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PRIVATE CONSUMPTION IN BAHRAIN: AN EMPIRICAL INVESTIGATION

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ABSTRACT

The paper attempts to explain the long run and cyclical behavior of private consumption in Bahrain for the period 1975–2004. The growth of the real non-oil income and demography are the two most important determinants of private consumption in Bahrain–a result quite consistent with the life-cycle hypothesis of consumption. The rational expectations approach to the consumption function suggests that only unexpected changes in income would cause changes in consumption. We tested this hypothesis for Bahrain. Results seem to indicate that for Bahrain consumers both anticipated and unanticipated components of non-oil income are important in their consumption decision. This can be attributed to the fact that Bahraini consumers may face liquidity and other financial constraints in deciding their consumption. The paper also finds evidence in favor of the error-correction model under which the private consumption in Bahrain varies procyclically in the short run but remains constant in the long run.

JEL Classification: *E21, O53.*

Keywords: *Life-cycle hypothesis, Liquidity constraint, Error-correction model.*

I. INTRODUCTION

The issues of saving and consumption have important macroeconomic consequences for any country. Consumption decisions have immense macroeconomic consequences because they affect the economy as a whole both in the short run and long run.[1] The consumption decision is crucial for short-run analysis because of its role in aggregate demand. Since the major share of GDP comes from consumption, fluctuations in consumption are a key element of expansions and recessions of business cycle. The marginal propensity to consume is a determinant of fiscal policy multipliers. Thus, consumption function is a key tool in building the standard model of business cycle.

The consumption decision is also crucial for its role in the long run economic growth. Households allocate their disposable income between consumption and saving. Given the disposable income, more consumption means less saving. Thus, the studies in analyzing the saving behavior of countries have ended up in studying consumption behavior (Lahiri, 1989). In the traditional growth model of Solow, the saving rate is a key determinant of the steady-

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state capital stock and thus of the level of economic well-being.[2] The endogenous growth models of Romer (1986) and Lucas (1988) have reemphasized the role of saving rate that would not only influence the level of output but also have a lasting impact on the economy's long run rate of growth.

It is then not surprising that the literature on the time series consumption function has grown tremendously over the last two decades. The issues of consumption and saving are even more important for an economy like Bahrain that depends on exhaustible or nonrenewable resource oil. Bahrain is an oil-exporting mini state in the Middle East. The growth rates of Bahrain have been determined by oil and gas production and prices. Though the share of oil and gas to GDP is not that high (about 20 per cent of GDP), compared to its other neighboring Arab oil-exporting countries, its economy has always been evolved around this sector.

Farzin (1999) has shown that, for an economy for which gross national income is generated primarily from liquidation and direct export of the national exhaustible asset, the optimal saving rate (both in its time profile and magnitude) differs sharply compared to a nonextractive economy. The difference is quite understandable. For the exhaustible resource economy as the resource (oil) is extracted, the capital base of the economy shrinks over time. Thus an adequate share of national income must be saved and invested in alternative income-generating assets to prevent the declining future flows of income and consumption in the post-oil era.

Given its immense importance, it is quite surprising that there is no study that explains the determinants of private consumption in Bahrain. This study is an attempt to fill up the gap. The paper attempts to explain the long run and the cyclical behavior of private consumption in Bahrain for the period 1975–2004.

The rest of the paper is organized as follows. A brief review of the literature on the empirical consumption function is presented in section II, followed by empirical specifications of the time series consumption function in section III. Data used in this paper and their sources are discussed in section IV. The empirical results are presented in section V and some concluding remarks are presented in section VI.

II. REVIEW OF LITERATURE

John Maynard Keynes in 1936 conjectured that income is the main determinant of consumption and the marginal propensity to consume (MPC) is between 0 and 1 and the Keynesian model that followed found the MPC much closer to 1. The higher MPC had huge policy implications because the higher MPC would have a higher fiscal multiplier effects in reducing widespread unemployment during that time. Carroll (2001) suggests that the main thrust of Milton Friedman's (1957) permanent income hypothesis is to prove an MPC much less than one to discredit the Keynesian model that said consumption was roughly equal to current income. On the other hand, Franco Modigliani's life-cycle hypothesis introduced in 1954 emphasizes that consumption depends on income and wealth.

