Estimation of Consumption Functions Using Savings Motive Hypothesis (SMH)

Jimmy Alani ®

Gulu University

Submission Time: 14 November 2021 | **Acceptance Time:** 9 June 2022

ABSTRACT

The paper aims to provide more accurate and robust estimates of the marginal propensity to consume (MPC). The problem of the study is that some researchers find that MPC is more than 70%. In contrast, others find that MPC is between 50% and 70% in most economies. The paper's hypothesis is that: MPC falls between 50% and 70% in most economies in the long–run. The paper's consumption function is based on the savings motive hypothesis (SMH). This implies that consumption in period 1 is the addition of autonomous consumption and variable consumption in period 2. The SMH is tested using data from India, Kenya, South Africa, Saudi Arabia, the UK and USA between 1970 and 2018. The six countries are selected because they represent three levels of national development: low, middle and high income. Data analyses are performed using World Bank Data and the generalized least squares (GLS) method. Empirical evidence shows that estimation of the consumption function using SMH provides more accurate results. The SMH is based on the psychological savings motive theory. Test findings show that the short-run global MPC (0.43) could be used in making household and national welfare decisions.

Key words: *Household consumption function, Savings motive hypothesis, Psychological saving motive theory, Household disposable income, Marginal propensity to consume.*

JEL Codes: C23, E21, 055, E21, F41.

1. INTRODUCTION

The major purpose of this paper is to provide more accurate and robust estimates for the marginal propensity to consume. The problem of the study is that some researchers find evidence that the marginal propensity to consume is more than 70% (Muellbauer & Lattimore, 1995, p. 292). In contrast, others find that consumer expenditure accounts for between 50% and 70% of spending in most economies (Muellbauer & Lattimore, 1995, p. 292). This makes the working hypothesis of the paper to be as follows: In the long-run, marginal propensity to consume falls between 50% and 70% in most economies.

Over the past few decades, macroeconomics has experienced the most striking features of a vast body of research work in the field of consumption theory. The theory of the consumption function is among the first relationships in macroeconomics to have been empirically studied. The absolute income hypothesis is the origin of the entire body of theories on consumption function. Keynes (1936) was the first person to advance the consumption function theory by hypothesizing that "aggregate income, as a rule, is the principal variable upon which the consumption constituent of the aggregate demand function will depend" (Keynes, 1961, p. 69). Thus, according to Keynes, "consumption depends partly on the phycological propensities and

® Jimmy Alani, Senior Lecturer in Economics, Gulu University, P.O. Box 166, Gulu City, Uganda, (email: j.alani@gu.ac.ug), Tel: +256 772 184339. The author gratefully acknowledges the assistance of International Economic Review for publication of this paper for free.

habits of individuals and the principles on which income is divided between them" (Ahmed et al., 2015). Many hypotheses have been advanced to explain the relationship between consumption and income. Keynes (1961) considers absolute income the main determinant of current consumption. Duesenberry (1948) believes that relative income is the prime determinant of consumption. Friedman (1957) contends that permanent income is the primary variable influencing consumption. Others have believed that consumption is determined by past income or current consumption levels. Meanwhile, other theorists have believed that the consumption function continually shifts upward, thus showing the long-run proportionality between consumption and income (Hadden, 1965, pp. 1–3).

The modified consumption function states that current period consumption depends on expected income. Therefore, implying that desired consumption is actualized after acquiring and spending on consumption. The income hypothesis advanced by Duesenberry (1948) is called the "relative income hypothesis." He shows that in the long-run average propensity to consume is equal to the marginal propensity to consume. Friedman (1957) supports the argument above that Duesenberry (1949) advanced.

However, according to the income hypothesis advanced by Keynes (1936), the average propensity to consume is less than the marginal propensity to consume. Although (Modigliani and Brumberg (1954) support Keynes (1936) that consumption depends on income, they argue in their life cycle income hypothesis that people formulate their income expenditure plans according to their expected income over their lifetime. They imply that while making their decisions, individuals consider their total income to be earned over their lifetime.

