Determinants of Domestic Saving Performance in Egypt An Empirical Study

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Abstract

This paper has analyzed the determinants of domestic savings in Egypt during the period (1975-2006) in both the short run and the long run. The unit root test was used to test the stationary of all time series, and after that the first difference and the first lag of all variables are used in the estimated model in order to get the best results. The results indicate that the growth of per capita income, the development of financial market, and the real interest rate are found to have positive influence on domestic savings especially on the long-run. Macroeconomic uncertainty as measured by the inflation rate (INF) is found to have a positive and statistically significant effect on domestic saving ratio in both the short run and the long run. This provides support of precautionary motives for saving in the face of increased economic uncertainty. In addition, budget deficit ratio appears to have a negative effect on domestic saving ratio. This means that higher government savings partially crowd out private savings, and thus does not provide support of the existence of the Realtaii Equivalence. Finally, current account deficit recorded a negative and statistically significant effect on both the short run and the long run, which imply that external saving may tend to act as a substitute to domestic private saving.
Determinants of Domestic Saving Performance in Egypt: An Empirical Study

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I. Introduction

Saving is primarily used to finance investments. Much of disparity in the growth performance between countries is often attributed to the differences in the rates of saving and investment. Low domestic saving rates may maintain low-growth levels. When domestic resources are not enough to finance investment, external sources are allowed to fill in this gap. While depending on foreign savings has its own benefits, it makes the country highly sensitive to external shocks. Therefore, domestic savings will continue to be a priority as a source of investment financing in order to minimize vulnerability to international economic fluctuations. In recent years, there has been a great interest of empirical work on the determinants of saving in both developed and developing countries. This attitude has been motivated by the widespread concern over falling saving rates in the major OECD countries and the growing divergence in saving and investment rates between countries of the developing world (Athukorala and Sen, 2004).

With regard to Egypt, investment behaviour witnessed reasonable records, with an average of gross fixed capital formation as a ratio of GDP to be 22.5 percent through the period 1980 — 2005. However, about 65% of investment has been only funded from domestic saving. Egypt's domestic savings ratio has an average of only 14.6 percent of GDP through the period 1980 - 2005, which is poor in relation to other countries at a similar level of per capita income. There is no doubt that the challenge of boosting savings has great importance in Egypt to sustain the achieved growth rate and increase its investment rate. Because of that, an understanding of the fundamental determinants of saving in Egypt represents critical importance in order to formulate policies to raise the domestic saving rate in line with the needs of economic growth. In this paper, we investigate some macroeconomic factors as possible explanations for domestic savings behaviour in Egypt.
Thus, the research points of this paper can be summarized in the following questions:

Does income growth have a positive effect on domestic savings?

Is there a full crowded out effect of budget deficit to private savings? (The Ricardian hypothesis).

Does financial market development have a positive effect on domestic savings?

Does domestic saving respond to changes in real interest rates?

Is there an effect of the current account deficit on domestic savings?

Does macroeconomic stability have an influence on domestic savings?

We use unit root and co-integration tests, which allow for heterogeneity in parameters and dynamics, to examine the long-run determinants of domestic saving rates in Egypt through the period 1975 — 2006. These techniques are more powerful than the conventional tests and overcome the inconsistency problem of the fixed-effect estimator typically employed in some previous studies of saving behaviour.

The paper is structured, as follows. Section II discusses the theoretical and empirical literature concerning the determinants of savings. Section III, displays some stylized facts of saving behaviour and the explanatory variables of domestic savings in Egypt during the study period. Based on the data, section IV explores the nature among domestic savings and the explanatory variables included in the econometric model. Finally, section IV provides a short conclusion.

**II. Theoretical and Empirical Literature**

There are many factors that determine the saving performance of a country. The most important factors are those related to income, demographic structures, the interest rate, macroeconomic stability, the extent of financial sector development, and external variables. The life-cycle hypothesis proposed by Modigliani (1986) provides a theoretical framework of most determinants of saving behaviour used in recent empirical studies. In this context, we try to analyze the theoretical framework of these determinants, followed by some recent empirical studies investigated these factors.
Income Growth

The fundamental assumption of the life-cycle hypothesis is that an individual seeks to maximize the present value of lifetime utility subject to the budget constraint. The theory predicts that consumption in a particular period, and thus the decision to save, depends on expectations about lifetime income. According to this theory, the lifetime of an individual is divided into a working period and a retirement period. Individuals are assumed to be net savers during the working period and dissavers during the retirement period. In the light of that, growth of per capita income will result in an increase of aggregate saving rate, beano- it increases the lifetime earnings and saving of younger age groups relative to older age groups (Athukorala and Sen, 2004). Thus countries with higher per capita growth rates are expected to have higher saving ratios than countries with lower growth rates. However, there is another view indicates that the size of this effect is likely to decline as per capita income rises and may even become negative for rich countries where investment opportunities and growth are relatively lower (Masson et al, 1998).

