data.The results indicate that capital mobility has always been high in MENA countries but this is particularly obvious for the period 1980-2007, which corresponds to the liberalization period. For the sub-period of 1963-1980, the estimated coefficients are relatively higher, implying the presence of a relatively lower level of capital mobility.

Keywords: *Feldstein-Horioka puzzle; Capital mobility; Fixed Effect Panel*

Introduction

This paper examines the degree of capital mobility for MENA countries. It is well known that one of the important aspects of achieving sustainable development is to preserve macroeconomic stability, which is closely related to the extent of capital mobility. For this reason, measuring the level of capital mobility is an important task to achieve. While higher capital mobility was encountered as one of the reasons behind the recent worldwide financial crisis, the subject is also important for policy makers and firms for a number of reasons; (i) the effectiveness of macroeconomic policies is closely related to the degree of international capital mobility; (ii) higher international capital mobility helps firms to allocate resources efficiently and achieve risk diversification; (iii) higher international capital mobility may also increase volatility which may end up with financial crisis. For example, the global financial crisis began in the USA and spread to Europe and then to the whole world. Today we see that devastating effect of global financial crisis is more pronounced in developed countries than the developing countries.

When we consider the MENA countries in this sense, although they are not composed of a homogeneous group, they seem that they are not as much affected as developed countries. It can be argued that this is because most of the MENA countries are oil-exporting countries and high oil prices following the invasion of Iraq led to an accumulation of significant amounts of dollars in these countries. Even though this is true, this cannot be the sole reason. To be sure, we first need to measure whether capital mobility is high in these countries. If capital mobility is high for this group of countries, we can accept that the capital they accumulated helped them to stabilize their economies during the crisis and that is why they are less affected by the global financial crisis. If capital mobility is low, then we say that these countries were exempt from the crisis because they were luckily not allowing free movement of capital.

Review of the empirical literature shows that most of the studies on the measurement of the level of international capital mobility have focused on estimating the Feldstein and Horioka (1980, hereafter FH) model. FH model involves examining the relationship between savings and investment empirically. Intuitively, the FH model implies that the correlation between savings and investment will be one if capital movement is not allowed and otherwise it will be zero if there is perfect capital mobility. Since then, many studies have been carried out to estimate the relationship between savings and investment, producing an enormous literature on the subject.

In this paper, we aim to estimate the FH coefficient for MENA countries using the fixed effect panel model. FH coefficients will be estimated for MENA countries over the period of 1963-2007 and sub-periods of 1963-1980, 1981-2007, 1981-1997 and 1998-2007. The small coefficients will be interpreted as increased capital mobility.

Literature Review

Given the importance of the subject for open economies, a number of different empirical

methodologies were developed aiming to measure the extent of capital mobility. The Feldstein-Horioka model has found widespread use in the empirical literature because the model is simple as well as providing an intuitive explanation for the level of capital mobility. The model suggested and empirically estimated by Feldstein and Horioka (1980) is as follows:

$$(I/Y) = cons + b\,(S/Y) \qquad (1)$$

where I, S and Y represent domestic investment, domestic saving and gross domestic product respectively. The coefficients cons and b denote constant term and savings-retention coefficients and they are the coefficients that will be ultimately estimated. In equation (1), dependent variable, domestic investment and independent variable, domestic saving is given as shares of the gross domestic product. Using data over 1960-74, Feldstein and Horioka (1980) found that the savings-retention coefficient is very close to the one for 16 OECD countries, implying low capital mobility. Since then, an enormous literature has accumulated to test the Feldstein-Horioka puzzle and explain the puzzle. Apergis and Tsoumas (2009) provide a detailed survey of these studies of empirical literature.

In general, the empirical literature on the subject provides mixed results for both developed and developing countries. Studies testing the puzzle for developing countries found out that the saving-retention coefficient is small, indicating that the level of capital mobility is high in these countries (Payne and Kumazawa, 2006; Apergis and Tsoumas, 2009;Coakley et.al., 1999). On the contrary, some studies provide evidence that capital mobility is low in developing countries (Murthy, 2008; Ghosh and Ostry, 1995). While Wong (1990) argue that the high capital mobility observed in developing countries can be attributed to the size of the non-traded sector, Kasuga (2004) argue that small-sized and inefficient financial mechanisms in developing countries lead to high capital mobility. Ozmen (2005), Bahami-Oskooee and Chakrabarati(2005), and Sinha and Sihna (2004) find that the correlation between saving and investment is high in larger economies.