The hypotheses testing of the Alani consumption function was performed using the generalized least squares method. On testing the Alani savings motive hypothesis (SMH) with observed annual data from India, Kenya, Saudi Arabia, South Africa, the UK and US, this paper finds that current consumption depends on future income in the long–run. In particular empirical findings in the paper confirm the advice provided by Muellbauer and Lattimore (1995, p. 292) that "Consumer expenditure accounts for between 50% and 70% of spending in most economies." The six countries are selected because they reflect the three levels of national development: low, middle and high income. "Not surprising, the consumption function has been the most studied of all the aggregate expenditure relationships and has been the critical element of all the macroeconomic model building efforts since the seminal work of Klein and Goldberger (1955)" (Fernandez–Corugedo, 2004, p. 2).

Although the psychological (Alani) consumption function is similar to the Keynesian consumption function, it differs slightly. This difference is such that while the Keynesians believe that consumption depends exclusively on disposable income and autonomous consumption in the current period. Alani contends that the consumption in the current period (i.e. consumption in period 1) depends on constant savings and expected psychological income (i.e. desired income in period 2). The psychological consumption function puts the psychological law of the consumer in the proper context. That is because the consumer is psychologically driven to save for the future and plan for what to consume before spending. Indeed, what motivates people to save from year to year are foresight, improvement, independence, enterprise, avarice (excessive desire for wealth) and habits.

Therefore, people desire to have income available in the future for the satisfaction of immediate primary needs of the family and motive towards accumulation. However, the desire for immediate satisfaction of the primary needs is usually more potent than the desire for accumulation, i.e. savings (Keynes, 1936, pp. 7–8). Hence, consumer's psychological desires in period one are met by expected income in periods two and one savings in durable goods and cash. Thus, the paper argues that consumption in period 1 equals variable consumption in period 2 plus savings (i.e. fixed consumption). Therefore, the psychological consumption in period 2 is proportional to disposable income in period 2.

The results obtained from the estimates of marginal propensity to consume (MPC) for India, Kenya, Saudi Arabia, South Africa, the United Kingdom and the United States were as follows: 0.655, 0.686, 0.510, 0.673, 0.569 and 0.696, respectively. Meanwhile, by defining the MPC as the ratio of the logarithm of consumption in period t to the logarithm of consumption in period t, the estimate of the MPC for each of the six countries was found to be 0.43. As a result, the annual short-run Global estimate for MPC was 0.43. Probably due to (a) influence of global demands for fuel, food and other common global materials and (b) the fact that the method nets out the price effects and influence of capital depreciation from the calculations.

Triangulations of the findings using other estimation models indicate that during the 1970 to 2019 period, the MPC for India, Kenya, Saudi Arabia, South Africa, United Kingdom and the United States were as follows: 0.684, 0.674, 0.541, 0.677, 0.644 and 0.658 respectively. The paper's major contribution is that while the Keynesian consumption function is constructed by intuition, the SMH derives the consumption function from the two-sector national income model. The paper is composed of the following sections: (1) introduction, (2) literature review, (3) theoretical framework, (4) data and methods, (5) results and discussions, (6) conclusion, (7) references and (8) appendices.

2. LITERATURE REVIEW

According to Smart (1916, p. 124), "The word consumption as used both commonly and in economic sciences covers two perfectly distinct things, the expenditure of money and the use of wealth." Therefore, consumption is the destruction of utilities for the satisfaction of wants. Productive consumption, in reality, is production. When subdivided into productive and unproductive, into consumption for acquisition and consumption for enjoyment, consumption means the utilization of commodities (Kyrk, 1923, p. 5). The concept of rationality is one of the core ingredients of the mainstream economic theory, and it is the most common expression in the rational consumer models. The mainstream economic theorists assume that rational consumers are selfish utility maximizers.

They also assume that each consumer obeys the axioms of rational choice and maximizes their utility function subject to the budget constraint. The rational consumer model includes the intertemporal choice, as the choice between present consumption (e.g. consumption this year) and future consumption (e.g. consumption next year). The mainstream choice is the bedrock upon which the mainstream consumption function is built. The theory of rational consumer can be used for deriving individual demand functions for goods and services. In the same way, intertemporal maximization can be used to derive aggregate consumption functions (Drakopoulos, 2021).