Demographic Factors

Demographic factors such as population age structure and dependency ratio also aTect saving performance. During childhood and old age, people on average consume more than they produce through their labor. During the middle years, people produce more than their consumption. The life cycle theory assumed that when there are too many young people to support, consumption increases and saving declines. The theory distinguished between dependency ratio and population growth on its effect on saving ratio. It indicated that although an increase of population growth rate may increase the number of active workers (savers) relative to the number of retired (dissavers), however, this may be accompanied by an increase of young ratio (dissavers) in the population as well. Thus the net effect of population growth on aggregate saving is theoretically unclear (Athukorala and Sen, 2004).

Fiscal Policy

The neo-clas.sical version of the lifecycle model assumes that a decline in government saving (more budget deficit) will tend to raise consumption and discourage saving by shifting the tax burden from present to future generations. As a
result of that, a decline in government savings will cause a decline in national savings. That is another view indicates that an increase in government savings would have no effect on national savings, as it would be completely offset by a corresponding fall in private savings "The iticanian Equivalence" (exam et al, 2003). According to the Ricardiaquivalence Hypothesis, it does not matter whether government finances its expenditure through taxes or by borrowing. The Ricardian Equivalence depends on the assumption of perfect capital markets, and therefore saving behaviour does not experience any uncertainty. However, if this assumption does not hold, then perfect substitution between public and private savings will not be achieved (Athukorala and Sen. 2004).

Interest Rate

The life-cycle theory introduced that, the net effect of the real interest rate on savings is unclear. The net effect of the real interest rate on savings can be decomposed into two effects. The substitution effect implies that a higher interest rate increases the current price of consumption relative to the future price, and thus affecting savings positively. The other effect, which is called the income effect, indicates that if the household is a net lender, an increase in the interest rate will increase lifetime income, and so increase consumption and reduce saving. Therefore, it is expected that the interest rate will have a positive impact on saving ratio only when the substitution effect dominates the income effect. In developing countries where financial markets are still not well developed, substitution effect is expected to be much greater than income effect, and thus the real interest rate is likely to have a net positive impact on domestic savings (Ozcan et al, 2003). However, the complexity and distortions in both the real and the financial sides of the economy tend to reduce the benefits of an increase in interest rates, and thus the positive impact on domestic savings may not be achieved.

Inflation and Macroeconomic Uncertainty

The life cycle hypothesis implies that inflation is neutral because of the absence of money illusion, and thus inflation does not have a real effect on saving behaviour. However, uncertainty in the form of inflation should rise saving since risk-averse consumers tend to set some resources aside as a precaution against possible
adverse changes in future income (Loayza et al, 2000). In that case, individuals will limit their present consumption and save more in order to consume more in future. On the one hand, inflation could affect savings through real wealth. Inflation acts as a tax on money balance holdings, so if individuals with to maintain the real value of their money balance holdings (the real balance effect), saving will rise with the rate of inflation (Hussein and Thirlwall, 1999).

Financial Development

The degree of financial sector development and the range and availability of financial assets to suit savers represents another important factor in promoting savings. The expansion of bank branches and improving the accessibility to banking facilities will result in reducing the cost of banking transactions, and thus motivate individuals' savings. On the other hand, if financial institutions are not well organized and stable, savings will be kept in non-monetary terms such as jewelry and real estate, and this may defeat the main purpose of saving. Therefore, the potential positive effect between the development of the consumer's credit market and household financial saving depends also on the degree of substitution between financial saving and other forms of savings in the household asset portfolio. As a result of that, the potential impact of financial development on private savings seems to be ambiguous (Athukorala and Sen, 2004).

External Variables

The external variables that might be relevant to savings are the current account deficit and terms of trade. It is supposed that an increase in the current account deficit (foreign saving) is associated by a partial decline in private saving, as foreign saving may tend to act as a substitute to domestic saving (Ozcan et al, 2003).

Terms of trade represents another external variable that may have an effect on saving behaviour especially for the oil exporters. Positive terms of trade may result in an increase, of savings through the positive effect on wealth and income. The traditional explanation of this relationship is illustrated in the Harberger—Laursen-Metzler hypothesis. It assumes that deterioration in terms of trade reduces real income and thus saving. This hypothesis assumed myopic expectations of consumers.

