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Evidence from the MENA Region

Erdal Özmen
Middle East Technical University
Department of Economics, 06531, Ankara, Turkey
E-mail: ozmen@metu.edu.tr

Economic Research Center
Middle East Technical University
Ankara 06531 Turkey
www.erc.metu.edu.tr

FINANCIAL DEVELOPMENT, EXCHANGE RATE REGIMES AND THE FELDSTEIN-HORIOKA PUZZLE: EVIDENCE FROM THE MENA REGION

Erdal Özmen
Middle East Technical University
Department of Economics, 06531, Ankara, Turkey
E-mail: ozmen@metu.edu.tr

ABSTRACT

This paper investigates whether the Feldstein and Horioka (1980) argument on domestic saving-investment relationship is supported by the data of the countries in the Middle East and North Africa (MENA) region when the financial development levels and exchange rate regimes are taken into account. To this end, we employ both the ARDL bounds cointegration test and panel mean group procedures. The results support the view that a successful international financial integration requires compatible levels of financial intermediation. The evidence also suggests that saving-investment cointegration is not invariant to exchange rate regimes.

Keywords: Capital Mobility, Exchange Rate Regimes, Feldstein-Horioka Puzzle, Financial Development, Investment, Saving, Middle East, North Africa.

JEL Classification: C32, F41

I. INTRODUCTION

The persistence of a strong correlation between domestic saving and investment in spite of policy regime changes towards flexible exchange rates, financial liberalization and international capital mobility has often been interpreted as the Feldstein and Horioka puzzle since their seminal contribution (Feldstein and Horioka, 1980; hereafter FH). In a world of capital immobility, investments are bound to be solely financed by domestic savings. The cointegration of saving and investment with a unitary coefficient is consistent with a policy of current account targeting in an open economy with fixed exchange rates. The exchange rate adjustment under a flexible exchange rate regime may lead to contemporaneous saving-investment correlation to be less than unity. In a world of fully integrated economies with perfect capital mobility, on the other hand, the saving-investment (S-I) link tends to disappear as domestic investment can now be financed by the worldwide pool of saving.

There are ample explanations for the FH puzzle ranging from empirical modelling issues (e.g. sample and variable selection, simultaneity bias, common contemporaneous shocks and non-linearity) to the discussion of the interpretation of the S-I interrelationship as a measure of the degree of capital mobility[1]. A crucial point in the FH puzzle is that the S-I relationship may not be invariant to the prevailing policy regime. The FH literature often maintains that countries with compatible levels of financial intermediation can borrow and lend from each other with negligible transaction costs. However, varying degrees of financial development and exchange rate flexibility between countries can both potentially act as frictions to international financial integration. This paper, thus, aims to investigate whether the FH argument is supported by the data of the countries in the Middle East and North Africa region when the levels of financial intermediation and exchange rate regimes are taken into account.

The Middle East and North Africa (MENA) data encompassing countries with different financial development levels, exchange rate regimes and resource endowments appear to be a natural candidate to assess the FH puzzle. The plan for the rest of the paper is as follows. The following section is devoted to a brief discussion of the FH puzzle. Section III presents the data. Section IV reports and discusses empirical results and Section V concludes.

II. THE FELDSTEIN-HORIOKA PUZZLE

A useful starting point to investigate the FH puzzle may be the following current account identity:

$$ca_t = sav_t - inv_t \qquad (1)$$

where ca = current account/GDP, sav =saving/GDP, inv = investment/GDP. In a world of capital immobility, or financial autarky, current account deficits can be

[1] See Coakley *et al*. (1998, 2004), Obstfeld and Rogoff (2000) and Taylor (2002) for recent surveys.

positive up to the limit allowed by the availability of foreign exchange reserves. The binding liquidity constraint defined by the foreign exchange reserves makes any current account deficit unsustainable, thus the ca is bounded to be stationary (I(0)) around zero mean. Given that both of them are integrated of order one (I(1)), this corresponds to the case that, inv_t and sav_t are cointegrated with a unitary coefficient.

