Advertising expenditure in Pakistan has increased at a compound growth rate of 19.0 percent and has averaged 0.05 percent of GNP during the period under analysis.[2] Hence a study of Pakistan provides an opportunity to examine advertising's impact on aggregate consumption. In so doing, however, it is emphasized that the relationship between advertising and consumption is not unidirectional but simultaneous. An increase in advertising expenditure will stimulate private consumption expenditure (if advertising is not regarded as economic waste). This will, in turn, attract new entrants into the market. These newcomers will use advertising not only to establish themselves but to gain market share. The encumbent will also use advertising to protect their market share. Thus, an increase in private consumption will also increase advertising expenditure.

The plan of the paper is as follows. In Section II we discuss methodology and data. The results corresponding to a single-equation model as well as simultaneous-equation model are presented and discussed in Section III. Concluding remarks are contained in the final section.

II. METHODOLOGY AND DATA

To achieve the objective of the paper we specify an aggregate consumption function with advertising as an argument.

$$C_t = \alpha_0 + \alpha_1 y_t + \alpha_2 A_t + \alpha_3 C_{t-1} \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where:

C_t = Real private consumption;
y_t = Real disposable income adjusted for remittances;[3]
A_t = Advertising expenditure; and
C_{t-1} = Last year consumption used as a proxy for wealth.

Equation (1) is not suitable for estimation purposes because of the following three reasons. First, it is the advertising intensity rather than advertising levels which is important for businessmen because they think more of advertising/sales ratio rather

[2] Advertising expenditure in this paper includes only advertising through television. Ideally, besides television, advertising expenditure should also have included advertising through press, radio, cinema and outdoor. However, data constraints have restricted us to include only advertising through television.

[3] When real disposable income was used the MPC always exceeded unity. Disposable income adjusted for remittances has also been used by Naqvi *et al.*, (1983) and Khan (1984, 1987).

than the actual amount spent on advertising. Second, the high correlation between y_t and A_t leads to the problem of multi-collinearity which makes our estimates inefficient. Third, since we use annual time series-data, advertising intensity is less likely to have its full effect on the propensity to consume for a period less than one year. As such, we re-specify the aggregate consumption function as:

$$(C/y)_t = \alpha_0 + \alpha_1 y_t + \alpha_2 (A/C)_t + \alpha_3 (C/y)_{t-1} \quad \ldots \quad \ldots \quad (2)$$

where:

$(C/y)_t$ = The average propensity to consume;
$(A/C)_t$ = Advertising intensity; and
$(C/y)_{t-1}$ = Lagged average propensity to consume used as a proxy for wealth variable.

It may be pointed out that instead of consumption expenditure we use average propensity to consume as an endogenous variable because we believe that advertising intensity will influence the propensity to consume more than the consumption level itself.

As pointed out in the preceding section the relationship between advertising and consumption is bidirectional therefore, advertising itself is an endogenous variable and is determined by its own previous level as well as private consumption expenditure.

$$(A/C)_t = \beta_0 + \beta_1 (C/Y)_t + \beta_2 (A/C)_{t-1} \quad \ldots \quad \ldots \quad (3)$$

The bidirectional relationship between consumption and advertising requires that Equations (2) and (3) must be estimated simultaneously using an appropriate estimation technique. It may be pointed that Equations (2) and (3) form a system of structural equations which is mathematically complete in the sense that there are two equations for two endogenous variables C/Y and A/C. The use of Ordinary Least Squares (OLS) to estimate these two equations would yield biased and inconsistent estimates. One way to circumvent the problem of the simultaneous equation system is to use the Two-Stage Least Squares (2SLS) method. However, 2SLS is essentially limited-information estimators where in the estimation of any structural equation complete information on all other structural equations in the model is not taken into account. The method of Three-Stage Least Squares (3SLS) is the full-information method which estimates the entire system simultaneously rather than each equation separately. If the specification of each equation in the system is correct then the 3SLS will be asymptotically more efficient than 2SLS. In this paper we use

3SLS to estimate Equations (2) and (3) simultaneously.[4]

Before we close this section a few words regarding data and its sources are in order. The data pertaining to real private consumption are taken from *Statistical Supplement Pakistan Economic Survey* 1987-88. Real disposable income is defined as real GNP minus income and corporation taxes adjusted for subsidies as well as remittances. This information is taken from the above-mentioned source. The data for advertising expenditure, as mentioned earlier, corresponds to advertising through television only; these are obtained from Pakistan Television Corporation.[5]

III. RESULTS

Having discussed the model and superiority of the estimation technique in the preceding sections we now turn to present results. Following the general practice we estimate a single-equation model comprising Equation (2) to examine the impact of advertising intensity on average propensity to consume with the help of OLS.[6] To check on for simultaneous equation bias we estimate Equations (2) and (3) simultaneously with the help of 3SLS.