For more details, See Harberger, 1950 and Laiursen and Metzler, 1950
However, recent literature argues that a change in terms of trade has an ambiguous effect on saving depending on whether the change in the former is seen to be permanent or temporary. A transitory improvement in terms of trade causes only a transitory change in income, and thus should lead to higher saving rather than higher consumption. This conclusion supports the direction of the Harberger-Laursen-Metzler effect. Nevertheless, a permanent improvement tends to reduce saving as consumers increase their consumption. Thus, the effect of terms of trade changes on saving depends on whether the change was anticipated or not (Masson et al, 1998).

The empirical studies that examined these determinants in developed or developing countries took several ways. Some studies have concentrated mainly on fixed-effect models using OLS estimates to explain the variations in saving performance among countries. Other studies depended on some robust techniques such as co-integration and integration tests, which allow for heterogeneity in parameters and dynamics across countries, to examine the long-run determinants of saving rates.

Some of these studies concentrated mainly on interactions between demographic factors (i.e. Fertility rates, the dependency ratio, life-expectancy) and saving. Others examined a variety of macroeconomic variables such as income, real interest rate, changes in terms of trade, money supply, government expenditure and openness of economy to capture the main determinants of saving levels. Add to that, other researchers used a mixed of demographic and macroeconomic factors. We can not separate the previous studies into groups according to factors determine the saving performance as most of these studies gather more than one group of factors to include the most possible factors and reveal the true determinants of variations in saving levels. Thus, I will display these studies chronologically.

Giovannini (1985) empirically investigated the hypothesis that savings respond positively to changes in the real interest rate in Less Developed Countries (LDCs). The results pointed out to the presence of very low responses of aggregate saving to the real interest rate. Another empirical study by Doshi (1994) examined the role of life expectancy as a determinant of saving performance. He demonstrated that life expectancy is a statistically significant and important factor affecting LDCs saving levels. However, the overall results were sensitive to the level of development.
and regional diversity.

In an attempt to investigate the determinants of saving rate in Pakistan, Khan et al (1994) used a variety of factors that included income, real interest rate, dependency ratio, foreign-capital inflows, foreign aid, changes in terms of trade and openness of economy. The study found a strong and positive effect of per capita GNP on national saving. In addition, it was found that real interest rate, change in terms of trade and openness of the economy positively influenced national saving. On the other way, debt to GNP ratio and dependency ratio were found to have adverse impact on national saving.

Among several other empirical studies, Edwards (1996) examined the process of determination of saving rates by incorporating some policy-related, demographic, structural and political variables that possibly determine the saving ratio. Per capita income growth seemed to be the most important determinant of private and public swings. Moreover, the results indicated that public savings were lower in countries with higher political instability, and public savings crowded out private savings, but less than proportionately.

Dayal-Ghulati and Thimann (1997) analyzed the empirical determinants of private savings for a sample of economies in Southeast Asia and Latin America over the period 1975-1995. The findings indicated that fiscal policy, particularly social security arrangements, may be the core policy instruments that boosted saving rates in some Asian countries. In addition, inflation volatility appeared to have a negative effect on the private saving rate in Latin America. The same is true for economic policies that liberalize financial markets and foster financial deepening. Macroeconomic stability and financial deepening were clearly important variables determining saving behaviour in the two regions as well.

To identify the empirical determinants of household saving, Callen and Thimann (1997) analyzed the empirical determinants of household saving using data from 21 OECD countries for 1975-95. This study focused on the influence of tax and social security systems on household saving. The paper therefore extended the usual set of explanatory variables used to explain household saving behaviour to include variables that capture the structure of the tax system and the financing of the social

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security and welfare system. These variables were found to have an important impact on household saving, and thus gave a signal to policy makers that by changing the design of these systems, governments may be able to influence saving.

Masson et al (1998) examined the determinants of private savings for a large sample of industrial and developing countries using both time series and cross-section data. The results suggested that there was a partial offset to private savings from changes in public saving for industrial countries, whereas in developing countries demographics and GDP growth were the most important determinants of private saving rates.

In another study, Cardenas and Escobar (1998) analyzed the determinants of saving in Colombia using a ‘framework of intertemporal model. The findings reinforced the importance linkage among national savings, government expenditure and age dependency. The results concluded that national saving partially responded to temporary changes in output, and higher government expenditures were associated with lower national saving. The results also indicated that an increase in age dependency has a significantly negative effect on private saving rates.