Feldstein and Horioka (1980) consider the following regression equation:

$$inv_t = \gamma_0 + \gamma_1 sav_t + u_t \qquad (2)$$

In (2), u is a disturbance term and γ_1 can be interpreted as the 'saving retention coefficient' to indicate the ratio of saving retained in the economy to finance investment. In a financially closed economy, investment can only be financed by domestic saving causing $\gamma_1 = 1$. With capital mobility, domestic investment can be financed by the worldwide pool of saving and domestic saving can be a source of overseas investment, thus the value of γ_1 decreases. Consequently, γ_1 is an indicator of the extent of capital mobility in the FH sense. A γ_1 of zero (one) indicates perfect (the absence of any) capital mobility. The puzzling result by FH is the persistent correlations between domestic saving and investment rates in the OECD countries despite extensive deregulation of capital markets.

The FH controversial finding –which Obstfeld and Rogoff (2000) identify as one of the six major puzzles in international macroeconomics- has spawned an enormous literature. One strand of the literature focuses on empirical modeling issues like sample sensitivity (Cadoret, 2001), common contemporaneous shocks and simultaneity bias due to the endogeneity of saving (Obstfeld and Rogoff, 2000), non-linear current account dynamics (Chortareas *et al.* 2004) and policy regime changes (Sarno and Taylor, 1998; Ho, 2000 and Özmen and Parmaksız, 2003). Transactions costs of international trade causing equity home bias (Obstfeld and Rogoff, 2000) and the definition of investment itself (Rossini and Zanghieri, 2003) are amongst the other plausible explanations of the puzzle. Coakley, Kulasi and Smith (1998), on the other hand, argue that the cointegration of saving and investment with a unit coefficient implies current account solvency irrespective of the degree of capital mobility. Consistent with this interpretation, endogenous government policy actions targeting a sustainable current account have been postulated to explain the long-run saving-investment relationship (Artis and Bayoumi, 1990).

A crucial point in the FH puzzle is the invariance of the S-I relationship to policy regime changes. The sustainability of current account deficits and the scope of endogenous policy actions targeting the current account may not be invariant to the prevailing exchange rate regime. In a financially closed economy with fixed exchange rates the size of the current account balance (S-I gap) is limited to the availability of foreign exchange reserves. Thus, the S-I gap may be expected to adjust to meet the liquidity constraint under financial autarky. Exchange rate adjustments may lead to a different path of endogenous policy actions under a flexible exchange rate regime. The liquidity constraint becomes much less tighter with financial opening as the S-I gap can be financed also via foreign savings. With financial opening, the current account sustainability or solvency becomes an intertemporal issue and the current account balance may substantially reduce its status as the primary policy objective (Artis and Bayoumi, 1990).

A successful financial integration requires compatible levels of financial intermediation. Recently, Guisso, Sapienza and Zingales (2004) show that differences in local financial development matter even within a financially integrated single country with no frictions to capital movements. Financial development allows the mobility of capital not only internationally but also domestically from a domestic intermediater to a domestic borrower. Thus, as argued by Guisso *et al.* (2004, p.967), the impairment of either international capital mobility or domestic financial intermediation can lead to domestic investment to be correlated with domestic saving.

The level of financial development is important not only for an efficient intermediation of international financial assets flows but also on the evolutions of domestic saving and investment, and thus on current account dynamics. The net impact of financial development on current account deficits, however, may not be unambiguous. According to the endogenous growth literature, financial deepening can increase investment via more efficient allocation of saving (Bencivenga and Smith, 1991). Financial development and integration leads to higher current account deficits according to Blanchard and Giavazzi (2002) as it increases consumption via loosening liquidity constraints and allowing for consumption smoothening. Financially more developed countries can be expected to have higher "equity home bias" (Lewis, 1999) leading to lower current account deficits. Financial underdevelopment, on the other hand, can lead to a bias for overseas equities and thus can cause incremental domestic saving to finance primarily overseas investment.