Fisher (1930) was the founder of this mainstream neoclassical approach to the theory of the rational consumer. In his theoretical framework, he assumed the consumer to be a rational, forward-looking agent and chose consumption levels for the present and future to maximize his life satisfaction. Fisher (1930) develops consumer choices subject to the intertemporal budget constraint, which measures total resources available for present and future consumption. See

Appendix 1 for reconciling the mainstream consumption with the Keynesian consumption function (Drakopoulos, 2021).

The consumption function represents the relationship between consumption and disposable income. Keynes (1936) hypothesizes that the current disposable income of a household is the prime determinant of current consumption. The slope of the Keynesian consumption function is described as the marginal propensity to consume (MPC). The MPC is assumed to be constant and has values between 0 and 1. Meanwhile, the average propensity to consume (APC) is the fraction of income devoted to consumption. According to Keynes, for every increase in income, the APC declines (Ahmed et al., 2015).

In macroeconomics, there are four common theories of consumption behaviour. The absolute income hypothesis (AIH) of Keynes (1936), the relative income hypothesis (RIH) of Duesenberry (1949) and Modigliani (1947), the life cycle income hypothesis (LCH) of Modigliani and Brumberg, 1954), and the permanent income hypothesis of Friedman (1957). Although the AIH does not account for the trade-off between present consumption and future consumption, it provides a good approximation of consumption in cases where the economy is stable (Keynes, 1936; Sekantsi, 2016). Meanwhile, Kuznets (1946) used United States (US) data over a more extended period and found a proportional relationship between consumption and income. The marginal propensity to consume out of disposable income was between 0.84 and 0.89. The only difference was the depression period that Keynes had examined (Foster, 2018). Kuznets (1946) confirmed that in the US, between 1869 and 1938, consumption was a stable function of income, with the MPC being less than 1.

However, he found that the APC had remained constant over the last hundred years before 1946. His finding was consistent with the economists' belief that APC equals MPC in the long run (Hadden, 1965, p. 9). Theoretical limitations of AIH led to the development of the relative income hypothesis by Duesenberry (1949), life cycle hypothesis (LCH) by Modigliani and Brumberg (1954), and permanent income hypothesis (PIH) by Friedman (1957). During the 1950s and 1960s, Keynes's theories of consumption were prevalent. However, several economists rejected the assumption that consumers do not consider future income when deciding how much to consume. Moreover, empirical evidence revealed that the savings rate was stable even if income was rising, contrary to what Keynes had hypothesized. Consequently, the contradiction prompted new theoretical models, especially theories based on micro-foundations (Landsen, 2016, p. 11).

According to Duesenberry (1949, pp. 28–32), consumption does not create utility on its own but about what other people consume (i.e., RIH). He assumes that consumer preferences are interdependent rather than independent of each other. To him, this effect is felt more strongly in the lower income bracket than in the higher income bracket. That is because income earners in the lower income bracket more often get in touch with consumers with superior habits. He reasons that such demonstration effect of consumer's consumption standard next to one's own is "keeping with the Joneses" (Hadden, 1965, pp. 16–19).

Another theory of consumption is the life cycle income hypothesis. It assumes that an individual's consumption depends on their life stage. That is because income fluctuates substantially depending on age, and the average consumer attempts to smooth consumption over their lifetime. In particular, in the life cycles, for young adulthood at retirement phases, consumption over income may be maintained by drawing down past savings. However, in the middle phase of the life cycle, when income tends to be relatively high, only a portion of income is consumed with increased savings or reduced debt. The LCH also postulates that a significant effect of wealth can earn income that could be drawn down and consumed over the remaining portion of one's life (Matlanyane, 2005; Sekantsi, 2016).

If one started life with a certain amount of money, this money income would be spent, and over time reduces the level of permanent income, as the amount of savings and dissaving get altered. However, savings are likely to decline as the availability of wealth boosts consumption. Meanwhile, PIH is based on the assumption that people prefer their consumption to be smoothed than left volatile. Thus, consumers attempt to maintain a reasonably constant consumption pattern even though their income may vary considerably over time. Moreover, they prefer to buy similar goods from time to time (Singh, 2004).