For the last 50 years or so, studies on consumption and saving evolved around these two hypotheses. These two hypotheses are two ways of putting Fisher's theory of intertemporal optimization. The standard implications of life-cycle-permanent income model of consumption

are derived by maximizing the present value of agent's life time utility subject to an intertemporal budget constraint equal to the current net wealth plus the present value of the agent's labor income over the remaining working life. By the mid seventies, as Blinder and Deaton (1985) have pointed out, the two hypotheses had similar econometric forms and had similar implications. By the end of seventies the random walk model of Hall (1978) and the error correction model of Davidson *et al*. (1978) reopened the discussions that followed an immense number of studies on time series consumption function. Blinder and Deaton (985) thoroughly reviewed these models and estimated a distributed lag model that accommodates many of the specifications of life-cycle permanent income model including both random walk or "Euler-type" specifications and the error-correction model.

In the 1990s, with the advances of computer speed, sophisticated mathematical and computational techniques are used to solve optimal consumption problem. Carroll (2001) reviews this line of research and argues that models in the 1970s and 1980s based on perfect foresight/certainty equivalence assumption did not model uncertainty in a meaningful way and as a result these models rejected the implications of Friedman's permanent income hypothesis prematurely. His results indicate that "if consumers are moderately impatient, their behavior in the modern model with uncertainty resembles Friedman's conception of the permanent income hypothesis," (p. 35). In the new analysis precautionary saving behavior and liquidity constraint are strongly interconnected. The behavior of constrained consumers is virtually indistinguishable from the behavior of unconstrained consumers with a precautionary motive.

Browning and Crossley (2001) defend the life-cycle model of consumption and saving. With the availability of more and more micro data from the U.S., U.K. and Canada, the implications of the life-cycle model are strengthened and they have argued that the life-cycle framework have had more successes than failures.[3]

Main findings of the statistical studies of consumer behavior can be summarized as follows. The marginal propensity to consume out of permanent changes in income is large and not much different from one (Barro, 1997). In contrast, the marginal propensity to consume out of temporary income is only about 20 to 30% (Hall, 1989).

III. EMPIRICAL SPECIFICATION OF PRIVATE CONSUMPTION

According to the life-cycle hypothesis income growth and demographic structure are the two fundamental determinants of consumption and saving rate (Modigliani and Cao, 2004). Growth and the changing demographic structure affect consumption and aggregate savings by making young consumers and savers both more affluent and more numerous than older consumers. As Blinder and Deaton (1985) have argued and Lahiri (1989) has shown that the implications of this hypothesis can be captured by a consumption function of the form:

$$\Delta c_t = \beta_0 + \beta_1 c_{t-1} + \beta_2 y_t + \beta_3 y_{t-1} + \beta_4 PR_t + \beta_5 \Delta PR_t + Z\gamma + u_t \qquad (1)$$

where c and y are natural logarithms of per capita real consumption and income. In equation (1), the term ($\beta_4 PR_t + \beta_5 \Delta PR_t$)–a linear combination of the per centage of population aged 15–64 (PR) and the change in that per centage (ΔPR)–captures the changing demographic structure. The Z variables (contemporaneous or lagged) include other variables that may

influence consumption and u_t is a random disturbance term.

The life-cycle model has been expanded to incorporate the effect of changes in age distribution of the population on aggregate consumption. According to the life-cycle model, the proportion of income consumed varies over a person's lifetime. The theory suggests that individuals dissave when they are young and when they are old (retirement years) and they accumulate wealth during their high earning years. Hence changes in the proportion of young and old people in the population will influence the national saving rate and consumption of the economy (Modigliani and Cao, 2004). Lahiri (1989) found that the age-dependency ratio (PR) measured as the per centage of population aged 15–65 have significant influence on consumption and saving in 7 out of 8 Asian developing countries.

