

An Empirical Investigation of the Determinants of Oman's National Savings

Paresh Narayan

*Department of Accounting, Finance and Economics,
Griffith University*

Saud AL Siyabi

The Ministry of Finance, Muscat, Oman

Abstract

In this note we examine the determinants of Oman's national savings for the period 1977–2003 using the bounds testing approach to cointegration. We use the ARDL model to estimate the long run and short run determinants of national savings. Our main finding is that the current account, the urbanisation rate and the money supply exert statistically significant impacts on Oman's national savings in the long run.

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1. Introduction

The Sultanate of Oman is located in the Middle East and occupies the South Eastern corner of the Arabian Peninsula. Oman is a small open economy that depends largely on oil revenues for financing investment projects. Over the past three decades, oil revenues allowed Oman to achieve an impressive growth record and high standards of living. For instance, over the period 1980-1990, Oman achieved an average annual growth in nominal GDP of about 8.4 percent, much higher than what has been recorded in that period by many other developing countries. In real terms, GDP multiplied by approximately 12 fold from around OR760 million in 1970 to around OR9 billion in 2003. As a consequence, nominal per capita gross national income increased remarkably over the years from OR158 in 1970 to OR3430 in 2003.¹

However, a major issue is whether oil revenues can continue to finance investment requirements and increase the standards of living in Oman in the near future. According to some documents recently revealed by Shell, one of the largest oil companies having concessions in Oman, there are many concerns regarding Oman's oil industry. Not only were Oman's oil reserves overstated by 40 percent in 2000, there are also many serious technical problems faced by the industry that will lead to a remarkable decline in production in the near future (Gerth and Labaton 2004). Moreover, at current production levels, it is estimated that oil reserves will last for only around 17 years (McBrierty and AL Zubair, 2004).

Oman's national savings rate has been declining throughout the past three decades. For instance, national savings (as a percentage of GDP) has decreased sharply from around 42 percent in 1974² to 11 percent in 1988, and then, after years of recovery, it started to fall again to average a meagre 2 percent in 1998. While the national savings rate has increased sharply to reach 28 percent in 2000, it however started to fall again and averaged 22 percent in 2003. It is expected to decline further by the end of 2005.³

Given the importance of savings, the prediction that oil revenues would not be able to continue financing investment requirements in Oman in the near future, and the downward trend of savings over the past three decades (with exception of the year 2000), this study aims to examine empirically the determinants of the national savings rate for Oman. The empirical analysis is conducted using annual data for the period 1977-2003, and is based on the bounds testing approach to cointegration suggested by Pesaran *et al.* (2001) and the autoregressive distributed lag model suggested by Pesaran and Shin (1999) for estimating long run and short run elasticities.

The balance of this article is organised as follows. In section 2, we discuss the model. In section 3 we present the econometric methodology. In section 4, we discuss the empirical results, and in the final section we conclude.

2. Model

¹ Over the period (1970-1995), the average annual growth of per capita income was 11.7 percent.

² There are no precise estimates for national savings in Oman prior to 1974. However, McBrierty and AL Zubair (2004) claim that national savings rate in Oman in 1970 was estimated to be above 50 percent of GDP.

³ The Omani Ministry of National Economy has formulated the 6th five-year development plan (FYDP, covering 2001-2005), which projects national savings rate in Oman to decline to around 18 percent by the end of 2005.

Following the literature (see, *inter alia*, Agrawal, 2001; Cohn and Kolluri, 2003; Ozcan *et al.*, 2003) and taking into account constraints relating to data availability for Oman, we propose to estimate the following model:

$$S_t = \beta_0 + \beta_1 Y_t + \beta_2 CA_t + \beta_3 UR_t + \beta_4 CR_t + \beta_5 M2_t + \varepsilon_t \quad (1)$$