The extreme-bounds analysis was used by Hussain and Brookins (2001) to examine the determinants of national savings, based on both cross-sectional and panel data across a large sample of countries. Their results supported that agricultural share in total output, public saving, budget balance, and the current account balance were robust in explaining saving behaviour.

Sarantis and Stewart (2001) used panel co-integration and integration tests to examine the long-run determinants of aggregate private saving rates in a dynamic panel of OECD countries during the post Second World War period. They found strong evidence for the existence of a long-run equilibrium saving function. Although the results suggested a number of significant determinants of saving rates, the parameter estimates varied significantly across countries.

In Jordan, Halls’ (2003) analyzed and examined the determinants of private savings during the period 1976-2000 using the OLS and the instrumental variable methods. The main results indicated that the dependency ratio had a negative and significant effect on private savings, and government savings depressed private
savings. However, GDP growth rate and GDP per capita income had a significant positive effect on private savings. Moreover, the development of Jordan consumer’s credit market, the ratio of social security, and welfare public expenditures to total public expenditures appeared to have positive effects on private savings. Finally, the real interest rate, inflation rate, and terms of trade were found to have insignificant impact on the level of private saving in Jordan.

Ozcan, et al. (2003) investigated the determinants of private saving for Turkey through the period 1968-1994 using a number of policy and nonpolicy variables. The findings of the estimated model supported the hypothesis that the private saving rates have strong inertia. It was found that the effects of a change in a given saving determinant were fully realized in the long term rather than in the short-term. The findings further indicated that although higher government savings crowded out private savings, they did it in less than one-to-one manner, and thus the Ricardian Equivalence did not hold strictly. In addition, income level showed a positive effect on the private saving rate, however, the growth rate of income was not statistically significant. Moreover, financial depth and development measure of Turkey suggested that countries with deeper financial systems tend to have higher private saving rates. The results also indicated that life expectancy rate tends to have a negative impact on savings. Furthermore, the precautionary motive for saving was supported by the findings that inflation captured the degree of macroeconomic uncertainty and had a positive impact on private saving in Turkey. With regard to external factors, it was found that terms of trade shocks increased private saving in Turkey. Although the current account deficit represents an important explanatory variable for the private savings, its effect was insignificant in Turkey.

In India, Athukorala and Sen (2004) examined the determinants of private saving during the period 1954 - 1998. The methodology used in this study involved the estimation of a saving rate function derived from the life-cycle model that has been the standard theory for the explanation of changes in private saving over time and across countries. The results of the estimated model provided an evidence of a statistically positive effect of the real interest rate, the growth and the level of per capita income, the spread of banking facilities, and the rate of inflation on domestic saving. On the other hand, terms of trade and inward remittances by expatriate Indians
witnessed a negative impact on the saving rate. Fiscal policy reported that public saving seemed to be an imperfect substitute for private saving. The result relating to the inflation rate suggested that mild inflation seemed to have a positive impact on private saving.

In another study, the relationship between a variety of macroeconomic variables and private savings was broadly examined by MetinOzcan and Oman (2005) using a sample of 15 countries in the Middle East and North Mica (MENA) over the period 1981-1994. The estimated results provided further evidence of the significantly positive effect of the growth rate of income, and per capita income on private savings. In addition, public savings crowded out private savings only partially which means that the Ricardian Equivalence does not hold strictly. Regarding the financial factors, the paper provided evidence that countries with deeper financial systems tend to have higher private savings. Moreover, macroeconomic stability captured by the inflation rate was found to have a positive impact on savings.

To explore the relative importance of national saving determinants in Oman, Narayan and Al Siyabi, S. (2005) examined the long run anti short run effects of Oman's national savings for the period 1971-2003 using the bounds testing approach to cointegration. The main findings provided strong evidence that the current account, the urbanization rate and the money supply had statistically significant impacts on Oman's national savings in the long run.

We can conclude from the previous literature that the determinants of saving performance are diverse. Most empirical studies emphasized the significant and negative influence of government savings on the saving rates, confirming the claim that government savings tend to crowd out private savings. Moreover, direct positive association between GDP growth rate, GDP per capita growth rate and private savings, indicates that these variables represent the most important determinants of private and public savings. Interest rate, inflation rate and terms of trade appear to have an ambiguous impact on saving levels. Moreover, demographic factors such as dependency ratio and urbanization rate seem to have a negative effect on private saving rates, however, the significance of these variables was mixed between studies.
However, taking into account the differences in economic, social, and demographic conditions among countries, we should not assume that factors, which successfully have explained saving performance in one country or in a group of countries, would be certainly appropriate or successful elsewhere. Some of these factors may be significant in one case, but not in others, and thus they should be carefully examined taking into consideration the characteristics of each case. Thus, we try in this study to examine macroeconomic factors that explain domestic saving behaviour in Egypt, which may help policy makers to formulate policies that enhance saving ratios.