III. DATA AND MEASUREMENT ISSUES

The MENA region covers a wide array of countries from Morocco in the West and the Islamic Republic of Iran (hereafter Iran) in the East. The data availability limits us to consider only a selected number of countries including Algeria, Egypt, Iran, Israel, Jordan, Morocco, Saudi Arabia, Syria, Tunisia and Turkey. This sample is, however, appears to be rich enough to encompass different financial structures, exchange rate regimes and endowments and development levels[2]. Algeria, Iran, Saudi Arabia and to a lesser extend Egypt and Syria are oil exporting countries. According to World Bank classification, Egypt is a low-income country, Algeria, Iran, Jordan, Syria, Morocco, Saudi Arabia, Tunisia and Turkey are middle-income countries, whilst Israel is a high income country. Saudi Arabia is a net creditor country in international financial markets.
As already discussed, exchange rate regime and financial development level may be important for the evolution of current account deficits. The conventional

[2]See Creane *et al*. (2004) and the March (2003) issue of *Finance and Development* published by the IMF for recent surveys of the macroeconomic conditions of the MENA countries.

classification of exchange rate regimes is provided by the IMF which is "*de iure*," that is, it is essentially based on what the countries say that they do. However, deviations of actual behaviour from announcements appear to be common as recently shown by Reinhart and Rogoff (2004). Furthermore, the presence of parallel markets and multiple exchange rate practices are often the case in some countries including Egypt and Iran in our sample. Therefore, it may be preferable to consider *de facto* regimes rather than the *de jure* ones. In this study we follow the exchange rate classification by Reinhart and Rogoff (2004) which is based on *de facto* exchange rate performance, including in parallel markets and multiple exchange rate practices. For the estimation, we considered the "coarse grid" classification of Reinhart and Rogoff (2004) on a 1—5 scale, with higher values denoting more flexible exchange arrangements. For the level of financial development we use liquid liabilities (currency plus demand and interest-bearing liabilities of banks and other financial intermediaries) to GDP as a proxy variable. As noted by Beck, Demirgüç-Kunt and Levine (2000) this is the broadest available indicator of financial intermediation and a typical measure of financial depth[3].

IV. EMPIRICAL RESULTS

In this part, our empirical relations of interest are basically

$$inv_{it} = \gamma_{0i} + \gamma_{1i} sav_{it} + u_{it} \quad (3)$$

and

$$inv_{it} = \gamma_{0i} + \gamma_{1i} sav_{it} + \gamma_{2i} ERR_{it} + \gamma_{3i} fin_{it} + u_{it} \quad (4)$$

along with the identity

$$ca_{it} = sav_{it} - inv_{it} \quad (5)$$

where, i is the country index, sav = Gross national savings, including net current transfers (% of GDP), inv = Gross fixed capital formation (% of GDP), ca = current account balance (% of GDP), fin = Liquid liabilities (% of GDP) and ERR = *de facto* exchange rate regime. The data for sav, inv and fin are from the World Bank World Development Indicators. The *de facto* exchange regime classification is from Reinhart and Rogoff (2004). We consider annual data from 1976 to 2001. Equation (3) is the conventional FH regression and (4) is defined to investigate the impacts of exchange rate regimes and financial deepening.

The integration properties of the variables are investigated by conducting the ADF and KPSS tests with the lag length fixed as two to obtain comparable

[3] Recently, Creane *et al.* (2004) construct a financial development index encompassing a wide range of financial sector indicators for MENA countries. According to the index, Jordan and Saudi Arabia are at higher levels, Tunisia, Morocco and Egypt are at medium levels whilst Algeria, Iran and Syria are at low levels of financial development. The ranking is based on recent 2000-2003 data and may not be representing the time path of financial development of the countries during the last three decades. Owing to the severe data limitations, we consider the conventional quantitative indicator of financial development.

results. The results suggest the stationarity (I(0)) of ca_t only for Israel and Jordan. Following Coakley *et al*. (1998), this can be interpreted as lending a support to the sustainability of current account balances for these countries. For the rest of the countries, ca_t is I(1). Both of the variables generating the ca_t, sav_t and inv_t, are I(1) for Algeria, Egypt, Iran, Syria and Turkey. The variable sav_t is I(1) for Morocco, S. Arabia and I(0) for Israel, Jordan, Tunisia whilst inv_t is I(1) for Israel, Jordan. The financial development proxy variable fin_t is I(0) for Iran and I(1) for the others. The results for the rest of the variables may not be definitive whether they are I(0) or I(1). However, the necessary condition for the implementation of the Pesaran *et al.* (2001) bounds test for the null of no cointegration, the degree of integration being less than two for each of the variables in a system, appears to be satisfied by the results of both the ADF and KPSS tests.

