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Capital Flows in Selected Arab Economies: Evidence from the Relationship between Investment and Savings

Jamel Jouini

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These economic studies are the product of the staff of the Economic Department at the Arab Monetary Fund (AMF). The Fund publishes these studies which survey issues pertinent to monetary, fiscal, banking, trade and capital market policies and their impact on Arab economies.

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Executive summary

Since the study of Feldstein and Horioka (1980) was conducted, many studies in the economic literature have paid more attention to the relationship between investment and savings in developed and developing economies to understand how such relationship has behaved over time and where it stands now. In particular, attention is paid to the links running from savings to investment, thus highlighting the empirical evidence of international capital mobility. In this context, the current study revisits the investment-savings nexus by selecting a set of eight Arab countries (Bahrain, Egypt, Iraq, Oman, Saudi Arabia, Sudan, Tunisia, and the United Arab Emirates (UAE)) over the 1970-2018 period through the adoption of various relevant testing and estimation issues.

The results of the study find evidence for three main claims. First, the investment-savings nexus differs across Arab economies, reflecting heterogeneity in capital mobility. Indeed, some countries are relatively more open than the other economies, given that only a low part of their domestic savings is translated into domestic investments, suggesting that most savings likely flowed outside these countries.

Second, capital mobility changes over time, as the relationship between investment and savings differs across two sub-periods of the sample period for the considered Arab economies. This finding may be useful for decision-makers in the Arab region to handle well the

time-varying investment-savings nexus when dealing with capital mobility.

Third, few Granger causality patterns, running mainly from savings to investment, are found over the short-run. However, there is evidence of unilateral causality running from savings to investment for all Arab countries over the long-run. This outcome suggests that the Arab policymakers may effectively establish policies that aim to enhance domestic investment through increasing domestic savings over the long-run.

Introduction

The pioneer work of Feldstein and Horioka (1980) reveals a high investment-savings relationship for a set of 16 Organisation for Economic Co-operation and Development (OECD) member countries, suggesting that this outcome is an evidence of low capital mobility and, thus, limited financial integration, albeit the capital flows between OECD economies are assumed to be reasonably free. Indeed, it is found that an increase by $1 in savings generates an increase by $0.89 in domestic investment over the 1960-1974 period, implying immobile capital in the sample of OECD countries.[1] Within this context, according to the Feldstein-Horioka hypothesis, perfect capital mobility implies that savings should flow to most productive capital countries regardless of borders, thus limiting the investment-savings nexus in the country of origin. However, high investment-savings relationship implies low capital mobility, as savings are assumed to stay in the country of origin that performs more like a closed economy where investment and savings are equal.

[1] Bai and Zhang (2010) confirm the general outcome of the Feldstein-Horioka puzzle with revised dataset, as they find that an increase by $1 in savings generates an increase by $0.67 in domestic investment for the 16-country sample over the 1960-1974 period. The investment-savings nexus falls to 0.40 over the 1975-1989 period and then to 0.30 over the 1990-1996 period, a period considered by Obstfeld and Rogoff (2000) who find a coefficient of 0.68.

The empirical investigation of the relationship between investment and savings in the Arab economies is an interesting issue given that some of them, especially oil-exporting countries, have made high savings due to oil wealth. It is also worth noting that the investment-savings nexus is not extensively addressed in the literature for the Arab region. Therefore, we believe that it is important to revisit the links between investment and savings for the Arab region in a relevant framework to achieve the study objectives.

This study explores the empirical evidence of the investment-savings relationship over the long-run to check whether domestic savings are translated into domestic investments for eight Arab economies (Bahrain, Egypt, Iraq, Oman, Saudi Arabia, Sudan, Tunisia, and the UAE) over the 1970-2018 period through various econometric approaches. More precisely, the study first investigates the change of the investment-savings nexus over time by opting for a cointegration test with structural break. Second, it makes use of two different estimation methods in the cointegrating framework to determine the magnitude of the investment-savings nexus, thus highlighting the level of capital mobility in the Arab region. Third, the estimation methods are applied to check the stability of the relationship between investment and savings to understand how such relationship has behaved over time and where it stands now. Fourth, Granger causality test is employed to assess the mutual links between investment and savings over both the long-run and short-run.

The results reveal that the investment-savings nexus reflects the heterogeneity in capital mobility across the Arab economies under study, as evidenced by the effects of savings on investment over the entire sample period. The relationship between investment and savings changes over time, showing evidence of time-varying capital mobility for all considered countries. There is also evidence of Granger causality links running from savings to investment for few countries over the short-run and for all countries under study over the long-run. These outcomes are of great interest for policymakers of the considered Arab countries to establish relevant policies to boost investment through savings, and can also be useful for the other economies in the Arab region, as most of them share common economic links with the countries under study.