There has been extensive discussion in the literature about the precise functional form and dynamic structure of consumption function. The distributed lag model as specified in equation (1) captures both the short-run and the long-run properties of the consumption-income relationship. Blinder and Deaton (1985) have argued that the specification in equation (1) accommodates or "nests" many of the specifications that have been discussed in the literature – including both the rational expectations–permanent income hypothesis or "Euler-type" specifications of Hall (1978) and Flavin (1981) and the error– correction model by Davidson and others (1978). To test implications of these models, we also estimate an augmented specification that decomposes income variable in equation (1) into anticipated and unanticipated components as:

$$\Delta c_t = \beta_0 + \beta_1 c_{t-1} + \beta_2 y_t^a + \beta_2^* y_t^u + \beta_3 y_{t-1} + \beta_4 PR + \beta_5 \Delta P + Z\gamma + u_t, \qquad (2)$$

where subscripts a and u stand for anticipated and unanticipated components of income. According to the rational expectations permanent income (or "surprise only") model of Hall, anticipated changes in income should not affect private consumption because these changes are already embodied in past consumption decisions in an intertemporal framework. However, it is often argued especially for developing countries like Bahrain that anticipated growth in income may induce changes in consumption decision because of the liquidity constraint (Haque and Montiel, 1989). For example, if consumers know with certainty that their income is going to grow 10 per cent next year, they may not be able to increase their current consumption if they cannot obtain the credit to do so. From equation (2), according to Hall's hypothesis, $\beta_1 = \beta_2 = \beta_3 = 0$. Rossi (1989) in a rational expectations permanent income framework has shown that variations in per capita real consumption may be related to variations in demographic composition through overhead costs of children, but it is independent of the level of the age-composition variable; that is $\beta_4 = 0$, $\beta_5 >< 0$. So Lahiri's (1989) test of the rational expectations-permanent income hypothesis or Blinder and Deaton's (1985) "surprise only" hypothesis becomes:

$$H_1 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$$

It is also important to test whether anticipated changes in income matter in the determination of private consumption in Bahrain in the light of Hall's hypothesis and liquidity constraint. This hypothesis, called as "no decomposition" by Blinder and Deaton (1985), is to test whether anticipated and unanticipated variables are equal, so that only actual variables matter; that is, it is to test the hypothesis

$$H_2 : \beta_2 = \beta_2^*$$

Lahiri (1989) has pointed out that an explanation of consumption in terms of actual income is valid if anticipated and unanticipated income affects consumption in the same way.

Suppose that H_2 is not rejected so that the analysis of consumption can be carried out in terms of actual consumption. The adjustment of consumption to changes in income is presumably far from instantaneous. Davidson et al (1978) have proposed an "error-correction" model to capture some of the stylized facts that consumption in many developed countries has been observed to vary procyclically in the short-run but to remain constant over the long run. Their error-correction model has an attractive dynamic property that the consumption is constant in the long run and any short-run "error" or deviation of consumption from its long-run value is corrected over time to ensure the constancy of consumption in the steady state. We can rewrite equation (2) in an error-correction form as:

$$\Delta c_t = \beta_0 + \beta_1 (c_{t-1} - y_{t-1}) + \beta_2 \Delta y_t + \beta_4 PR + \beta_5 \Delta PR_t + Z\gamma + u_t \qquad (3)$$

The coefficient β_1 in equation (3) is the error-correction parameter, which measures the speed at which the long-run discrepancy between consumption and income is eliminated in each period through appropriate adjustment in current consumption. Note that if the error correction model is valid, one restricts the parameters in equation (1) as $\beta_1 + \beta_2 + \beta_3 = 0$. Thus, a test of the error-correction model in the context of the equation (2) is:

$$H_3 : \beta_1 + \beta_2 + \beta_3 = 0 .$$

Three versions of equation (2) were estimated: (1) an unrestricted version; (2) constraining $\beta_2 = \beta_2^*$ consistent with H_2; and (3) constraining $\beta_1 + \beta_2 + \beta_3 = 0$ (and $\beta_2 = \beta^*_2$) consistent with H_3.