III. An Overview of Saving Behaviour in Egypt

The saving rates of Egypt were quite stable over the study period. The behaviour of domestic savings as a percentage of GDP presented in table (1) and Fig. (1) shows small fluctuations in its value during the period 1975-2006. The mean of this ratio ranged from about 14% to 17% through the sub-periods (1975-1984, 1985-1994, and 1995-2006), with an average of 15.6% for the whole period (1974 — 2006). It followed first an upward trend until the mid of 1980s, and then a downward trend between 1985 and 2000. Savings tend to increase somewhat after 2000. As we stated earlier, the domestic saving ratio in Egypt represents a relatively low value comparing to some other countries with a similar level of the development stage, which have mean saving rates between 20 and 30 percent such as Morocco, Tunisia, and Turkey (Ozcan 2000).

On the other hand, the budget deficit ratio (as a percentage of GDP) witnessed a remarkable decline during the period study with a mean of about 14% during 1975 - 1984, declined to about 4.47% during the period 1985-1994, and reached about 1.14% during 1995-2006. Also, the current account deficit to GDP witnessed similar pattern during the period study with an average of 13% during 1975-1984, declined to about 9.6% and 5% for periods (1985-1994) and (1995-2006) respectively. Moreover, inflation rate shows an upward trend until the beginning of 1990s where inflation rate started to decline to reach about 2.5% in 2000, and began to increase after that. Real interest rate recorded a negative sign through the period 1975-1994, but this image changed after that with a positive real interest rate. These reductions in the budget deficit ratio, the current account deficit ratio, the inflation rate, and the
increased of the real interest rate reflect the successful IMF stabilization programme started in 1991.

Table (1): Descriptive Si:Ma of variables sled in the econometric model.

<table>
<thead>
<tr>
<th>Var.</th>
<th>DS</th>
<th>BD</th>
<th>CA</th>
<th>GPO</th>
<th>INF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975 - 1984</td>
<td>16.07</td>
<td>13.97</td>
<td>-6.03</td>
<td>13.08</td>
<td>8.52</td>
</tr>
<tr>
<td>Mean</td>
<td>19.57</td>
<td>24.81</td>
<td>-1.13</td>
<td>19.18</td>
<td>18.86</td>
</tr>
<tr>
<td>1985 - 1994</td>
<td>17.17</td>
<td>4.47</td>
<td>-5.31</td>
<td>9.64</td>
<td>1.99</td>
</tr>
<tr>
<td>Mean</td>
<td>21.14</td>
<td>10.55</td>
<td>3.85</td>
<td>17.86</td>
<td>3.51</td>
</tr>
<tr>
<td>Max</td>
<td>15.14</td>
<td>-1.70</td>
<td>-12.84</td>
<td>2.52</td>
<td>-1.02</td>
</tr>
<tr>
<td>Min</td>
<td>13.97</td>
<td>1.14</td>
<td>4.18</td>
<td>4.96</td>
<td>2.93</td>
</tr>
<tr>
<td>1995 - 2006</td>
<td>17.11</td>
<td>2.54</td>
<td>7.23</td>
<td>9.50</td>
<td>5.83</td>
</tr>
<tr>
<td>Mean</td>
<td>11.90</td>
<td>-0.90</td>
<td>-3.06</td>
<td>1.36</td>
<td>1.13</td>
</tr>
<tr>
<td>Max</td>
<td>15.63</td>
<td>6.19</td>
<td>-1.98</td>
<td>8.96</td>
<td>4.25</td>
</tr>
<tr>
<td>Min</td>
<td>21.14</td>
<td>24.81</td>
<td>7.23</td>
<td>19.18</td>
<td>18.86</td>
</tr>
<tr>
<td>1995 - 2006</td>
<td>8.02</td>
<td>-1.70</td>
<td>-13.73</td>
<td>1.36</td>
<td>-3.65</td>
</tr>
</tbody>
</table>

Source and calculated by the author depending on International Financial Statistics (IFS) database

DS: the ratio of domestic saving to GDP,

BD: the budget deficit ratio to GDP,

RR: the real interest rate,

CA: the current account deficit ratio to GDP,

GPCI: the growth rate of fixed per capita income.