Here, S is the national savings rate, Y is the level of per capita income, CA is the current account surplus, UR is the urban population rate, $M2$ is the money supply used as a proxy for wealth, and CR is the domestic credit. *National savings rate*: the raw data for this variable was taken from the *International Financial Statistics* (IFS). The national savings series was first obtained using the national accounting identity (national savings = current account balance + investment). We then divided this by the GDP deflator obtained from the *IFS* using 2000 as the base year to obtain real savings. After that, it was divided by the real GDP (which also constructed using data taken from the *IFS*) to convert it as a ratio of the real GDP. *Per capita GNI*: this variable was constructed using data from three sources. Data on the GNI was taken from the *IFS*, which was converted into real values using the GDP deflator. Data on population was taken from the World Bank's World Table for the years (1974-1979) and from the OMNE's *Statistical Year Book (2004)* for the years (1980-2003). *The current account surplus*: this variable was taken from the *IFS*. It was divided by the GDP deflator to convert it into real values, and then it was divided by the real GDP to obtain it as a ratio of the real GDP. *The money supply*: this variable is the broad measure of money supply and it is equal to the narrow measure of money supply M1 (the aggregate of currency with the public and local currency demand deposits) plus quasi money (local currency savings, time deposits, margins and foreign currency deposits). This variable was obtained from the *IFS* and deflated by the GDP deflator in order to convert it into real terms. It was then divided by the real GDP to convert it as a ratio of the real GDP. *The urban population rate*: this variable was obtained from the World Bank's World Tables. *Domestic credit*: this variable was obtained from the *IFS* before it was converted into real terms using the GDP deflator. It was then divided by the real GDP to convert it as a ratio of the real GDP. The variables savings, income, money supply and domestic credit were converted into natural log form before analysis. The expected sign for β_1 and β_2 is positive, while the expected sign for β_3 , β_4 and β_5 is negative.

3. Econometric methodology

To test for cointegration we use the bounds testing approach proposed by Pesaran *et al.* (2001). Suppose that with respect to Equation (1) we predict that there is a long-run relationship among $S_t, Y_t, CA_t, UR_t, M2_t$ and CR_t . Without having any prior information about the direction of the long-run relationship among the variables, the following unrestricted error correction (EC) regression is estimated:

$$\begin{aligned} \Delta S_t = & a_{0S} + \sum_{i=1}^n b_{iS} \Delta S_{t-i} + \sum_{i=0}^n c_{iS} \Delta Y_{t-i} + \sum_{i=0}^n d_{iS} \Delta CA_{t-i} + \sum_{i=0}^n e_{iS} \Delta M2_{t-i} \\ & + \sum_{i=0}^n f_{iS} \Delta UR_{t-i} + \sum_{i=0}^n g_{iS} CR_{t-1} + \lambda_{1S} S_{t-1} + \lambda_{2S} Y_{t-1} + \lambda_{3S} CA_{t-1} \\ & + \lambda_{4S} M2_{t-1} + \lambda_{5S} UR_{t-1} + \lambda_{6S} CR_{t-1} + \varepsilon_{1t} \end{aligned} \quad (2)$$

Similarly, taking each of the other variables in Equation (2) as dependent variables, other EC equations are estimated. Given the limited number of observations (30) and

the use of annual data, the lag length will be restricted to two, that is, $n=2$. The F test is used to test the existence of long-run relationships. The null hypothesis for no cointegration amongst the variables in Equation (2) is $(H_0 : \lambda_{1S} = \lambda_{2S} = \lambda_{3S} = \lambda_{4S} = \lambda_{5S} = \lambda_{6S} = 0)$ against the alternative hypothesis $(H_1 : \lambda_{1S} \neq \lambda_{2S} \neq \lambda_{3S} \neq \lambda_{4S} \neq \lambda_{5S} \neq \lambda_{6S} \neq 0)$. This can also be denoted as follows: $(F_S | Y, CA, M2, UR, CR)$. Similarly, the F test for the non-existence of the long-run relationship in other equations where each of the other variables is taken as dependent variables can be tested. Given the small sample size, the critical values are extracted from Narayan (2005). The null hypothesis of no cointegration is rejected if the calculated F-statistic is greater than the upper bound critical value.

4. Results

The results of the bound testing approach for cointegration show that the calculated F-statistics, $F_S(\cdot)$, is 9.6030 which is higher than the upper bound critical value of 5.761 at the 1 percent level of significance, implying that the null hypothesis of no cointegration cannot be accepted and that there is indeed a cointegration relationship among the variables in this model.⁴ Having found a long-run relationship, we applied the ARDL method to estimate the long run and the short run elasticities (see Pesaran *et al.*, 2001 and Pesaran and Shin, 1999 for details). The results are reported in Table 1.