The PIH is similar to the LCH, where consumers tend to smoothen out fluctuations in their income so that they save during periods of high income and dissave during periods of low income such that consumers would try to decide whether to change or not to change income temporally. If consumers decide to save more, income will have a negligible effect on consumption. Only when they are sure that the change in income is permanent will their consumption change by a substantial amount. In so doing, people would tend to look to their long–term income prospects, known as their permanent income. As a result, they would adjust their consumption to their actual income.

In order to test his PIH theory, Friedman (1957) assumed that, on average, people would base their decisions on permanent income, i.e., on what had happened over the past several years. Hence, the PIH indicates that a rise in income should not increase consumer spending but, with time, should have a more significant effect (Singh, 2004). Friedman (1957) could not measure permanent income and resorted to using exponential declining smoothing weights by applying current and past observations of income to generate what he viewed as the approximation of permanent income. Meanwhile, Ando and Modigliani (1963) modified Friedman's theory by including the prior insight of Modigliani and Brumberg (1954).

Their modification was that consumers are not infinitely lived; the aggregate consumption pattern over the life cycle must be considered when accounting for the effect of a permanent income on consumption (Hynes, 1998). According to Keynes (1964), effective demand consists of desired consumption and investment. The desired consumption, with a certain level of real income, follows a phycological law. When aggregate real income is raised, aggregate consumption increases but not so much as income since savings accompany consumption. Therefore, it implies that a constant or decreasing MPC accompanies economic growth. As a result, growth requires increasing investment to sustain them over time (Keynes, 1964, p. 171; Liu, 2012, p. 19).

According to Bilgili and Baglitas (2015), the random walk hypothesis might be called the permanent income hypothesis with rational expectations (REPIH). That is because they substitute rational expectations for adaptive exceptions in their model. This substitution enables individuals to determine their level of consumption through information obtained from the past, current, and future times. They believe that through evaluation of all the probabilistic information, consumption could not be estimated and might follow a random walk. Therefore, they argue that all information contained in consumption (C_{nt}) is contained in lagged consumption C_{nt-1} plus an error term $(\in_t)$ (Bilgili & Baglitas, 2015; Hall, 1978).

Khan et al. (2018) rejected the existence of the permanent income hypothesis but accepted the absolute income hypothesis in the economy of China (Keho, 2019). Al Gahtani et al. (2019) estimated the consumption function of Saudi Arabia by using the life cycle hypothesis over the period 1970 to 2017 and by employing the error correction model (ECM) to the available data. They found that income and wealth had significant effects on consumption. The long-run MPC estimate was 0.95, implying that the ECM might not have been appropriate for the estimation of the MPC of Saudi Arabia, as this current paper shows.

Meanwhile, Keho (2019) shows that in all 12 ECOWAS countries, consumption strongly depends upon current income, thus confirming that the Keynesian theory of consumption is valid. However, in all the 12 countries considered, data analyses show that some of the estimates for the MPC were not very realistic, i.e., some of the estimates are above one end others are very close to zero.

Consequently, this present paper aims to modify the Keynesian consumption function by taking the desired level of consumption (C_{nt}^*) at time t to be $C_{nt-1} - C_0$, indicating that consumption (C_{nt-1}) depends on the constant level of saved income C_0 and the expected level of disposable income Y_{dt}, where (C_{nt}^*) is equal to βY_{dt}. In other words, people plan at time $t-1$ for the commodities they desire to consume in time t. Moreover, it is the desire that drives people to acquire income and savings for time t, to implement their desired plans formulated at time $t-1$. Various mathematical formulations backing this hypothesis are presented in Appendix 1.

3. THEORETICAL FRAMEWORK

The theoretical framework examines the psychological goal of the consumer to survive well in period t by acquiring some commodities (C_{nt-1}), equivalent to what he might have consumed in a period $t-1$ less savings (C_0). In order to attain his future survival goal, the consumer strives to acquire durable goods in a period t by saving an amount $S = C_0$. Thus, reserving what he saved in period $t-1$. The implication of this psychological causality (law) leads to the physical causality such that the quantity of commodities (C_{nt}^*) the consumer requires in period t, is equivalent to period $t-1$ consumption and savings (C_0), given as $C_{nt}^* = C_{n-1} - C_0 = \beta Y_{dt}$.