The remainder of the study is organized as follows. Section 1 reviews empirical works on the investment-savings relationship. Section 2 presents the model and data. Tests and estimation issues are introduced in Section 3. Section 4 analyzes the empirical findings related to capital mobility across Arab countries. Concluding comments and policy recommendations of the outcomes are set forth at the end of the study.

1. Literature review

Since the study of Feldstein and Horioka (1980) was conducted, many studies in the economic literature have extensively examined

the investment-savings nexus in developed and developing countries to explore the empirical evidence of international capital mobility. Within this context, Ben Slimane et al. (2013) investigate the degree of capital mobility in Morocco and Tunisia from 1980 to 2010 using time series testing and estimation techniques. The results reveal a relatively high capital mobility in the countries under study, as there is evidence of low correlation between investment and savings over both the long-run and short-run.

Choudhry et al. (2014) assess the degree of capital mobility in the European Union through different versions of the Feldstein-Horioka coefficient based on time series and panel data techniques. The results indicate that the Feldstein-Horioka coefficient is time-varying, as it varies from 0.52 over the 1990–1995 period to 0.02 over the 2003–2008 period, increasing capital mobility and, thus, economic integration in the European Union. It is also found that the coefficient passed to 0.26 after the global financial crisis, thus highlighting worrying signs of disintegration. In a similar context, Katsimi and Zoega (2016) employ panel testing and estimation procedures to examine the effects of the European single market in 1993 and the euro in 1999 on the Feldstein–Horioka hypothesis. The results indicate that institutions, exchange rate risk, and credit risk affect the relationship between investment and savings. Bibi and Jalil (2016) revisit the Feldstein-Horioka puzzle for a set of 88 countries over the 1980–2015 period based on panel data testing and estimation methods. The findings reveal a lack of international capital mobility

between the countries. The authors argue that capital mobility can be improved through developing the financial sector and increasing governance, globalization, and judicial environment.

Ginama et al. (2018) opt for panel data methods to assess the Feldstein–Horioka puzzle for OECD countries. The findings reveal that the Feldstein–Horioka puzzle has been fading away recently. Kaur and Sarin (2018) examine the Feldstein-Horioka puzzle for a set of eight Asian countries (China, Japan, India, Hong Kong, Iran, Indonesia, Saudi Arabia, and Thailand) over the 1980–2016 period based on panel estimation and testing procedures. The findings indicate that the economies under study become open to capital flows over the post-Asian crisis period, as evidenced by the fall in the investment-savings relationship. Kim et al. (2018) investigate the role of globalization and regionalism in capital markets through assessing the role of regional versus global savings in financing domestic investment for a panel of 141 economies divided into six regions, namely Asia-Pacific, Latin America, North America, Europe, MENA, and Sub-Saharan Africa over the 1980-2011 period. The results indicate that investment is mainly financed by domestic savings in North America, by regional savings in Europe, and by global savings in the other regions.

Raza et al. (2018) employ time series techniques to examine the effects of capital mobility on the investment-savings nexus for Iceland over the 1960-2008 period, the 1960-1994 period of

restricted capital mobility, the 1994-2008 period of free capital mobility, and the 2008-2016 period of imposition of capital controls in response to the global finance crisis. The results show evidence of a decline in the correlation between investment and savings over the long-run, due to the Iceland's entry into the European single market in 1994. However, the investment-savings nexus weakens further over the post-crisis period. Ko and Funashima (2019) opt for time–frequency domain techniques to examine the Feldstein–Horioka puzzle for a set of nine economies (Argentina, Australia, Canada, Finland, Italy, Spain, Sweden, the UK, and the US) over the 1885–2010 period. The results reveal higher investment-savings relationship for large countries compared to small economies, and inverted U-shaped and increasing correlation patterns. It is also found that for many economies, the fiscal balance is most related to a positive investment-savings nexus.

Akkoyunlu (2020) revisits the relationship between investment and savings for Turkey over the 1950–2017 period and the 1950–1989 and 1990–2017 sub-periods based on the bounds testing approach. The results show evidence of a positively (negatively) correlated investment-savings nexus over the 1950–1989 (1990–2017) sub-period of restricted (perfect) capital mobility, which is aligned with the Feldstein-Horioka hypothesis. The author explains the negative investment-savings nexus over the 1990–2017 period by higher world interest rates that lead to increase the domestic interest rates which, in turn, lead to increase domestic savings. McFarlane et al.