Table1: Results

Panel A: Long-run results		
Variables (national savings rate is the dependent variable)	Coefficient	t-statistics (P-value)
Constant	-6.0588	-1.6496[.117]
Y	0.50296	0.98868[.337]
CA	6.7852***	10.9290[.000]
UR	-0.012339*	-1.8342[.084]
$M2$	-0.91098**	-2.3251[.033]
CR	0.14414	1.1779[.255]
Panel B: Short-run results		
Constant	-9.1429	-1.5872[.128]
ΔY_t	2.6661**	2.4081[.026]
ΔCA_t	7.0000***	9.2530[.000]
ΔUR_t	-0.018620*	-1.7413[.097]
$\Delta M2_t$	-1.3747**	-2.1604[.043]
ΔCR_t	0.99728***	3.7382[.001]
ΔCR_{t-1}	0.89028***	2.9595[.008]
EC_{t-1}	-1.5090***	-7.1550[.000]

Note: *(**)** indicates significance at the 10 %, 5 % and 1 % levels, respectively.

⁴ When the other variables in this model are used as a dependent variable, the F-statistics, namely $F_Y(\cdot)$, $F_{CA}(\cdot)$, $F_{M2}(\cdot)$, $F_{UR}(\cdot)$, $F_{CR}(\cdot)$ are smaller than the lower bound critical values.

In the long- run, the level of per capita GNI has an insignificant impact on the national savings rate. In the short- run, the level of income exerts a positive and statistically significant impact on national savings - a 1 percent increase in income increases the national savings rate by 2.7 percent, which is significant at the 5 percent level. The current account surplus appears with the correct sign and is statistically significant at the 1 percent level in both the long run and short run. The results indicate that a 1 percent increase in the current account surplus leads to 0.18 percent and 0.19 percent increase in the national savings rate in the long run and short run, respectively.