INF: the inflation rate,

M: the ratio of broad money supply (M2) to GDP.
Fig. (1): Trends of Domestic Saving Ratio, Budget Deficit Ratio and Current Account Deficit during the period (1975-2006)

Fig. (2): Trends of Growth Rate of Per Capita Income, Inflation Rate and Real Interest Rate during the period (1975-2006)
IV. The Empirical Model and Results

The discussion of literature review suggests a number of factors, which might be important in determining domestic saving behaviour in Egypt. Taking into account constraints relating to data availability for Egypt, this study utilizes annual data covering the period 1975-2006. Data is based largely on the International Financial Statistics (IFS), United Nations, which provides a long time series data of most variables used in the model. First, we outline the dependent variables used in our model, and then we outline the methodology adopted and the results.

So, the model can be represented as follow: model (1)

\[ DS_t = a_0 + a_1 GPCI_t + a_2 BD_t + a_3 RR_t + a_4 M_t + a_5 INF_t + a_6 CA_t + u_t \]

The dependent variable is the ratio of domestic saving to GDP (DS). The domestic saving series for the period (19985-2006) was first obtained from the Ministry of Economic Development. The rest of the series (1970-1985) was calculated using the national accounting identity (domestic savings = gross domestic product (GDP) — private consumption — government consumption expenditure), which is the same identity used by the Ministry of Economic Development for calculating this series. We then divided this series by the GDP to convert it as a ratio of the GDP.

The independent variables of macroeconomic determinants of domestic savings can be defined in the following way:

GPCI: is the growth rate of fixed per capita income,

BD: is the budget deficit ratio to GDP. (Budget deficit is expressed in positive values so that an increase of budget deficit ratio is represented by the increase of the value of this ratio),

RR: is the real interest rate,

M: is the ratio of broad money supply (M2) to GDP,

INF: is the inflation rate, measured as the growth rate of consumer price index as a proxy of macroeconomic stability,

CA: is the current account deficit ratio to GDP [- (exports — imports)/GDP].
The raw data for these variables were taken from the *International Financial Statistics* (IFS).

Most macroeconomic time series exhibit substantial co-movement, and thus estimating the previous model using OLS frequently suffers from the problem of non-stationary regressors and spurious regressions, which do not reflect long-run relationship but common time trends (Engle and Granger, 1987). Therefore, in order to investigate the long-run effects of the model, we should first test whether the proposed variables in the model (1) are stationary or not. This step is carried out using Augmented Dickey Fuller (ADF) test. The next step is to test for the presence of cointegration among the explanatory variables.

The procedure to test for stationarity in the levels of variables starts with the most unrestricted model (a drift and time trend are included) as shown in equation below:

\[
X_t - X_{t-1} = AX_t = a + PT + pX + \epsilon
\]

where \(X_t\) represents the variable of interest, \(T\) is a time trend. The null hypothesis that \(X_t\) is non-stationary (I(1) = 0, and \(p = 1\)) is rejected if the coefficient on \(X\) is significantly negative. One lag of the dependent variable is added to make sure that the error term is free of significant serial correlation.*

The Augmented Dickey-Fuller (ADF) test is conducted to check for a unit root for all variables in both levels and first differences. The results of these tests are presented in Table (2), which reveal that the hypothesis of a unit root cannot be rejected in most variables in levels. However, the hypothesis of a unit root is rejected in first differences which indicates that all variables are integrated of degree one.\[^3\]

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\[^3\] Estimated results of ADF test and the estimation of model (2) are calculated using STATA 9.2 software.
### Table (2)
#### Augmented Dickey-Fuller test for unit root

<table>
<thead>
<tr>
<th>Variable</th>
<th>Lag</th>
<th>Variable level</th>
<th>1st. Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(Is)</td>
<td>(It)</td>
</tr>
<tr>
<td>DS</td>
<td>0</td>
<td>-3.568 *</td>
<td>-6.719 ***</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-3.801 **</td>
<td></td>
</tr>
<tr>
<td>BD</td>
<td>0</td>
<td>-3.194</td>
<td>-7.180 ***</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-3.176</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0</td>
<td>-2.444</td>
<td>-3.247 *</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-2.408</td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>0</td>
<td>-3.507 *</td>
<td>-5.332 **a</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-3.468 *</td>
<td></td>
</tr>
<tr>
<td>INF</td>
<td>0</td>
<td>-2.111</td>
<td>-6.069 ***</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-2.052</td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>0</td>
<td>-2.041</td>
<td>-6.269 **a</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-2.285</td>
<td></td>
</tr>
<tr>
<td>GPCI</td>
<td>0</td>
<td>-2.448</td>
<td>-8.074 ***</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-2.541</td>
<td></td>
</tr>
<tr>
<td>u</td>
<td>0</td>
<td>-4.854 ***</td>
<td></td>
</tr>
</tbody>
</table>