IV. THE DATA AND SOURCES

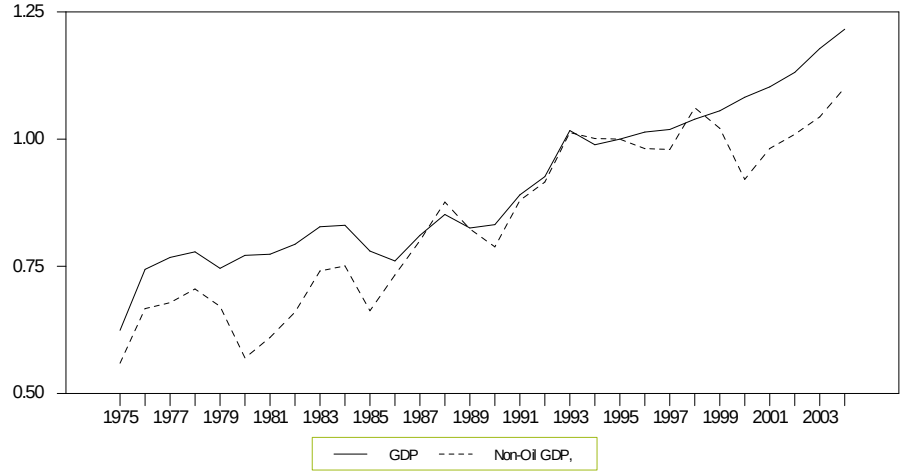
The data cover the period 1975 to 2004. Starting date is 1975 because beyond 1975 data on consumption, income, and other variables are not available. The dependent variable is real private per capita consumption. Ideally, the consumption data should include spending on non-durables (excluding durables) and the imputed services of the stock of consumer durables. For almost all developing countries, including Bahrain, data on consumer expenditures on durables are not available. The standard practice (see for example, Haque and Montiel, 1989 and Lahiri 1989) is to use total private consumption expenditures. The data on total nominal private consumption expenditures is taken from *International Financial Statistics* (*IFS*) yearbooks/ tape.[4] Private consumption expenditure is deflated by the implicit GDP deflator and then divided by population to arrive at real private per capita consumption. The natural logarithm of real private per capita consumption of Bahrain for the period 1975–2004 is shown in figure 1.

Figure 1 shows that there was a huge jump in private consumption of Bahrain in 1990 and then stayed in that high level for about two more years and then settled in new high level since 1992. This jump was due to the Gulf war in 1990 when a substantial number of people, especially from Kuwait, came to Bahrain. This sudden influx of people had a huge impact on current consumption especially on the imputed services of the stock of consumer durables. For the purpose of estimation, we have used a dummy variable (D) for some years to capture dips and the upward jump in private consumption in Bahrain.

Figure 1: Real Private Per Capita Consumption, 1975-2004

The other main variable is income. The use of GDP that includes income from accumulated capital like interest, dividends and rentals, is preferred to labor income in instances where a separate measure of wealth is not available. Bahrain is an oil-exporting small economy. The whole economy evolves around the oil sector and its GDP is divided into oil and non-oil GDP. A substantial portion of its oil GDP goes to government revenue and consumption. So, for private consumption, the appropriate income variable would be the non-oil GDP. The whole GDP is taken from *IFS* yearbook and oil GDP in current prices is obtained from various issues of Bahrain *National Accounts*. Oil GDP is subtracted from GDP to obtain non-oil GDP. GDP and non-oil GDP are both deflated by the implicit GDP deflator and they are both divided by population to get real per capita GDP and non-oil GDP.[5] Figure 2 shows the movement of Bahrain's GDP and non-oil GDP.

Figure 2: Real Per Capita GDP and Real Per Capita Non-Oil GDP, 1975-2003 (Index 1995 = 1.00)



As discussed above, Bahrain's non-oil GDP evolves around oil and gas sector. Figure 2 corroborates the fact that the real per capita non-oil GDP moves closely with the overall GDP.

Data on age composition are taken from Bahrain *Statistical abstract*. Age composition data before 1981 are not available, so the missing values for the period 1975-80 were simply interpolated by fitting a linear trend. Data for total population are taken from IFS yearbooks. Data for Bahrain's CPI and all other data are taken from IFS yearbook.