(2020) assess the Feldstein-Horioka hypothesis for the US over the 1947-2017 period using time series techniques over both the long-run and short-run. The results reveal that the Feldstein-Horioka puzzle does not hold with respect to private or government savings over the three detected structural periods, namely 1947Q1–1984Q3, 1984Q4–1999Q4, and 2000Q1–2017Q3.

2. Model and data

We assess capital mobility across Arab economies through the analysis of the relationship between investment and savings.[2] Within this context, Feldstein and Horioka (1980) estimate such nexus for a set of 16 OECD countries from 1960 to 1974, and show evidence of high correlation between investment and savings, thus suggesting low capital mobility for the considered economies. This outcome is known as the Feldstein-Horioka puzzle that has raised a strenuous debate in the related literature, as evidenced by the above-mentioned empirical studies. Practically, we estimate the following long-run relationship between investment and savings:

$$IG_t = \alpha + \beta SG_t + \varepsilon_t \quad (1)$$

where IG_t is the share of gross capital formation in GDP, SG_t is the ratio of gross domestic savings to GDP, and ε_t is the disturbance

[2] The investment-savings nexus has important implications for policies that seek to handle economic growth.

term. The savings retention coefficient β allows us to assess the capital mobility across countries.[3] Indeed, there is evidence of high capital mobility if the coefficient is low, and vice versa.

We use annual data from 1970 to 2018 for eight Arab countries, namely Bahrain, Egypt, Iraq, Oman, Saudi Arabia, Sudan, Tunisia, and the UAE.[4] The study period is long enough to assess the relationship between investment and savings in a cointegrating framework. Data are gathered from the World Development Indicators (WDI) database published by the World Bank.

3. Tests and estimation issues

3.1. Unit root and cointegration tests

We conduct the test developed by Zivot and Andrews (1992) to examine the unit root properties of investment and savings.[5] If the variables are integrated of order one, we make use of the test proposed by Gregory and Hansen (1996a,b) to investigate the long-run linkages between investment and savings by accounting for an endogenous structural break, which is incentivized by the fact that

[3] The savings retention coefficient, as called by Feldstein and Bachetta (1991), is an estimate of the savings amount retained and translated into domestic investment.

[4] By doing so, we assess capital mobility across high-, middle-, and low-income countries in the Arab region.

[5] The test is built under the null hypothesis of unit root with one break date in level and trend.

the 1970-2018 period recorded shocks and crises hitting the relationship between investment and savings in the Arab region. Additionally, when ignoring structural breaks, unit root and cointegration tests without regime-shifts may not perform well in terms of size and power.

Let us now present the cointegration procedure developed by Gregory and Hansen (1996a,b). The standard model of cointegration with a trend and no regime-shift takes the following form:

$$IG_t = \mu + \gamma t + \delta SG_t + u_t \qquad (2)$$

where the variables IG_t and SG_t are integrated of order one, and the error term u_t is integrated of order zero.[6] To account for a structural break in the cointegrating relationship between the variables, we define the following dummy variable:

$$D_{t\tau} = \begin{cases} 0 & if \;\; t \leq [\tau T] \\ 1 & if \;\; t > [\tau T] \end{cases} \qquad (3)$$

where $\tau \in (0, 1)$ is the timing of the break date, T is the sample size, and $[\cdot]$ denotes integer part. Under these conditions, the regime and trend shift model, where the intercept μ, the trend coefficient γ, and the slope coefficient δ change, takes the following form:

[6] Note that for the standard model of cointegration with no trend and no regime-shift, the trend coefficient γ is equal to zero.

$$IG_t = \mu_1 + \mu_2 D_{t\tau} + \gamma_1 t + \gamma_2 t D_{t\tau} + \delta_1 SG_t + \delta_2 SG_t D_{t\tau} + u_t \quad (4)$$

where μ_1, γ_1, and δ_1 are coefficients before the regime-shift, and μ_2, γ_2, and δ_2 are coefficients after the break.[7]

Gregory and Hansen (1996a,b) test the null hypothesis of no cointegration between investment and savings that the model given by Eq. (2) holds with an error term u_t integrated of order one against the alternative hypothesis that the model given by Eq. (4) holds. In this study, we employ the augmented Dickey-Fuller (ADF) statistic that is calculated by regressing $\Delta\hat{u}_{t\tau}$ on $\hat{u}_{t-1,\tau}$ and $\Delta\hat{u}_{t-1,\tau}$, $\Delta\hat{u}_{t-2,\tau}$,..., $\Delta\hat{u}_{t-p,\tau}$, where $\hat{u}_{t\tau}$ is the residual obtained from estimating the model given by Eq. (4) by Ordinary Least Squares (OLS) for each change point τ, and p is the optimal lag order chosen by the Schwarz Bayesian criterion. The ADF test statistic is then defined as follows:

$$ADF = \min_{\tau \in T} \left[tstat\left(\hat{u}_{t-1,\tau}\right) \right] \quad (5)$$

The limiting distribution of the ADF test statistic is approximated using simulation methods to calculate the critical values following the procedure developed by MacKinnon (1991) and based on fitting a response surface.