IV.1. Panel Estimations of the Conventional and Augmented FH Equations

The recent studies on the FH puzzle often employ fixed effects estimation procedures to allow heterogeneity between the panel of the countries considered. These methods, however, still impose a common slope coefficient which is indeed crucial for the FH puzzle. In this paper, following Coakley *et al.* (2004), we prefer to employ the Pesaran and Smith (1995) panel mean group (MG) method which permits heterogeneity in both intercept and slope coefficients. Phillips and Moon (1999) show that that the cross-sectional variation in a non-stationary panel may be helpful in obtaining consistent estimates of a long-run average parameter even if there is no time series cointegration at the individual level. As argued by Coakley *et al.* (2001, 2004), this insight justifies the use of the MG procedure which provides consistent estimates for nonstationary, heterogenous panels. Furthermore, standard t-tests for the MG estimator based on the N(0,1) distribution have reasonably good size properties irrespective of I(0) or I(1) errors as shown by Coakley *et al.* (2001).

To obtain the MG estimators, we consider the conventional FH

$$inv_{it} = \gamma_{0i} + \gamma_{1i}sav_{it} + u_{it}$$

and, the augmented FH

$$inv_{it} = \gamma_{0i} + \gamma_{1i}sav_{it} + \gamma_{2i}ERR_{it} + \gamma_{3i}fin_{it} + u_{it}$$

equations. The MG estimator ($\hat{\gamma}_{MG}$) and its standard error (se($\hat{\gamma}_{MG}$)) for N cross-sectional units, are calculated as follows:

$$\hat{\gamma}_{MG} = \sum_{i=1}^{N} \hat{\gamma}_i / N \text{ and se}(\hat{\gamma}_{MG}) = \sigma(\hat{\gamma}_i)/\sqrt{N}$$

where $\hat{\gamma}_i$ and $\sigma(\hat{\gamma}_i)$ are the estimated individual country time-series coefficients and their standard deviations, respectively.

Table 2 reports the OLS estimates of the equations for each of the countries. The table reports also the ADF statistics to test the non-stationarity of equation residuals (Engle and Granger, 1987). The results suggest non-rejection of the null of no-cointegration at the 5 % level for all of the countries and variable systems except Egypt and Morocco (negative saving retention coefficient!). According to the conventional FH framework, this is consistent with an argument that none of the countries in the region can be classified as a financial autarky. The estimates of the saving retention coefficients are individually insignificant for Egypt, Israel, Morocco and negative for S. Arabia.

In the FH framework, this can lend a support to the hypothesis that the rest of the countries in the sample are not financially integrated. The significant positive ERR_t coefficients are consistent with the view that movements towards more exchange rate flexibility make higher levels of current account deficits sustainable[4]. The effect of financial deepening appears to be mainly via eliminating liquidity constraints on consumption as suggested by the negative fin_t coefficients. However, all these individual country results may be misleading given the nonstationarity of most of the variables and of the residuals from the regressions containing them. Therefore, we prefer to leave the discussion of the individual country estimates to the later section in the context of the ARDL bounds tests results.

The panel MG method yielded the following results (standard errors in parentheses):

$$inv_t = \underset{(2.89)}{15.76} + \underset{(0.135)}{0.34} sav_t$$

$$inv_t = \underset{(5.02)}{20.37} + \underset{(0.134)}{0,29} sav_t + \underset{(0,77)}{2.26} ERR_t - \underset{(0.38)}{0,11} fin_t$$

According to the MG results, the saving retention coefficient is significant for the panel sample. The magnitude of the mean saving retention coefficient (0.3) is close to those results for some samples of developing countries. Coakley *et al.* (1999), for example, estimate the coefficient for a panel of 44 developing countries as 0.40. Montiel (1994) suggests a saving retention coefficient of 0.6 as a benchmark for evaluating whether a country's capital account is open or not. Accordingly, the MENA countries can be interpreted as having being exhibiting a considerable degree of capital mobility. More flexible exchange rates appear to be more likely associated with higher investments and current account deficits. The increase in the level of financial intermediation potentially increasing consumption via eliminating liquidity constraints and investments via better allocation of resources may be insignificant in the dynamics of current account dynamics. The statistical insignificance of the financial intermediation proxy in the investment-saving imbalance is consistent with this argument.