Estimation of equation (2) requires dealing with unobservable anticipated per capita real income variable (y_t^a). Following Blinder and Deaton (1985), y_t^a is generated, as the one-period ahead forecasts, from:

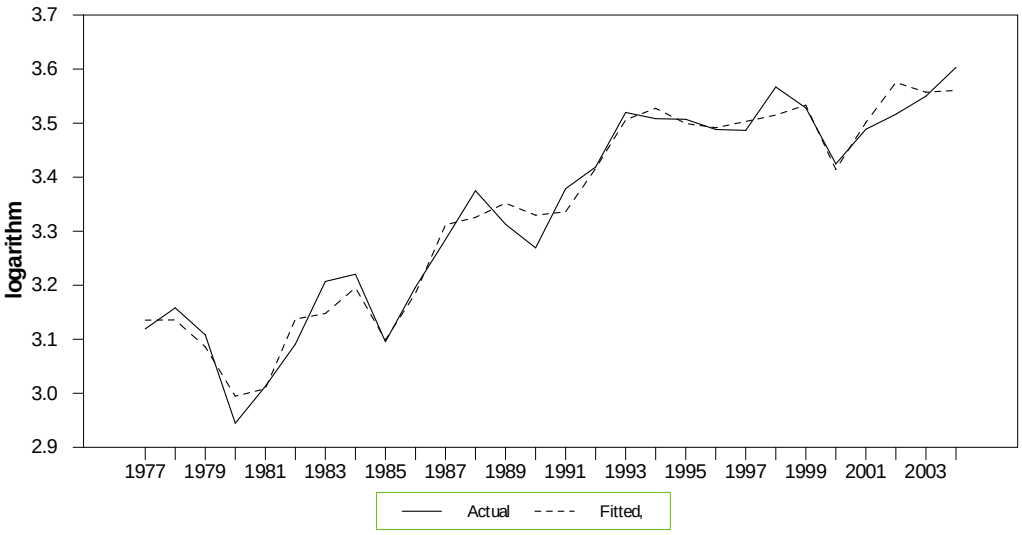
$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \alpha_3 c_{t-1} + \alpha_4 c_{t-2} + \alpha_5 PR_t + \alpha_6 \Delta PR_t + \alpha_7 r_t + \alpha_8 t + \alpha_9 t^3 + e_t \quad (4)$$

where r_t is the expost real interest rate defined as the deposit nominal interest rate less the actual per centage change in the consumer price index and t is the time trend. The anticipated component of y_t is the predicted value of y_t and the unanticipated component is the series e_t. After the anticipated and unanticipated series are created, equation (2) is estimated by OLS.[6] The anticipated and unanticipated series are shown in figure 3.

V. EMPIRICAL RESULTS

Different variables inin equation (2) were considered depending on the availability of data; at the end the adequacy of the model was determined by employing a series of diagnostic tests of model specification. A potential important variable in *Z* could have been terms of trade. Bahrain is a mini state and a highly open economy. Movements in the terms of trade can

Figure 3: Actual and Fitted Non-Oil GDP



potentially affect the consumption in an open economy. A change in terms of trade can directly affect consumption through revaluation of exports and imports. The terms of trade shocks affect consumption through wealth effect and substitution effect induced by relative price changes within and between periods.[7] Lahiri (1989) found that changes in terms of trade (ΔT) had negative impact on consumption for three Asian countries. The terms of trade (usually measured by the unit value of exports to the unit value of imports) data are not available at all for Bahrain. Instead, equations were estimated by including the ratio of exports to GDP (x) thought to be a proxy of terms of trade. However, the estimated coefficients of x found to be statistically insignificant in all estimations and as a result dropped from final estimations.

Another potential variable in Z could be real per capita private wealth usually consists of the end of period value of physical assets, net liquid financial assets and nonliquid financial assets. Unfortunately, these data are not available for Bahrain. As a proxy of wealth, equations were estimated using the end of period per capita stock of M2 deposits deflated by the CPI. Again, this variable was found to be insignificant and as a result dropped from the equation. In estimation of equation (2), expost real interest rate r_t is included. The real interest rate r_t is defined as the deposit nominal interest rate less the actual per centage change in the consumer price index. For developing countries, the literature on the impact of financial liberalization has emphasized a positive impact of real interest rate on saving. The impact of real interest rate found to be significant for the consumption growth of Bahrain.