[7] Note that for the regime-shift model, the trend coefficients γ_1 and γ_2 are equal to zero.

3.2. FMOLS and DOLS estimation methods

In case of cointegration between investment and savings, we apply the Fully Modified Ordinary Least Squares (FMOLS) and the Dynamic Ordinary Least Squares (DOLS) methods to estimate the long-run relationship to assess capital mobility across Arab economies. The FMOLS estimation method, developed by Phillips and Hansen (1990), removes the problems caused by the correlation between the long-run relationship and stochastic regressors innovations by employing a semi-parametric correction. The FMOLS estimators are asymptotically unbiased and have fully efficient mixture normal asymptotics. The DOLS estimation procedure, proposed by Saikkonen (1992) and Stock and Watson (1993), allows us getting asymptotically efficient estimators by augmenting the cointegrating relationship with lags and leads of first differenced explanatory variables so that the disturbance term of the resulting long-run equation is orthogonal to the whole history of the stochastic regressor innovations.

3.3. Granger causality tests

The existence of a long-run relationship between investment and savings[8] allows us to analyze the short-run linkages in the vector error correction model (VECM) framework. For this purpose, Engle

[8] The existence of cointegrating linkages implies Granger causality between investment and savings, but it does not tell us about causality direction.

and Granger (1987) determine the VEC model by adding the one-period lagged residuals computed from the long-run relationship between investment and savings to the vector autoregressive (VAR) model based on first-differenced variables. Practically, the VEC model takes the following form:

$$\begin{cases} \Delta IG_t = a_1 + \sum_{i=1}^{p} b_{1i}\,\Delta IG_{t-i} + \sum_{i=1}^{p} c_{1i}\,\Delta SG_{t-i} + d_1 \hat{u}_{IG,t-1} + v_{1t} \\ \Delta SG_t = a_2 + \sum_{i=1}^{p} b_{2i}\,\Delta IG_{t-i} + \sum_{i=1}^{p} c_{2i}\,\Delta SG_{t-i} + d_2 \hat{u}_{SG,t-1} + v_{2t} \end{cases} \quad (6)$$

where $\hat{u}_{t-1}$ is the one-period lagged residuals whose coefficient d is expected to be negative and statistically significant.[9] Two Granger causality tests are conducted in the VECM framework. First, the short-run causality is determined based on the dynamics of the VAR process by conducting the *F*-test to test the null hypothesis that all coefficients related to the corresponding variable are equal to zero. Second, the long-run causality is determined based on the disequilibrium adjustment by conducting the *t*-test of statistical significance of the error correction term coefficient.

4. Analysis of the results

We first present a descriptive analysis to get some information on the variables. Second, we test for unit root in the variables to check their integration orders. Third, in case of integration of order one, we

[9] The error correction term coefficient d_1 (d_2) measures the adjustment speed of the short-run deviations of investment (savings) towards the long-run equilibrium state.

examine cointegration between investment and savings in a time-varying framework. Fourth, in case of cointegration, we estimate the savings retention coefficient over the whole period and then examine its stability over time. Fifth, we assess the Granger causality between investment and savings over both the long-run and short-run.

4.1. Preliminary data analysis

The individual country investment and savings patterns presented in Figure 1 reveal that investment and savings across Arab economies closely track each other for few years, and record a large decoupling for many years. Another striking feature is that the investment-savings nexus is different across countries and varies widely over time.

The summary statistics reported in Table 1 reveal that Bahrain records the highest average share of investment in GDP (29.15%) followed by the UAE (27.34%) and Oman (27.14%). Regarding the ratio of gross domestic savings to GDP, the UAE have the highest average (52.93%) followed by Iraq (44.83%) and Oman (43.07%). The shares of investment and savings in GDP are the least volatile for Tunisia compared with the other countries. The empirical correlations indicate that investment and savings are positively connected for Egypt, Oman, Sudan, Tunisia, and the UAE. By cons, there is evidence of a negative and low correlation between investment and savings for Bahrain, Iraq, and Saudi Arabia.