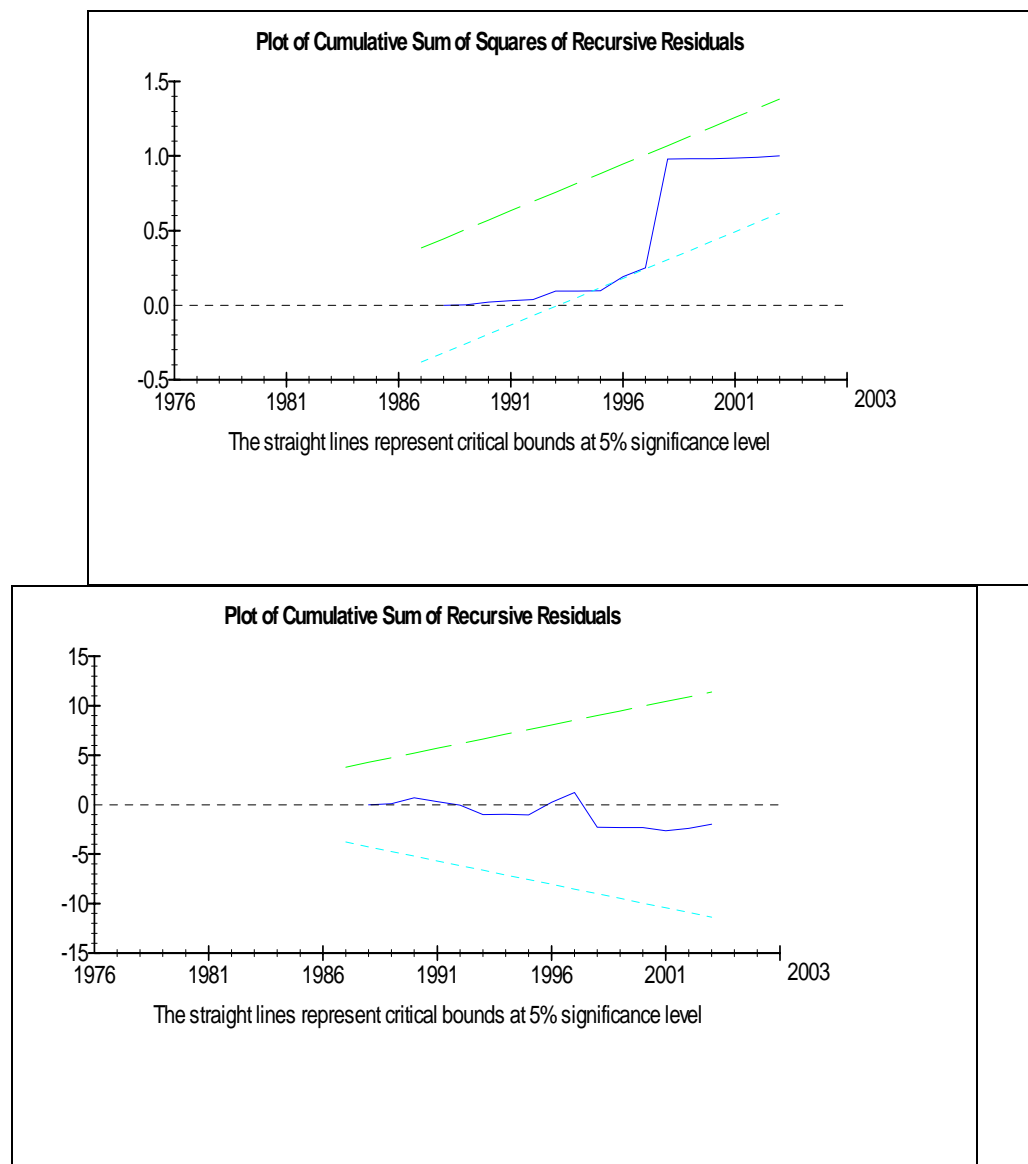
The urban population rate also appears with the correct sign and is statistically significant at the 10 percent level. The results suggest that a 1 percent increase in the urbanization rate leads to 0.69 and 1.06 percent falls in the national savings rate in the long run and short run, respectively. With respect to money supply, its coefficient is statistically significant at the 5 percent level and also appears with the correct sign in both the long run and short run. A 1 percent increase in money supply leads to a fall in the national savings rate by around 0.9 percent in the long run and 1.4 percent in the short run.

The domestic credit is statistically significant only in the short run but appear with the wrong sign: an increase in domestic credit by 1 percent in a particular year raises the national savings rate by 0.99 percent within that year. A one-period lagged effect is also statistically significant and positive: a 1 percent increase in domestic credit actually leads to a 0.89 percent increase in the national savings rate.

Apart from the existence of a long-run relationship, the underlying ARDL model seems to be statistically acceptable. The adjusted R-squared of the error correction model is 0.91, implying that 91 percent of the variation in the national savings rate is explained by the independent variables, which is an indication of a very good fit. Moreover, the error correction term EC_{t-1} , which measures the speed of adjustment to restore equilibrium in the dynamic model, appear with a negative sign and is statistically significant at the 1 percent level, ensuring that long-run equilibrium can be attained. However, the coefficient of -1.5 implies that savings disequilibrium in this period fluctuates around its long-run equilibrium in a dampening manner before converging; hence, the precise period of convergence toward long-run equilibrium is unknown.

The stability of the selected ARDL model specification is evaluated using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) of the recursive residual test for structural stability (see Brown *et al.*, 1975). The model appears stable and correctly specified given that neither the CUSUM nor the CUSUMSQ test statistics exceed the bounds of the 5 percent level of significance (see Figure 1).

Figure 1: CUSUM test



5. Conclusions

The goal of this paper was to examine the determinants of Oman's national savings rate. We examined the relationship between national savings and its determinants, namely per capita income, current account, urbanisation rate, money supply and domestic credit using annual data for the period 1977-2003. We applied the bounds testing approach to cointegration and found that national savings and its proposed determinants were cointegrated. We used the autoregressive distributed lag model to estimate the long run impact of per capita income, current account, urbanisation rate, money supply and domestic credit on the national savings and found that current account, urbanisation rate and money supply significantly impacted on Oman's national savings.

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