Bangake and Eggoh (2010) mention the importance of the legal protection system provided for investors in relation to capital mobility. They tested the Feldstein-Horioka puzzle for 37 African countries using the panel cointegration technique and found that savings and investment are a non-stationary and cointegrating series. Their estimation results indicate that capital mobility is higher (0.34) in the countries with strong legal protection of investors than in countries with worse protection (0.85). Overall, the test of the Feldstein-Horioka puzzle for the developing countries, including Middle East countries, shows high capital mobility because the magnitude of foreign aid and the extent of the non-traded sector are high in these countries and they have weak financial markets and are relatively open economies (Apergis and Tsoumas, 2009).

Econometric Methodology and the Data

This paper attempts to investigate the relationship between investment rate and saving rate to measure the level of capital mobility for MENA countries. The data subject to empirical analysis is taken from IMF International Financial Statistics for 12 countries in the MENA region over the period 1963-

2007. The data set is determined by the availability of the data. In other words, those countries that have unbroken series of data over the sample period are included in the data set. These countries are Algeria, Israel, Iran, Egypt, Jordan, Kuwait, Libya, Morocco, Saudi Arabia, Syria, Tunisia, and Turkey. The variables employed in the empirical work involve gross domestic investment and gross domestic savings as percentages of gross domestic product.

As in any empirical study employing time series data, it is vital to determine the level of integration of series. For this reason, we first check the level of integration of investment rate and saving rate variables. The integration level of variables can be determined by the standard unit root tests such as the Augmented Dickey-Fuller (ADF) test. However, it is well-known that standard unit root tests which are test based on individual time series have low power against stationary alternatives. For this reason, the recently developed panel unit root tests were frequently employed in the investigation of the time series properties of data. Since panel data increases the power of the test by enhancing the time series dimension of the data by the cross section, the results will be more reliable. Some of the most popular panel unit root tests are as follows: the LLC (Levin, Lin and Chu, 2002), the IPS (Im, Pesaran and Shin, 2003), ADF - Fisher Chi-square (Maddala and Wu,1999), and PP - Fisher Chi-square (Choi, 2001). While the LLC test allows for heterogeneity of individual deterministic effects and a heterogeneous serial correlation structure, it assumes the presence of a homogeneous autoregressive root under the alternative. The latter is identified as a serious limitation for the LLC test. The LLC test procedure involves using pooled t-statistics of the estimator to evaluate the hypothesis of non-stationarity of each individual time series. The more recently developed IPS tests overcame the limitation of the LLC test by allowing for heterogeneity of the autoregressive root under the alternative. The IPS test is simple to calculate and allows for residual serial correlation and heterogeneity of dynamics across groups. However, simulations indicate that the IPS test is sensitive to a correct choice of lag orders in the underlying ADF regressions; the power of the t-bar test is more favorably affected by a rise in time dimension of the data than the cross-section units of the data; and the interpretation of the IPS test results are difficult because of the heterogeneous nature of the alternative hypothesis. Maddala and Wu's (1999) and Choi's (2001) tests were similar in the way that both suggested panel unit root tests performed using a Fisher statistic, but they were developed to overcome the shortcomings of the LLC and the IPS tests. Maddala and Wu's (1999) and Choi's (2001) tests solves the problems related to previously mentioned tests by providing the combination of probability values for a unit root tests applied to each group in the data set. With this in mind, we employed the LLC, the IPS, ADF-Fisher and PP-Fisher panel unit root tests in this paper. For the LLC and IPS test, the optimal lag length is determined according to Schwarz criteria.

The time series properties of the variables involved determined our choice of the empirical methodology to use in the analysis of measuring the extent of capital mobility model. As shown below, since both independent and dependent variables of the empirical model are stationary variables, we did not test for cointegration and decided to estimate the model with fixed effect panel data model. The empirical findings are provided in the next section.

Empirical Results

In this section, the estimation results obtained from panel unit root tests and the equation (1) which shows the relationship between investment rate and saving rate will be provided. Table 1 and Table 2 provide panel unit root tests results for investment and saving variables respectively. In the first column, the LLC, the IPS, ADF-Fisher and PP-Fisher panel unit root tests are given. While the second column provides panel unit root test results with constant, results with constant and trend are given in the third column. It is worth mentioning that the optimal lag length for the tests were determined according to Schwarz criteria. Examination of the tables shows that the null hypothesis of non-stationarity is rejected at 1% level by all tests. Therefore, we conclude that the variables subject to empirical analysis of the paper are stationary at levels and hence there is no danger of regression results being spurious.