The preliminary insights derived from the graphs and summary statistics are not conclusive regarding the nature of the investment-savings nexus. Therefore, a deeper investigation will be provided below based on the above testing and estimation procedures to achieve the objectives of the analysis.

4.2. Unit root and cointegration

We conduct the above-mentioned unit root and cointegration tests to examine the non-stationarity properties and the long-run linkages between investment and savings. The results reported in Table 2 reveal non-stationarity for the level variables and stationarity for their first-differences whatever the test equation, suggesting that investment and savings are integrated of order one for all countries. Under these conditions, we can test for cointegrating linkages between investment and savings. The results presented in Table 3 show evidence of cointegration between the variables, as the test rejects the null hypothesis of no cointegration for the regime-shift and regime and trend shift models in all Arab countries.

4.3. Detection of breaks

The break dates in the long-run relationship between investment and savings for the regime-shift and regime and trend shift models, determined by the cointegration test of Gregory and Hansen (1996a,b), are displayed in Table 4. The detection of these structural breaks suggests that the study period experiences influential

international shocks hitting the investment-savings nexus. There are similar dates across Arab countries, thus implying that these economies are simultaneously hit by crises given the strong economic links between some of them. Most breaks are detected in the 80s and 90s, thus reflecting the repercussions of several domestic and international events, occurred over these periods, on the Arab economies.

4.4. Investment-savings nexus over the whole period

Given the evidence of cointegrating linkages between investment and savings, we employ the FMOLS and DOLS estimation techniques to assess capital mobility across the considered Arab countries over the long-run for the whole study period. The long-run estimates reported in Table 5 reveal similarity in the savings retention coefficient across both FMOLS and DOLS estimation methods in terms of sign, magnitude, and statistical significance. Indeed, the coefficient is positive and statistically significant at the conventional levels for six out of eight countries for both estimation techniques. Regarding magnitude, the significant savings retention coefficient differs across Arab countries, as it ranges from 0.139 for the UAE to 1.027 for Egypt for the FMOLS method, and from 0.174 for the UAE to 1.039 for Egypt for the DOLS technique,[10] thus reflecting the heterogeneity in capital mobility across the Arab countries.

[10] Both estimation techniques, FMOLS and DOLS, provide similar results.

The UAE seem to have high capital mobility than the other Arab economies, as the savings retention coefficient is relatively low, suggesting that savings likely moved outside the country. However, for Egypt, there is evidence of low capital mobility, as the causal relationship between investment and savings is strong, implying that savings likely stayed inside the country and translated into domestic investments. Overall, with these findings, it seems that the UAE are a relatively high open economy compared to the other Arab countries, due to the financial and economic reforms that played a crucial role in enhancing capital mobility and, thus, increasing integration.

4.5. Stability of the investment-savings nexus over time

This section aims to check the stability of the investment-savings relationship by estimating the model over two periods separated by the break selected by the cointegration test (see Table 4).[11] The results reported in Tables 6 and 7 reveal that the savings retention coefficient differs across periods for all Arab countries, suggesting that capital mobility and, thus, integration is time-varying over the considered study period.[12] This finding is of great importance for

[11] Estimating models with different break dates for each country provides a robustness check for the stability of the investment-savings nexus over time.

[12] The savings retention coefficient is sometimes negative for four out of eight countries over the sub-periods, suggesting that the investment-savings relationship says something about integration. In this situation, policymakers should deal with

policymakers who may deal with the time-variation of the investment-savings nexus when examining capital mobility across Arab economies. The outcome is aligned with several related empirical works in the literature that show evidence of time-varying integration in developed and developing countries (see Qiao et al., 2011; Arouri et al., 2013; Jouini, 2015; and Ahmed and Huo, 2019).

4.6. Granger causality results

The Granger causality test results reported in Table 8 are mixed. Indeed, there is evidence of unidirectional causality running from savings to investment over the short-run for Bahrain and Sudan, and from investment to savings for Oman. However, for Saudi Arabia, investment and savings are mutually linked over the short-run. For the other Arab economies (Egypt, Iraq, Tunisia, and the UAE), the results show no Granger causality between investment and savings over the short-run. Regarding the long-run Granger causality, the results provide evidence of unilateral causal linkages running from savings to investment for all Arab economies, as the error correction term coefficient is statistically significant and negative (as expected) in the investment equation.[13] There is also evidence of no Granger

this outcome with a lot of precautions to elucidate the reasons of this negative causal link running from savings to investment.