Here the psychological law of the consumer to survive is represented as the savings motive hypothesis (SMH). Appendix A1 employs the SMH to reconcile the mainstream neoclassical and Keynesian consumption functions by deriving the savings motive consumption function from the neoclassical intertemporal budget constraint. Appendix A2 implies that the saving motives hypothesis (SMH) is an appropriate consumption function. In the SMH theory, for various reasons in period $t-1$, the household saves part of the durable commodities consumed $C_0 = C_{nt-1} - C_{nt}^* = constant$ in order to cater for its saving motives (commodities kept for reuse or unexpected events) in period t. Under Appendix A3.1, consumer behavior in the national income accounting consists of aggregate disposable income (Y_{dt}) which is the addition of household consumption C_{nt} and the aggregate household investment I_t.

Under Appendix A3.2, the SMH of consumption function is justified using the intertemporal budget constraint ideas borrowed from Varian (2014, pp. 183–186). The Alani consumption function is further triangulated in Appendices A3.3 to A3.7 under the following themes: (a) comparing Alani consumption function with the Keynesian consumption function, (b) deriving the MPC from its definition, (c) derivation of marginal propensity to consume (MPC) presented in logarithm form, (d) introducing physical causality in psychological causality of the Keynesian model and (e) developing the inverse adjustment theory for estimation of MPC.

4. DATA AND METHODOLOGY

The paper performs linear regression analyses using the generalized least squares (GLS) method on secondary data collected from the World Bank Statistics on six countries over the 1970 to 2019 period. Data used in empirical analyses are on aggregate household consumption and disposable income because they are the two variables commonly present in the household consumption function. The t, F, DW and H_T statistical tests were conducted by comparing the computed t, F, DW and H_T values with their respective critical values from standard Statistical Tables. The H_T is the computed t value used in testing for heteroscedasticity (variances that are not constant) by conducting the usual t tests.

5. RESULTS AND DISCUSSIONS

Six sets of results are presented in Appendix B. These Six sets of estimates are on the MPC for six counties: India, Kenya, Saudi Arabia, South Africa, the United Kingdom, and the United States of America. A summary of the results on the MPC is presented in Table 5.1 below. The empirical findings show that the values of MPC for the six countries fall between 0.50 and 0.70, thus satisfying Muellbauer and Lattimore (1995, p. 292) claim that "Consumer expenditure accounts for between 50% and 70% of spending in most economies."

From Table 5.1, the MPC for the six countries during the given period were as follows: India: 0.655, Kenya: 0.657, Saudi Arabia: 0.510, South Africa: 0.667, the United Kingdom: 0.634, and the United States:634. See Appendix C for details of frequency and descriptive statistics of the variables for the six countries in local currency units.

Country	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6
India	0.655	0.694	0.431	0.546	0.684	0658
Kenya	0.686	0.673	0.431	0.657	0.647	0.657
Saudi Arabia	0.510	0.694	0.425	0.541	0.648	0.489
South Africa	0.673	0.579	0.430	0.535	0.667	0.621
United Kingdom	0.569	0.700	0.431	0.634	0.644	0.574
United States	0.696	0.672	0.431	0.634	0.658	0.683

Table 5.1 Summary of MPC Values between 1970 and 2019 for Six Sets of Country Results. Data Source: The MPC values were obtained from the various GLS regressions conducted.