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[4] Due to the constancy of the exchange rate regimes for Morocco, S. Arabia, Syria and Tunisia during the sample period, the augmented FH equations does not contain the ERR variable for these countries.

IV.2. ARDL Bounds Tests and the Long-Run Relationships

In this section we proceed with the analysis of long-run relationships between the variables postulated to explain the FH puzzle by employing an Autoregressive Distributed Lag (ARDL) modelling approach and the bounds testing procedure of Pesaran, Shin and Smith (2001). For a k^{th} order Vector Autoregression (VAR(k)) system $z_t = (y_t, x'_t)'$, an ARDL equation for y_t and the vector of long-run forcing variables x_t can be written as:

$$\Delta y_t = a + b_1 y_{t-1} + b_2 x_{t-1} + \sum c_i \Delta y_{t-i} + \sum d'_j \Delta x_{t-j} + ew_t + \varepsilon_t \quad (6)$$

where, i = 1, ..n; j = 0, .., n and n = k-1 and w_t is a vector of exogenous components e.g. dummy variables. Pesaran *et al.* (2001) provides the CV bounds to test the null of no cointegration ($b_1 = 0$, $b_2 = 0'$). The implied long-run relationship by (6) can be written as:

$$y_t = \theta_0 + \theta_1 x_t + \Phi w_t + v_t \quad (7)$$

An important advantage of the bounds approach is that the system postulated to be cointegrated can contain both I(0) and I(1) variables.

To investigate the FH puzzle, we consider both the conventional FH variable space and a general model that contains also the policy regime proxy variables. The general ARDL and the implied long-run equations are:

$$\Delta inv_t = a + b_1 inv_{t-1} + b_2 sav_{t-1} + b_3 fin_{t-1} + \sum c_i \Delta inv_{t-i} + \sum d_{1j} \Delta sav_{t-j} + \sum d_{2j} \Delta fin_{t-j} + e_1 ERR_t + \varepsilon_t \quad (8)$$

$$inv_t = \theta_0 + \theta_1 sav_t + \theta_2 fin_t + \Phi_1 ERR_t + v_t \quad (9)$$

Note that, under ($b_3 = d_{2j} = e_1 = 0$) and ($\theta_2 = \Phi_1 = 0$), the equations yield the corresponding conventional FH specifications.

Table 3 reports the implied long-run relationships from the estimation of ARDL models for each of the countries. The table also records the values of the Bounds Test (Q_B) to test the null of no cointegration between the variables. We started with setting a maximum VAR lag length k=4 and choose the optimum ARDL lag length according to the Schwarz's Bayesian Information Criteria (SBC).

The results of the bounds tests suggest that the equations represent long-run equilibrium relationships for every country when the exchange rate regime and the level of financial intermediation are taken into account. The long-run saving retention coefficients are very high for all the countries except Egypt (0.12), Syria (0.42) and Morocco (negative!). In the conventional FH approach, the rest of the countries can be characterized as relatively financially closed economies. However, this interpretation may be ignoring the fact that the levels of financial intermediation in most of the countries may not be assessed as sufficiently compatible, for example, with those of the international financial centers. An insignificant saving retention coefficient may be perfectly consistent also for a country where domestic savings tend to finance investments abroad due to the lack of sufficient domestic financial intermediation.

In the conventional FH framework the high saving retention coefficient is interpreted as evidence supporting capital immobility irrespective of the prevailing exchange rate regime. A S-I cointegration, however, is consistent also with a policy of current account targeting in a financially open economy with fixed exchange rates. Given the fact that, most of the countries in the sample adopted fixed/managed exchange rate regimes during the sample period, the high saving retention coefficients may be interpreted supporting endogenous policy actions towards current account deficit (CAD) targeting, rather than capital immobility. Exchange rate flexibility can act as a disciplining device on CAD by allowing exchange rates to adjust to CAD disequilibrium (Edwards, 2004). The statistical insignificance of ERR for Algeria, Iran, Jordan and Turkey may be consistent both with the "shock absorber" interpretation of exchange rate flexibility and a CAD targeting under an inflexibility. A flexible exchange rate regime, on the other hand, can also increase the capacity of a country to accommodate external shocks (Milesi-Ferretti and Razin, 1996) and thus can make higher CAD sustainable. Supporting this approach, movements towards more flexible exchange rate regimes appear to be more likely associated with higher investments and thus higher CAD in Egypt and Israel.