Empirical Estimates of Unrestricted and Restricted Consumption Function

We first estimated the unrestricted version of the consumption function (2). Both the series on consumption and income are nonstationary in our sample. However, note that Blinder and Deaton (1985) and Stock and West (1988) have suggested that valid inferences can be drawn from estimation of equation (2) in its present form. Since consumption and income are cointegrated, the conventional test statistics remain valid in the presence of integrated regressors. The estimates of the equation (2) are as follows:

$$\begin{array}{ccccccccccc} \Delta c_t = 1.18 & - & 0.29 c_{t-1} & + & 1.57 y_t^a & + & 1.18 y_t^u & - & 1.19 y_{t-1} & - & 3.14 PR_t \\ (0.50) & & (2.40) & & (2.49) & & (3.05) & & (3.29) & & (1.72) \end{array}$$

$$\begin{array}{ccccccccc} + & 1.46 \Delta PR_t & + & 0.16 D & - & 0.007 r_t & + & 0.03 t & - & 0.00 t^3, \\ & (0.79) & & (2.46) & & (1.00) & & (1.21) & & (1.56) \end{array}$$

N = 28 DF = 17 R^2 = 0.81 $\bar{R}^2$ = 0.69 SSE = .07
D-W = 2.03 LM(1) = 1.67 F_1 = 10.47 (0.00) F_2 = 0.27 (0.61)

where D is the dummy variable. Figure 1 indicates that there were dips in real private per capita consumption in years 1980, 1985, and 2000. These years correspond to recessions in Bahrain. Then there was a jump in real private per capita consumption in Bahrain in 1991 following the Gulf War in 1990. The dummy variable D is equal to 1 for the years 1980, 1985,

1991 and 2000 and zero for rest of the sample period. Figures in parenthesis under coefficient estimates are absolute t-values. Two types of regression residual diagnostic statistics are reported. They are Darbin-Watson statistics (DW) and the Lagrange multiplier test statistic for the first-order serial correlation, LM(1). F_1 is the F-statistic testing the hypothesis H_1 that "only surprises matter" (that is, H_1: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$) and F_2 is the F-statistic testing the hypothesis H_2 that decomposition of current income between the anticipated and unanticipated parts is not important (that is, H_2: $\beta_2 = \beta^*_2$).

The overall goodness of the fit of equation (2) measured by R^2 and $\bar{R}^2$ is quite good, especially when the dependent variable is the rate of growth of per capita private consumption in real terms. The equation does not seem to suffer from any first-order serial correlation. The LM test statistic for the first-order serial correlation, which is distributed as χ^2, has a marginal significance of 0.20 indicating that it is not significant at the standard level of significance.

The numbers in parentheses after F-values of F_1 and F_2 are the marginal significance of two tests H_1 and H_2. Hypothesis H_1 states that "only surprises matter" is convincingly rejected at less than 1 per cent level of significance. Also note that the coefficients of both anticipated and unanticipated income are significant at the 5 per cent level of significance. Results strongly indicate that the anticipated movements in non-oil income and other variables have an important impact on private consumption in Bahrain. This is widely known in Bahrain and our results seem to confirm that the consumers in Bahrain face liquidity constraints when determining their consumption behavior.

Hypothesis H_2 states that the decomposition of current income between anticipated and unanticipated components are not important is not rejected at the standard level of significance (the marginal significance of the test is 0.61). That is, results presented above suggest that the decomposition of current income between anticipated and unanticipated components is not of great importance for Bahrain. These results may appear to be a refutation of the rational expectation version of the permanent income hypothesis of Hall (1978) for the case of Bahrain. This is not true, as Davidson *et al.* (1978) have shown, a distributed lag formulation of the consumption function of the form of equation (2), that includes lagged income and consumption terms, even under H_3 (which assumes the validity of H_2) is consistent with distributed lag variants of the permanent income hypothesis.