*•, **, *** denote rejection at 10%, 5% and 1% respectively

(Note: The critical values of the table are not from normal t-tables but calculated by Dickey. and Fuller)

Furthermore, co-integration involves examining the stationarity of the residuals ($u_r$) from the long-run relationship. If the residuals are integrated of degree zero, then we can assure that the linear combination of the variables in the model (I) is co-integrated. The result of the ADF stationarity tests of the residuals indicates that these residuals are stationary of degree zero at 1% level of significance (i.e. 1 (0)). In other words, the linear combination of the variables of the model (I) is stationary and they are co-integrated.

Given the presence of both stationary and non-stationary variables, we use the general model, which aims to minimize the possibility of estimating spurious relations while retaining long-run information. The dynamic relationship includes lagged independent variables, plus the lagged value of the residual from the co-integrating regression ($u_r$), in addition to the first difference of variables, which appear in the right hand side of the long-run relationship. One way of overcoming autocorrelation is...
to add a lagged dependent variable to the model. Therefore, the dynamic relationship is formulated as following. (Model 2)

\[
ADS_t = Y_{t-9} + AAGPCI_t + 13; ABD_t + 13; ARR_t + \beta_6 AM_t + 13; AINF_t + 46; ACA_t + 13; DS_{t-1} + \Delta GPCI_t + Y_{t-9} RR_{t-1} + 13; M_{t-1} + A; INF_{t-1} + /3_u_{t-1} + e_t
\]

Table (3) reports the final results of the estimated model (2), together with a set of commonly used diagnostic statistics. First, fitting of the model 2 seems to be statistically acceptable. The adjusted \( R^2 \) is about 75%, which implies that changes in the explanatory variables explain 75% of the variations in the domestic saving ratio in Egypt during the period (1975 — 2006). Moreover, the error correction term \( (1,_{-1}) \) appears with a negative sign and is statistically significant at 1% level, ensuring that the long-run equilibrium can be attained. In addition, the Durbin-Watson statistic is about 2.93 which provides evidence of the absence of autocorrelation.

The estimated parameters of the explanatory variables point out to:

1- The results indicate that the growth rate of per capita income has a positive effect in both the short run and long run as expected and statistically significant at 5 percent level in the long run. A one percent increase in per capita income seems to bring about 0.60 percent increase in the domestic saving rate. This provides support for the argument that, for countries in the initial stages of development, the level of income is an important determinant of the capacity to save. If the growth rate in GDP were higher than the growth rate in population, this would increase the level of per capita GDP, which in turn would increase the level of private savings.

2- Regarding the effect of the real interest rate (RR), it is found that it has a positive and statistically significant effect at 1 percent level on the short run. When real interest rate is negative, as the case of Egypt in most years of the study, individuals tend to draw their savings from regular saving channels and prefer to retain their savings in other forms such as buying gold or physical assets. In that case, reduction in RR will result in a decrease in private savings. However, the effect of RR in the long run appears to be positive but statistically insignificant.
Table (3): The estimated parameters of model (2)

Dependent Variable  \( ADS, \)

R-squared = 0.8585
Adj R-squared = 0.7502
Durbin-Watson d-statistic( 14, 31) = 2.933049