[13] The error correction term estimates in the investment equation differ across countries, as they range from -0.811 for Saudi Arabia to -0.167 for Bahrain. Therefore, the deviations from the long-run in the current year will be restored by

causality running from investment to savings over the long-run for all Arab economies. These outcomes suggest that the Arab countries may effectively opt for policies that aim to boost domestic investment through enhancing domestic savings over the long-run.

Conclusion and policy recommendations

The study examines the relationship between investment and savings and its stability over time to assess capital mobility across eight Arab economies over the 1970-2018 period. In this context, we endeavor to investigate whether there is support for the Feldstein-Horioka hypothesis touching on the relationship between capital mobility and investment-savings nexus. Indeed, there is evidence of perfect capital mobility for weak investment-savings relationship, and vice versa. The analysis is conducted based on reliable testing and estimation procedures to draw pertinent recommendations that can help policymakers in the Arab region handle well the investment-savings relationship.

The study finds evidence for three main claims. First, with regards to the entire sample period, the savings retention coefficient differs across Arab countries, reflecting heterogeneity in capital mobility.

81.1% for Saudi Arabia and 16.7% for Bahrain in the next year, implying that the error correction mechanism of the short-run deviations of investment following a shock takes 1.23 years for Saudi Arabia and six years for Bahrain to attain the long-term state.

Indeed, some Arab economies, that are relatively more open compared to others due to several reforms aimed to increase economic and financial integration, record low significant investment-savings nexus, suggesting that such a nexus can proxy for integration and lead policymakers to make relevant decisions.

Second, capital mobility is time-varying across Arab countries over the study period, as the investment-savings nexus differs across periods for all Arab economies. This outcome may be of great interest for policymakers in the Arab region to understand how the investment-savings nexus has behaved over time and where it stands now, thus allowing them to handle well the time-varying aspect of such nexus when dealing with capital mobility.

Third, there is evidence of four causality patterns between investment and savings over the short-run for four out of eight Arab countries, two of them are unidirectional running from savings to investment, one unidirectional pattern running from investment to savings, and one bidirectional nexus. Additionally, unilateral causal linkages running only from savings to investment are found for all Arab economies over the long-run. This finding suggests that the policymakers in the Arab region may effectively make policies that aim to enhance domestic investment through boosting domestic savings over the long-run.

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Table 1. Summary statistics

Country	IG_t	SG_t
Bahrain		
Mean	29.154	33.219
Std. Dev.	7.361	9.856
Corr.	-0.061	-
Egypt		
Mean	21.508	13.426
Std. Dev.	6.572	4.366
Corr.	0.747	-
Iraq		
Mean	17.806	44.830
Std. Dev.	10.701	22.663
Corr.	-0.142	-
Oman		
Mean	27.144	43.069
Std. Dev.	6.946	9.496
Corr.	0.245	-
Saudi A.		
Mean	23.525	40.300
Std. Dev.	7.510	16.333
Corr.	-0.005	-
Sudan		
Mean	17.447	11.110
Std. Dev.	4.663	5.295
Corr.	0.632	-
Tunisia		
Mean	24.201	18.803
Std. Dev.	2.953	4.173
Corr.	0.531	-
UAE		
Mean	27.338	52.925
Std. Dev.	6.006	15.037
Corr.	0.528	-

Table 2. Unit root test results

Country	Variable	Break in level		Break in level and trend	
		Level	First Diff.	Level	First Diff.
Bahrain	IG_t	-4.067	-9.276***	-4.482	-9.310***
	SG_t	-3.197	-6.551***	-4.073	-6.537***
Egypt	IG_t	-3.452	-6.849***	-3.546	-6.895***
	SG_t	-3.611	-8.634***	-3.429	-8.612***
Iraq	IG_t	-4.501	-8.290***	-5.048	-8.251***
	SG_t	-4.178	-7.154***	-4.277	-7.235***
Oman	IG_t	-3.687	-6.861***	-4.641	-6.799***
	SG_t	-4.684	-7.995***	-4.654	-8.004***
Saudi A.	IG_t	-4.414	-6.414***	-5.036	-6.387***
	SG_t	-3.471	-6.417***	-4.153	-6.639***
Sudan	IG_t	-4.565	-6.907***	-4.731	-7.229***
	SG_t	-4.248	-7.581***	-4.136	-9.737***
Tunisia	IG_t	-3.283	-7.011***	-3.674	-7.781***
	SG_t	-4.567	-9.952***	-4.708	-10.234***
UAE	IG_t	-4.083	-7.848***	-4.683	-7.731***
	SG_t	-3.086	-7.673***	-4.269	-8.028***

Notes: The Zivot and Andrews (1992) test is constructed under the null hypothesis of unit root; and considers a model with one endogenous break date in level, and a model with one endogenous break date in level and trend. The critical values are -5.34 (1%), -4.80 (5%) and -4.58 (10%) for the model with break in level, and -5.57 (1%), -5.08 (5%) and -4.82 (10%) for the model with break in level and trend. *** denotes stationarity at the 1% level.