Single Equation Results: Ordinary Least Squares

Equation (2) which specifies the average propensity to consume dependent upon the level of real disposable income, advertising intensity and lagged propensity to consume as arguments is estimated and the results are reported below. In order to make our analysis rich we estimated several variants of Equation (2) but report the results corresponding to only three.

$$\text{III-1}\quad (C/Y)_t = \underset{(1.27)}{0.225} - \underset{(-0.43)}{0.000000339}y_t + \underset{(0.40)}{0.000283}A_t + \underset{(3.942)^*}{0.782}\,(C/y)_{t-1}$$

$$\bar{R}^2 = 0.51; \qquad h = 0.87; \qquad F = 7.00$$

$$\text{III-2}\quad (C/y)_t = \underset{(1.45)}{0.243} - \underset{(1.035)}{0.000000285}y_t + \underset{(1.0613)}{70.58}\,(A/C)_t + \underset{(3.75)^*}{0.736}\,(C/y)_{t-1}$$

$$\bar{R}^2 = 0.545; \qquad h = 0.167; \qquad F = 7.80$$

[4]We also estimated Equations (2) and (3) simultaneously by using the instrument variable variant of the 2SLS but the results were not satisfactory.

[5] We are grateful to Mr Matee-ur-Rehman of PTV for supplying the necessary data on advertising to us.

[6]Metwally and Tamaschke (1982) and Taylor and Weiserbs (1972) have also estimated single Equation model to examine the relationship between Advertising and Consumption.

report the results corresponding to only two exercises.

$$\text{III-4}\quad \underset{}{(C/y)_t} = \underset{(2.29)^*}{0.40} - \underset{(2.07)^*}{0.0000009 y_t} + \underset{(2.19)^*}{286.02\,(A/C)_t} + \underset{(2.73)^*}{0.54\,(C/y)_{t-1}}$$

$$\bar{R}^2 = 0.99; \qquad DW = 1.60; \qquad SER = 0.027$$

$$(A/C)_t = \underset{(1.19)}{-0.0009} + \underset{(1.30)}{0.0012\,(C/y)_t} + \underset{(5.83)^*}{0.79\,(A/C)_{t-1}}$$

$$\bar{R}^2 = 0.79; \qquad DW = 1.50; \qquad SER = 0.0009$$

$$\text{III-5}\quad (C/y)_t = \underset{(5.13)^*}{0.64} - \underset{(4.53)^*}{0.0000013 y_t} + \underset{(4.36)^*}{363.46\,(A/C)_t} + \underset{(2.04)^*}{0.28\,(C/y)_{t-1}}$$

$$\bar{R}^2 = 0.99; \qquad DW = 1.40; \qquad SER = 0.031$$

$$A_t = \underset{(6.60)^*}{-60.7} + \underset{(7.68)^*}{0.00091 C_t} + \underset{(2.31)^*}{0.25 A_{t-1}}$$

$$\bar{R}^2 = 0.98; \qquad DW = 1.40; \qquad SER = 7.96$$

A cursory look at Equation III-4 is sufficient to see that advertising intensity is found to be statistically significant with the positive sign.[7] This suggests that advertising intensity is an important determinant of the propensity to consume. Furthermore, an increase in advertising intensity leads to an increase in the propensity to consume. What follows from this result is the fact that advertising in Pakistan cannot be regarded as economic waste. Its significant impact on the propensity to consume clearly shows the strong informative role that advertising has been playing in Pakistan to motivate potential consumers to increase their consumption expenditure. The income variable is found to be statistically significant with the negative sign. This result suggests that as income increases the average propensity to consume falls. This is consistent with the fact that the marginal

[7] The *t*-statistics reported in the parentheses of each estimated coefficients can be interpreted as following a "quasi-T" distribution, though strictly speaking its distribution is asymptotic normal. The meaning of $\bar{R}^2$ in simultaneous system is also at best ambiguous because it is not bounded (0, 1) but $(-\infty, 1)$. Hence low values of $\bar{R}^2$ are not an indication of a "poor fit". Similarly, the use of the *DW* statistic to test the absence or presence of serial correlation is not clear when one is using a full-information estimator [see Goldstein and Khan (1978)].