Since the decomposition of current income between the anticipated and unanticipated components is not important (H_2 is valid), that is, at least for Bahrain, the anticipated and unanticipated income affect consumption in the same way, we have reestimated the equation with actual current income. Results are as follows:

$$\begin{array}{lccccccccccc} \Delta c_t = & 1.55 & - & 0.31 c_{t-1} & + & 1.36 y_t & - & 1.08 y_{t-1} & - & 3.20 PR_t & + & 1.64 \Delta PR_t \\ & (0.92) & & (2.79) & & (4.47) & & (3.40) & & (1.94) & & (1.09) \end{array}$$

$$\begin{array}{lccccccc} + & 0.15 D & - & 0.01 r_t & + & 0.04 t & - & 0.00 t^3, \\ & (3.32) & & (2.00) & & (2.15) & & (2.67) \end{array}$$

N = 29	DF = 19	R^2 = 0.83	$\bar{R}^2$ = 0.74
SSE = 0.06	D-W = 2.18	LM(1) = 1.27	F_3 = 0.01 (0.93)

Again, the equation does not seem to suffer from any first-order serial correlation. The LM test statistic for the first-order serial correlation has a marginal significance of 0.26 indicating that it is not significant at the standard level of significance. The overall goodness of the fit is also good. The current income in influencing consumption is also highly significant. Results also show that the age structure (*PR*) of the population has a significant effect (at the 6% level of significance) on private consumption in the long run. Real interest rate has a significant effect on the consumption growth of Bahrain, though the quantitative effect is negligible. The negative sign of the real interest coefficient suggests that the intertemporal substitution effect of interest changes dominate the income effect.

Setting the difference terms to zero, the following steady state relationship between consumption, income, age structure and interest rate can be obtained:

$$c_t = 5 + 0.9y_t - 10.32\ PR - 0.03r_t + \text{other terms}$$

The steady state coefficient indicates that a one per cent increase in income would raise the long-run consumption by 0.9 of a per cent. That is, the long-run income elasticity is close to unity, which is consistent with empirical evidence from other countries.

A straightforward way of testing the error-correction model is to look at the value of long-run income elasticity of consumption obtained by estimating equation (2) under $H_2 : \beta_2 = \beta_2^*$ and to judge whether it is significantly different from unity. As shown above the long-run income elasticity is 0.9, which is not significantly different from unity. As mentioned above this test is equivalent to test the hypothesis $H_3 : \beta_1 + \beta_2 + \beta_3 = 0$. F-value of this test is shown above as F_3. As the F-value and its marginal significance indicate that we cannot reject the hypothesis H_3. Thus, the error-correction type model of consumption is valid for Bahrain.

Empirical Estimates of the Error-Correction Model

Estimates presented above indicate that the error-correction model is valid and in that case equation (3) in the text is the error-correction model. Estimates of the error correction model are presented below.

$$\Delta c_t = \underset{(1.84)}{1.41} - \underset{(2.91)}{0.31}(c_{t-1} - y_{t-1}) + \underset{(6.15)}{1.38}\Delta y_t - \underset{(2.31)}{3.11}PR_t + \underset{(1.15)}{1.67}\Delta PR_t$$

$$+ \underset{(3.78)}{0.15}D - \underset{(2.07)}{0.01}r_t + \underset{(3.95)}{0.04}t - \underset{(3.60)}{0.00}t^3,$$

N = 29	DF = 20	R^2 = 0.83	$\bar{R}^2$ = 0.76
SSE = 0.06	D-W = 2.17	LM(1) = 0.85	

The overall goodness of the fit of the model is again quite good. The equation does not seem to suffer from any first-order serial correlation. The LM test statistic for the first-order serial correlation has a marginal significance of 0.36 indicating that it is not significant at the standard level of significance.

Results strongly supports the error-correction model, with the effect due to the error-correction term ($c_{t-1} - y_{t-1}$) is less than one and is highly significant. The estimated error-correction coefficient indicates that the previous level of consumption is above or below the level of spending that is consistent with lifetime income, consumers will correct 31 per cent of the discrepancy within a year. The reasons why consumers in Bahrain adjust only partially to the discrepancy between last year's consumption and the level of consumption that is consistent with lifetime income can be attributed to financial costs, liquidity constraints or habitual consumption patterns.