Table 3. Cointegration test results

Country	Regime shift	Regime and trend shift
Bahrain	-5.146**	-5.854***
Egypt	-6.464***	-6.588***
Iraq	-5.301**	-5.423*
Oman	-4.863*	-5.581**
Saudi A.	-6.227***	-7.590***
Sudan	-6.158***	-6.158***
Tunisia	-5.499***	-6.269***
UAE	-5.139**	-5.510**

Notes: The Gregory and Hansen (1996a,b) cointegration test is constructed under the null hypothesis of no cointegration; and considers a regime-shift model and a regime and trend shift model with one endogenous break date. The critical values are -5.47 (1%), -4.95 (5%) and -4.68 (10%) for the regime-shift model, and -6.02 (1%), -5.50 (5%) and -5.24 (10%) for the regime and trend shift model. ***, ** and * denote cointegration at the 1%, 5% and 10% levels, respectively.

Table 4. Estimated break date

Country	Regime shift	Regime and trend shift
Bahrain	1985	1993
Egypt	1993	1992
Iraq	1985	1992
Oman	1985	1987
Saudi A.	2006	1984
Sudan	1982	1982
Tunisia	1985	1982
UAE	1983	1983

Table 5. Long-run estimates of the savings retention coefficient over the entire period

Country	FMOLS	DOLS
Bahrain	0.518***	0.622*
	(0.188)	(0.363)
Egypt	1.027***	1.039**
	(0.192)	(0.437)
Iraq	0.132	0.243
	(0.102)	(0.206)
Oman	0.334***	0.448**
	(0.115)	(0.201)
Saudi A.	0.055	0.056
	(0.056)	(0.045)
Sudan	0.600***	0.666**
	(0.137)	(0.294)
Tunisia	0.350***	0.446**
	(0.118)	(0.211)
UAE	0.139**	0.174*
	(0.069)	(0.102)

Notes: The values in parentheses are the standard errors. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 6. Long-run estimates of the savings retention coefficient over both sub-periods

Country		FMOLS		DOLS	
	Regime shift	1st period	2nd period	1st period	2nd period
Bahrain	1985	0.995***	0.173	1.258***	0.128
		(0.212)	(0.111)	(0.187)	(0.168)
Egypt	1993	1.840***	0.428***	1.975***	0.512**
		(0.171)	(0.091)	(0.287)	(0.195)
Iraq	1985	-0.479***	0.283***	-0.455***	0.337*
		(0.095)	(0.108)	(0.074)	(0.192)
Oman	1985	0.027	0.211*	0.327	0.309
		(0.244)	(0.117)	(0.645)	(0.185)
Saudi A.	2006	0.008	-0.135*	-0.008	-0.118
		(0.059)	(0.078)	(0.056)	(0.089)
Sudan	1982	-0.302	0.639***	-2.452	0.688***
		(0.707)	(0.116)	(1.329)	(0.214)
Tunisia	1985	0.835*	0.317***	1.084	0.385**
		(0.434)	(0.071)	(1.027)	(0.146)
UAE	1983	-0.216	-2.817E-4	0.063	0.114
		(0.288)	(0.094)	(0.828)	(0.123)

Notes: The values in parentheses are the standard errors. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 7. Long-run estimates of the savings retention coefficient over both sub-periods

Country		FMOLS		DOLS	
	Regime and trend shift	1st period	2nd period	1st period	2nd period
Bahrain	1993	0.979***	0.475***	1.078**	0.410*
		(0.303)	(0.125)	(0.476)	(0.211)
Egypt	1992	1.833***	0.438***	1.964***	0.510**
		(0.158)	(0.091)	(0.258)	(0.216)
Iraq	1992	-0.349***	0.569***	-0.292**	0.714***
		(0.065)	(0.118)	(0.139)	(0.192)
Oman	1987	0.105	0.205*	0.350	0.295
		(0.200)	(0.121)	(0.371)	(0.215)
Saudi A.	1984	-0.258*	0.188***	-0.027	0.223**
		(0.145)	(0.065)	(0.219)	(0.108)
Sudan	1982	-0.302	0.639***	-2.452*	0.688***
		(0.707)	(0.116)	(1.329)	(0.214)
Tunisia	1982	0.963**	0.310***	1.418	0.385*
		(0.418)	(0.087)	(1.085)	(0.218)
UAE	1983	-0.216	-2.817E-4	0.063	0.114
		(0.288)	(0.094)	(0.828)	(0.123)