As already discussed, the effect of financial deepening on saving, investment and current account deficits is an empirical issue. The financial intermediation variable indeed may also be interpreted as negatively correlated with the degree of liquidity constraints. The "consumption smoothing with the decrease in the liquidity/finance constraint" effect of financial deepening appears to be more significant in Israel, Morocco, Tunisia and Turkey as suggested by the significant and negative long-run fin_t coefficients. Financial deepening induced investment argument, on the other hand, is supported by the Egyptian data. In the rest of the countries, the overall net impact of financial deepening on investment and thus on current account appears to be insignificant.

V. CONCLUDING REMARKS

We investigated whether the Feldstein and Horioka (1980) argument on domestic saving-investment relationship is supported by the data of the countries in MENA region when the levels of financial intermediation and exchange rate regimes are taken into account. Consistent with the characteristics of the prevailing fixed or managed exchange regimes, the results suggest that saving and investment are cointegrated in most of the countries. The current account targeting under inflexible exchange rate regimes appears to be successful in maintaining current account sustainability. Our results lends a support also to an argument that exchange rate regime flexibility can act as a shock absorber and increase the capacity of a country to accommodate external shocks.

The results of alternative policy prescriptions and theoretical models often depend on the perceived degree of international capital mobility. International financial integration presents policy makers with both opportunities and challenges. International capital mobility allows the domestic saving-investment gap (current account) to be financed also via foreign saving, and thus loosens the external constraint relative to a financial autarky. However, often ignored in the FH literature, a successful financial integration requires compatible levels of financial intermediation. The lack of an adequate level of domestic financial intermediation for both inflows and outflows of savings can lead to high S-I correlation supporting the FH argument. A low saving retention coefficient, on the other hand, may not necessarily imply international financial integration. This is because, financial underdevelopment can impair the link between external saving to finance domestic investment. The saving flight abroad due to the lack of adequate domestic financial structure can yield a very low even negative saving retention coefficient.

This paper stressed the importance of considering financial development and exchange rate regimes in assessing the FH puzzle. The theoretical ambiguity of their effects on the evolution of saving-investment and thus current account dynamics should better be interpreted as a need for further empirical investigation rather than as a cause of neglecting them. To conclude, the results of this paper suggest that the Feldstein and Horioka (1980) argument may become less puzzling when financial intermediation levels and exchange rate regimes are taken into account.

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Table 1. ADF and KPSS Test Statistics