Results reported above strongly indicate that the two most important factors that influence the growth of private consumption in Bahrain are the growth of per capita real non-oil GDP of Bahrain and its age structure. The estimated coefficient of real per-capita non-oil GDP growth (Δy_t) is positive and highly significant. However, the estimated coefficient of the growth rate variable is quite large (1.38) indicating that the short-run marginal propensity to consume is very large. The marginal significance of the test that the coefficient of (Δy_t) is unity is 0.13. This means, there is a one-to-one correspondence between real per-capita non-oil GDP growth and consumption growth, ceteris paribus. The omission of unavailable wealth variable–an important determinant of private consumption–may have resulted in high short-run marginal propensity to consume. On the other hand Bahrain has a very high short-run marginal propensity to consume is not altogether surprising. Writers on Bahrain economy (see, for example, Elbadawi and Majd, 1993) have documented government policies that have encouraged excessive imports, higher consumption and lower savings. In this sense it is an important result that the policy makers in Bahrain should look at it.

Results also strongly indicate that an increase in the per centage of population aged 15–64 leads to a decrease in consumption. During our sample period, especially starting in the 1980s, development in Bahrain progressed in a steady pace. During this period infrastructure had a tremendous growth and much of the non-oil sectors developed and job opportunities created. With the progress, there has been a steady decline in the population growth rate and a steady increase in the percentage of population aged 15–64 for Bahrain that decreased private consumption in Bahrain–a result consistent with the life-cycle hypothesis. Though the age structure of the population has shown long-term movement, the evidence presented above suggests that changes in age composition of the population (ΔPR) do not affect private consumption in the short run. Results show that real interest rate also significantly (significance level 0.05) affects private consumption in Bahrain.

VI. CONCLUSION

The rational expectations approach to the consumption function suggests that only unexpected, not expected, changes in income would cause changes in consumption. We tested this hypothesis for Bahrain for the period 1975-2004. Results strongly suggest that for Bahrain consumers both anticipated and unanticipated components of income are important in their consumption decision.

In fact, we cannot reject the hypothesis that lagged and anticipated income is irrelevant to changes in consumption in Bahrain. This can be attributed to the fact that Bahraini consumers may face liquidity and other financial constraints in deciding their consumption.

Empirical evidence also indicates that the decomposition of current income between the anticipated and unanticipated components is not important. Thus, we reestimated the consumption function using actual non-oil income as one of the regressors. The estimated coefficient of the contemporaneous actual non-oil income is positive and highly significant. The estimated long-run non-oil income elasticity is not significantly different from unity. This result is quite consistent with the empirical evidence from other developed and developing countries.

Finally, we have estimated an error-correction type model of consumption for Bahrain. Estimates of the error-correction model indicate that changes in private consumption depend on the changes on real per-capita non-oil GDP (or the growth rate of the real per-capita non-oil GDP) and also on the equilibrium error term (or the error-correction term). However, the estimated coefficient of the growth rate variable is quite large indicating that the short-run marginal propensity to consume is very large. We also find that the private consumption in Bahrain decreases with the increase in the age dependency ratio measured as the percentage of population aged 15–64.

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Notes

1. Mankiw (2003) discusses the importance of consumption in macroeconomic aggregates.
2. Consumption is an essential ingredient of modern growth models found in Barro and Sala-i-Martin (2004). See also Van den Berg (2004).
3. Issues that are raised by Carroll (2001) and Browning and Crossley (2001) are beyond the scope of this paper. The implications of these studies can nonetheless be derived by the approach taken in this paper. More importantly the kind of data needed to calibrate is simply not available for Bahrain.
4. Our primary data source is *International Financial Statistics* (IFS) rather than Bahrain *National Accounts* because the IFS yearbook/tape covers a longer period and it avoids lots of inconsistency shown in different issues of Bahrain *National Accounts*.
5. Note that income should be disposable income but there is no income tax in Bahrain. So, for Bahrain real per capita non-oil income corresponds to disposable non-oil income.
6. Blinder and Deaton (1985) have argued that this two-step procedure is preferable over the estimation procedure that requires to treat equations (2) and (4) as a system.
7. The possibility of a reduction in the savings rate in response to an adverse movement in the terms of trade has come to known as the Laursen-Metzler-Harberger effect.

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