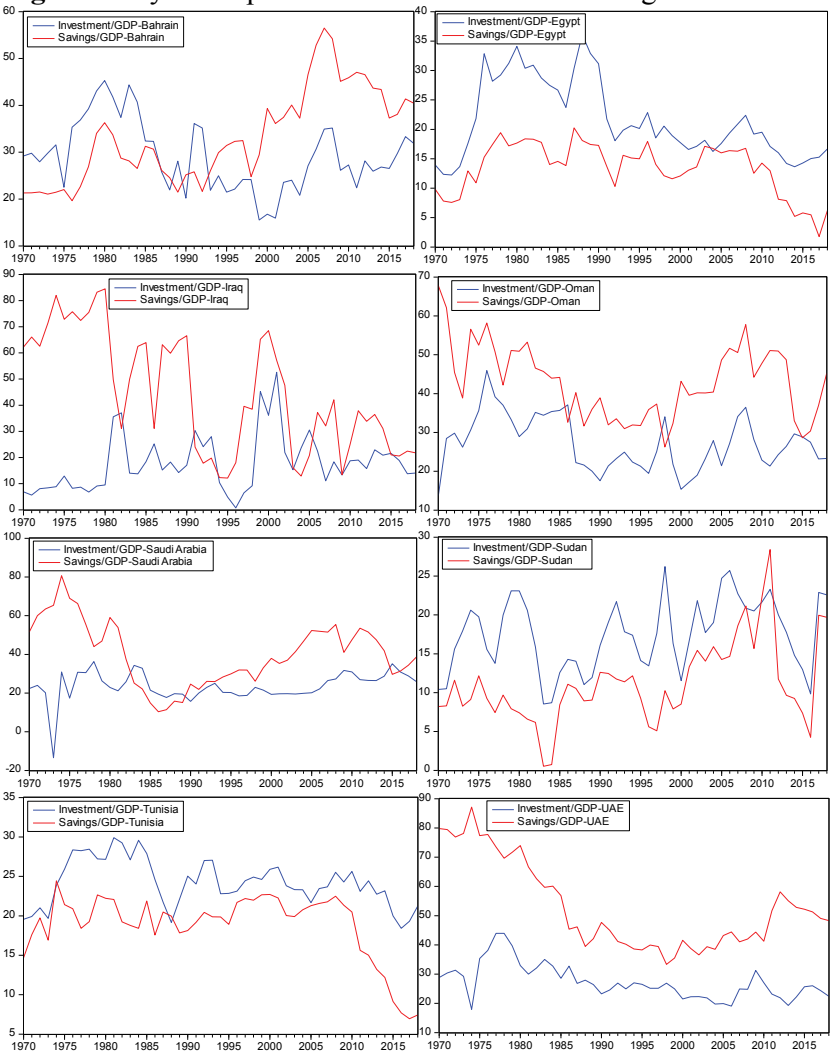
Notes: The values in parentheses are the standard errors. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 8. Granger causality test results

Dependent Variable	ΔIG_t		ΔSG_t	
Country	*F*-test	*t*-test	*F*-test	*t*-test
Bahrain	4.141**	-1.719*	0.007	-1.553
	(0.042)		(0.936)	
Egypt	0.444	-2.005**	1.256	-0.016
	(0.505)		(0.262)	
Iraq	0.006	-3.419***	0.504	-1.437
	(0.936)		(0.478)	
Oman	0.026	-4.119***	4.449**	2.003
	(0.872)		(0.035)	
Saudi Arabia	8.667***	-4.639***	4.843**	-0.130
	(0.003)		(0.028)	
Sudan	5.198**	-4.761***	0.273	-0.925
	(0.023)		(0.601)	
Tunisia	2.146	-3.556***	2.490E-4	-0.984
	(0.143)		(0.987)	
UAE	0.484	-3.920***	0.353	1.196
	(0.487)		(0.552)	

Notes: The values in parentheses are the *p*-values. The optimal lag order is determined by the Schwarz information criterion. *** , ** and * stand for Granger causality at the 1%, 5% and 10% levels, respectively.

Figure 1. Dynamic patterns of investment and savings



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