Table 1. Panel Unit root test results for the Investment variable

	With constant		With constant and trend	
	Statistics	Probability*	Statistics	Probability*
Levin, Lin and Chu	-3.26816	0.0005	-2.45043	0.0071
Im, Pesaran and Shin W-stat	-4.65013	0.0000	-3.54615	0.0002
ADF - Fisher Chi-square	70.1163	0.0000	57.4535	0.0001
PP - Fisher Chi-square	63.3885	0.0000	43.4409	0.0089

Note: *Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Table 2. Panel Unit root test results for the Saving variable

	With constant		With constant and trend	
	Statistic	Probability*	Statistic	Probability*
Levin, Lin & Chu t*	-2.59357	0.0047	-3.06139	0.0011
Im, Pesaran and Shin W-stat	-3.20335	0.0007	-2.80969	0.0025
ADF - Fisher Chi-square	52.5655	0.0007	47.3121	0.0031
PP - Fisher Chi-square	53.0406	0.0006	48.4657	0.0022

Note: *Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Having established that both saving and investment variables are integrated I(0), fixed effect panel methodology is used in the estimation of the F-H model. Table 3 presents the empirical findings for the whole period and the sub-periods. Examination of the table shows that the independent variables of the model and tests related to the model are given in the first column. The following five columns provide estimation results for different time periods. Estimation results for the whole period 1963-2007 are given in the second column. The sub-periods are determined by the main changes which occurred in the world economy. For example, 1980 marks the beginning of the liberalization period for developing countries. The year of financial crisis, 1997, in Asia is also a turning point in terms of

financial system in the world. Theoretically, we expect that capital mobility has increased over these periods in line with financial liberalization policies.

Examination of the Table 3 indicates that there is no statistically significant relationship between saving and investment rates implying the presence of very high capital mobility in the MENA region. The saving-retention coefficient (b) is almost zero for the period 1963-2007. Considering the sub-periods, it is clearly obvious that after 1980 capital mobility is significantly high compared to the period of 1963-1980. While the saving-retention coefficient is 0.13 and statistically significant at the 5% level for 1963-1980, it is very close to zero and not statistically significant for 1981-2007 periods. This indicates that liberalization policies had an immense effect in the MENA region in terms of increased capital mobility. Another important observation about the saving-retention coefficient is that this coefficient remained about the same during the sub-periods of 1981-1997 and 1998-2007.

Table 3. Fixed Effect Panel Estimation Results

Period	1963-2007	1963-1980	1981- 2007	1981-1997	1998-2007
Constant	0.234 (50.8)*	0.2001 (11.87)*	0.243 (52.2)*	0.250 (47.1)*	0.240 (23.4)*
Savings	0.0051 (0.285)	0.130083 (1.94)**	-0.02902 (-1.54)	-0.040 (-1.78)***	-0.056 (-1.48)
R-squared	0.533	0.666408	0.561	0.487	0.862
S.E. of regression	0.0547	0.055731	0.046	0.0508	0.025
F-statistic	9.854*	12.813*	9.567*	5.935*	29.22*
Wald Test (Chi-square)	0.081	3.753**	2.373	3.179***	2.185
Fixed Effects Tests:					
Cross-section F-Test	28.514*	17.802*	25.929*	10.789*	52.831*
Period F-Test	5.403*	13.269*	2.942*	2.964*	3.562*

Note: Values in brackets are t-values. *,**,*** denote significance at the levels of 1%, 5% and 10% respectively.

We also tested whether estimated savings-retention coefficients are different from zero using the Wald test. As seen from the table, except for the 1963-80 and 1981-1997 periods, the savings-retention coefficients are not different from zero statistically, implying the presence of perfect capital mobility. Finally, it is seen that both cross-section and period fixed effects contribute statistically significantly to the explanation of the dependent variable. In particular, significant period effects imply the existence of close connections among countries of the MENA region over time.

Considering the economic policies followed by the countries in the MEAN region, these findings provided above seem to be suspicious. As we know, most of these economies are closed economies, their financial markets are not developed and they have undertaken liberalization policies very recently. In this sense, we can argue that the findings of this study are in agreement with the findings

of the literature. As mentioned above, the level of capital mobility is found to be higher in relatively closed economies than open economies, in countries with inefficient financial markets than those with financially developed markets, etc. Since some of the MENA countries are resource-rich countries, they accumulate enormous savings; since they do not have financially developed markets, they need foreign capital and aid. Taking these together, we conclude that capital mobility is high in the MENA region.

Conclusion

In this study, we attempted to measure the degree of capital mobility in the MENA region. Time series properties of the data investigated using panel unit root tests indicated that both variables of interest are stationary. Therefore, we estimated the Feldstein-Horioka equation with fixed effect panel methodology. The findings of the study provided a number of important insights into the level of capital mobility in the region. First, characteristics of sub-periods are very different from each other in terms of the level of capital mobility. While the capital mobility is relatively low during the period of 1963-1980, it is pretty high during the period of 1981-2007. Secondly, the results imply the presence of perfect capital mobility in the period of 1981-2007. Thirdly, although the sub-periods of 1981-1997 and 1998-2007 are slightly different from each other, it seems that the perfect capital mobility assumption holds in these periods as well.

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