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coef.</th>
<th>t'</th>
<th>P &gt; t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-11.99781</td>
<td>-2.36 **</td>
<td>0.031</td>
</tr>
<tr>
<td><strong>Short-run results</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( AGPCI, )</td>
<td>0.17229</td>
<td>1.54</td>
<td>0.143</td>
</tr>
<tr>
<td>( A/3D, )</td>
<td>-0.26858</td>
<td>-2.58 **</td>
<td>0.019</td>
</tr>
<tr>
<td>( AM, )</td>
<td>-0.03537</td>
<td>-0.43</td>
<td>0.675</td>
</tr>
<tr>
<td>( AINF, )</td>
<td>2.86926</td>
<td>4.93 ***</td>
<td>0.000</td>
</tr>
<tr>
<td>( ALA, )</td>
<td>-0.28001</td>
<td>-2.89 ***</td>
<td>0.010</td>
</tr>
<tr>
<td>( ARR, )</td>
<td>2.74281</td>
<td>4.79 ***</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Long-run results</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( UPC I_{-1,} )</td>
<td>0.0062</td>
<td>2.86 **</td>
<td>0.011</td>
</tr>
<tr>
<td>( BD_{-1,} )</td>
<td>-0.25645</td>
<td>-1.91 *</td>
<td>0.072</td>
</tr>
<tr>
<td>( t'F_{-1,} )</td>
<td>0.25768</td>
<td>4.84 ***</td>
<td>0.000</td>
</tr>
<tr>
<td>( t'F_{-1,} )</td>
<td>0.42762</td>
<td>1.81 *</td>
<td>0.087</td>
</tr>
<tr>
<td>( CA_{-1,} )</td>
<td>-0.43422</td>
<td>-3.15 **</td>
<td>0.006</td>
</tr>
<tr>
<td>( RR_{-1,} )</td>
<td>0.29818</td>
<td>1.36</td>
<td>0.191</td>
</tr>
<tr>
<td>( DS_{-1,} )</td>
<td>-0.80505</td>
<td>-5.86 ***</td>
<td>0.000</td>
</tr>
<tr>
<td>( u_{-1,} )</td>
<td>-0.93547</td>
<td>-7.32 ***</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* Significant at 10%  ** Significant at 5%  ***Significant at 1%
3. We also found that macroeconomic uncertainty as measured by the inflation rate (INF) has a positive and statistically significant effect on domestic saving ratio in both the short run and the long run. This provides support of precautionary motives for saving in the face of increased economic uncertainty in Egypt. In addition, higher inflation rates may increase savings rein through its effect on the distribution of income in favor to entrepreneurs where their marginal propensity to save is higher than the low-income class. High inflation will also increase profits, which if it is reinvested will result in increasing of domestic savings.

4. The financial depth as captured by M has a negative but statistically insignificant effect on domestic savings in the short run. However, the results of the long run clearly show that the effect of M is positive and statistically significant. This finding confirms that an increase in financial depth, proxied by the increase in the M2/GNP ratio, is likely to have positive effect on domestive saving ratio especially in a country such as Egypt, which is undergoing a financial liberalization process.

5. Current account deficit (CA) recorded a negative and statistically significant effect on both the short run and the long run at 1 percent level. The results indicate that a 1 percent decrease in current account deficit leads to a 0.28 and 0.44 percent point increase in the domestic saving ratio in the short run and long run respectively. An increase in external saving or the current account deficit is met by a partial decline in private saving, as external saving may tend to act as a substitute to domestic private saving. This reinforces that an increase in current account deficit, which is financed by foreign governments rather than private investors, may have a negative impact on domestic savings. This heavy reliance on foreign creditors may raise political economy concerns.

6. The conventional analysis of sustained budget deficits indicates that an increase in the budget deficit reduces domestic saving unless it is fully offset by an increase in private saving. Our results confirm this viewpoint, where the budget deficit ratio has a negative and statistically significant effect on the domestic saving ratio in both the short run and the long run. This result

\[\text{Domestic saving is the sum of private saving and government saving (positive when the government sector runs a budget surplus).}\]
indicates that there is a partial offset on private savings of changes in government saving, and thus Ricardian Equivalence does not hold strictly.

7- Savings rates of the previous period have a negative and highly significant effect on today’s savings rates. The coefficient is about -0.81 indicating that savings rates clarify a certain degree of persistence.

II V. Conclusion

This paper has analyzed the determinants of domestic savings in Egypt during the period 1975-2006. The unit root test was used to test the stationary of all time series. and after that the first difference and the first lag of all variables are used in the estimated model in order to get the best results. The results of the study provide evidence that domestic savings in Egypt is determined by the following factors. First, the growth of per capita income is found to have positive influence on domestic savings, especially on the long-run. Second, budget deficit ratio appears to have a negative effect on domestic saving ratio. This means that higher government savings partially crowd out private savings, and thus does not provide support of the existence of full Recardian Equivalence. Third, the development of financial market as proxied by the increase in the M2/GNP ratio shows a positive and significant effect on domestic savings. Fourth, the real interest rate, and inflation rate prove to have positive and significant impact on the level of domestic savings in Egypt. Finally, current account deficit recorded a negative and statistically significant effect on both the short run and the long run, which imply that external saving may tend to act as a substitute to domestic private saving. At the end, we would like to emphasis that this research could be extended by further research to investigate the possible effects of demographic factors on saving behaviour, which we could not investigate in this study due to the lack of information available to us about time series data of Egyptian demographic factors.
References