		Levels				First Differences	
		ADF		KPSS		ADF	KPSS
Series		λ_m	λ_t	η_m	η_t	λ_m	η_m
Algeria	ca	-2.35	-2.53	0.53*	0.11	-5.25*	0.07
	sav	-1.61	-1.15	0.39	0.22*	-3.96*	0.19
	inv	-1.84	-2.88	1.12*	0.19*	-5.71*	0.06
	fin	-1.56	-2.17	0.69*	0.23*	-3.44*	0.16
Egypt	ca	-1.45	-2.49	0.60*	0.14*	-3.48*	0.10
	sav	-2.33	-2.26	0.12	0.11	-4.06*	0.05
	inv	-1.65	-3.46	0.76*	0.15*	-4.21*	0.14
	fin	-2.76	-2.32	0.55*	0.51*	-3.09*	0.43
Iran	ca	-2.89	-2.86	0.15	0.08	-5.90*	0.05
	sav	-2.96	-2.47	0.20	0.18*	3.84*	0.29
	inv	-2.54	-2.60	0.26	0.27*	-3.16*	0.38
	fin	-3.74*	-3.82*	0.10	0.09	-4.40*	0.07
Israel	ca	-3.21*	-3.57*	0.30	0.11	-5.55*	0.04
	sav	-4.40*	-4.60*	0.16	0.07	-4.95*	0.04
	inv	-1.80	-2.02	0.28	0.14*	-4.84*	0.08
	fin	-2.03	-2.02	0.18	0.16*	-3.92*	0.10
Jordan	ca	-4.34*	-4.55*	0.12	0.09	-7.21*	0.05
	sav	-3.34*	-3.21	0.11	0.18*	-5.92*	0.06
	inv	-2.50	-2.32	0.47*	0.16*	-3.51*	0.07
	fin	-1.63	-1.51	0.70*	0.23*	-4.48*	0.15
Morocco	ca	-2.86	-2.76	0.91*	0.24*	-3.41*	0.12
	sav	0.43	-1.13	0.81*	0.16*	-6.44*	0.17
	inv	-4.48*	-3.63*	0.59*	0.18*	-4.01*	0.16
	fin	0.82	-1.49	1.32*	0.20*	-5.33*	0.22
S. Arabia	ca	-2.42	-2.31	0.66*	0.23*	-5.13*	0.17
	sav	-2.02	-1.64	0.70*	0.28*	-4.54*	0.25
	inv	-2.55	-4.55*	1.00*	0.06	-5.75*	0.04
	fin	-1.72	-1.62	0.81*	0.28*	-3.34*	0.26
Syria	ca	-1.63	-1.36	0.28	0.23*	-3.55*	0.13
	sav	-2.38	-1.53	0.59*	0.29*	-3.40*	0.21
	inv	-3.37*	-2.90	0.57*	0.19*	-3.22*	0.12
	fin	-2.22	-2.55	0.35	0.25*	-2.87	0.10
Tunisia	ca	-2.74	-2.89	0.53*	0.07	-4.03*	0.05
	sav	-3.55*	-3.45*	0.14	0.04	-3.86*	0.04
	inv	-2.48	-2.88	0.78*	0.06	-3.84*	0.05
	fin	-1.22	-1.64	0.81*	0.13*	-4.74*	0.12
Turkey	ca	-2.94	-2.89	0.15	0.15*	-5.87*	0.06
	sav	-2.03	-2.32	0.84*	0.19*	-4.25*	0.11
	inv	-1.43	-1.48	0.85*	0.16*	-3.36*	0.18
	fin	2.19	0.21	1.05*	0.22*	-6.57*	0.30

Notes: All the test regressions contain a constant term. The equations for λ_t and η_t include also a linear trend. An asterisk (*) indicates the rejection of the null at the 5 % level. The critical values for the ADF and KPSS are from MacKinnon (1991) and Kwiatkowski *et al*. (1992), respectively.

Table 2: Conventional and Augmented FH Equations

	γ_0	γ_1	γ_2	γ_3	R^2	DW	ADF (0)	ADF (1)
Algeria	**18.82** (2.42)	0.36 (1.57)			0.09	0.37	-1.85	-2.03
	0.01 (0.01)	**0.48** (2.20)	3.04 (1.44)	0.10 (1.43)	0.31	0.67	-2.82	-2.58
Egypt	**22.81** (4.61)	0.02 (0.09)			0.00	0.34	-1.11	-1.70
	7.48 (1.44)	0.07 (0.47)	**4.73** (7.49)	0.05 (1.14)	0.72	1.40	-3.83	**-4.95**
Iran	4.77 (1.48)	**0.64** (5.42)			0.55	1.24	-3.33	-2.42
	14.83 (2.07)	**0.54** (4.45)	0.07 (0.06)	**-0.15** (-2.34)	0.64	1.53	-3.86	-2.61
Israel	**24.63** (9.41)	-0.22 (-1.25)			0.06	0.55	-1.52	-1.86
	26.90 (7.17)	-0.17 (-1.15)	**1.17** (3.18)	**-0.09** (-2.79)	0.43	1.03	-2.82	-3.07
Jordan	**13.17** (4.47)	**0.60** (5.41)			0.55	0.93	-2.61	-3.07
	32.54 (4.78)	**0.43** (3.91)	**3.77** (2.73)	**-0.20** (3.40)	0.71	1.49	-3.65	-4.35
Morocco	**30.45** (8.97)	**-0.35** (-2.10)			0.16	0.84	**-3.75**	**-3.82**
	30.93 (9.09)	-0.22 (-1.04)		-0.05 (-1.11)	0.20	0.84	-3.60	-3.70
S. Arabia	**19.45** (10.60)	0.11 (1.74)			0.11	0.67	-2.16	-3.21
	49.24 (5.52)	**-0.34** (-2.42)		**-0.42** (-3.39)	0.41	0.82	-2.61	-3.19
Syria	**12.37** (6.95)	**0.60** (7.06)			0.67	0.75	-2.49	-2.47
	15.45 (3.12)	**0.58** (6.36)		-0.05 (-0.67)	0.68	0.76	-2.59	-2.62
Tunisia	9.69 (1.57)	**0.75** (2.92)			0.26	0.74	-2.41	-2.63
	27.12 (2.36)	**0.67** (2.69)		-0.31 (-1.78)	0.35	0.99	-2.73	-2.92
Turkey	1.39 (0.75)	**0.90** (10.5)			0.82	1.05	-2.94	-2.72
	-0.83 (-0.32)	**0.88** (9.08)	0.58 (1.32)	0.01 (0.03)	0.84	1.09	-3.02	-2.45

Notes: t-ratios in parentheses. Bold faces denote significance at the 5 % level. The 5 % CV's for the ADF tests are –3.60, -4.11 and –4.59 for equations with two, three and four variables, respectively.

Table 3. Estimated long-run coefficients using the ARDL approach

	(p_1, p_2, p_3)	θ_0	θ_1	θ_2	Φ_1	Q_B
Algeria	(1,2)	**14.75*** (2.24)	**0.40** (1.91)			5.3
	(1,4,4)	-5.22 (-1.19)	**1.16*** (7.34)	0.03 (0.51)	**-2.21** (-1.78)	**5.7***
Egypt	(1,2)	**56.65*** (2.83)	-1.85 (-1.71)			4.9
	(4,4,4)	4.60 (1.65)	**0.12*** (12.06)	**0.09*** (3.85)	**4.08*** (25.71)	**19.7***
Iran	(1,0)	-22.82 (-1.20)	**1.81*** (2.26)			**10.1***
	(1,0,0)	-25.63 (-0.72)	**1.98** (1.62)	0.03 (0.16)	-0.91 (-0.25)	**7.5***
Israel	(1,1)	11.11 (1.11)	0.58 (0.94)			3.9
	(3,1,2)	**24.0*** (3.78)	**0.76*** (2.19)	**-0.26*** (-2.62)	**1.83*** (2.86)	**10.9***
Jordan	(2,0)	**9.98*** (4.54)	**0.70*** (3.98)			4.5
	(2,0,1)	**11.28*** (20.6)	**0.66*** (2.61)	0.01 (0.01)	0.11 (0.04)	**5.4***
Morocco	(1,0)	**22.12*** (3.04)	0.03 (0.08)			2.1
	(4,4,4)	**38.14*** (34.9)	**-0.78*** (-11.9)	**-0.03*** (-2.57)		**14.4***
S. Arabia	(3,3)	**17.11*** (19.5)	**0.14*** (4.12)			**19.6***
	(2,3,4)	**38.30*** (34.9)	**0.96** (1.98)	**0.78** (1.74)		**18.3***
Syria	(2,0)	**15.01*** (5.07)	**0.44*** (2.77)			2.6
	(2,1,0)	15.05 (1.57)	**0.42*** (1.95)	0.01 (0.04)		**8.7***
Tunisia	(1,0)	-19.1 (-1.00)	**1.93*** (2.42)			**6.2***
	(1,3,2)	-16.3 (-1.14)	**2.95*** (6.40)	**-0.55*** (-2.58)		**10.1***
Turkey	(3,0)	**-6.07*** (-2.11)	**1.23*** (9.50)			**5.9***
	(4,4,4)	-5.62 (-1.71)	**1.44*** (7.32)	**-0.29*** (-2.63)	0.57 (1.14)	**5.4***

Notes: (p_1, p_2, p_3) are the lag orders for autoregressive (p_1) and distributed lag (p_2, p_3) components of the ARDL specification chosen by the SBC. Asymptotic t-ratios in parentheses. Bold faces denote significance at the 5 % level. The critical values for the ARDL Bounds tests (Q_B) are from Pesaran *et al.* (2001).