In other words, Table 5.1 contains a summary of the six sets of country results on estimates of MPC between 1970 and 2019, derived from six sets of results presented in Appendix B.
Set 1 of the results under Table 5.1 shows the list of MPC estimates from 1970 to 2019 period for India, Kenya, Saudi Arabia, South Africa, the UK, and the US to be 0.655, 0.686, 0.510, 673, 0.569, 0.696, respectively (See Appendix B1 for details). Similarly, Set 6. of the results under Table 5.1 shows the list of MPC estimates over the 1970 to 2019 period for India, Kenya, Saudi Arabia, South Africa, the UK, and the US to be 0.658, 0.657, 0.489, 621, 0.574, 0.683 respectively (See Appendix B6 for details). The corresponding results for the respective countries are almost the same. That is because the regression results are from two models that represent the SMH consumption function theory: one being: $C_{nt-1} = C_0 + \beta Y_{dt}$ and the other being $C^*_{nt} = C_{n-1} - C_0 = \beta Y_{dt}$.

Set 2 of the results under Table 5.1 shows the list of MPC estimates from 1970 to 2019 period for India, Kenya, Saudi Arabia, South Africa, the UK, and the US to be 0.694, 0.673, 0.694, 0.579, 0.700, 0.672, respectively (See Appendix B2 for details). Set 2 results were obtained from the definition of the MPC as $MPC = (\Delta C_n)/(\Delta Y_d)$. On comparing (triangulating) the results obtained out of the SMH of Consumption function with the common definition of the consumption function, they were found to be almost the same for the respective countries. Implying that the structure of the SMH of consumption function is justified to be appropriate.

Set 3 of the results under Table 5.1 shows the list of MPC estimates over the 1970 to 2019 period for India, Kenya, Saudi Arabia, South Africa, the UK, and the US to be 0.431, 0.431, 0.425, 0.430, 0.431, 0.431, respectively (See Appendix B3 for details). Set 3 results indicate that defining the MPC in logarithm form provides the short–run MPC values that are the same, thus implying that the global $MPC = 0.43$.

The reason why the global $MPC = 0.43$ could be that the global oil demand represented by the global marginal propensity to consume ($MPC = 0.43$) in the Arab oil-producing countries drives the global MPC for oil and is a major source of energy in the production of goods and services. Therefore, Jouini and Ismail (2020) verify that over the short run, an increase of 1% in output might have generated an increase of 0.573% in savings and 0.427% in consumption in the Arab economies from 1981 to 2018 period. Moreover, China's computed average propensity to invest (API) was found to be 0.433 from 1960 to 2018. Implying the API/MPI in China could be the driving force behind the global MPC where China invests accordingly to satisfy the global demand for goods and services. Set 4 of the results under Table 5.1 shows the list of MPC estimates from 1970 to 2019 period for India, Kenya, Saudi Arabia, South Africa, the UK, and the US to be 0.546, 0.657, 0.541, 0.535, 0.634, 0.634 respectively (See Appendix B4 for details). The neoclassical model and the model obtained using calculus show that the MPC can be estimated by the APC as indicated theoretically in Appendix A3.7 and empirically in Table 1.

In reality, productive consumption is production "undertaken by use of durable commodities like beddings, chairs, computers, houses, roads, cars, land, etc., that can be consumed over more than a year." That is why saving ($S = C_0$) in year $t-1$ causes consumption ($C^*_{nt} = C_{nt-1} - C_0$) in year t to be less than consumption C_{nt-1}in year $t-1$ since some of the durable commodities consumed in period $t-1$ are reused in period t.

Set 5 of the results under Table 5.1 shows the list of MPC estimates over the 1970 to 2019 period for India, Kenya, Saudi Arabia, South Africa, the UK, and the US to be 0.684, 0.647, 0.648, 0.667, 0.644, 0.658, respectively (See Appendix B5 for details). Results falling under Set 5 in Table 5.1 were derived using models built in Appendix A3.6, where the psychological causality is translated into physical causality in the context of the modified Keynesian consumption (see Appendices A3.6 and B5 for details). Therefore, the results under appendix B5 are derived from the extended version of the Alani consumption function.

Similarly, Set 6. of the results under Table 5.1 shows the list of MPC estimates between 1970 to 2019 for India, Kenya, Saudi Arabia, South Africa, the UK, and the US to be 0.658, 0.657, 0.489, 621, 0.574, 0.683 respectively (See Appendix B6 for details). The corresponding results for the respective countries are almost the same because the regression results are from two models that represent the SMH consumption function theory: one being: $C_{nt-1} = C_0 + \beta Y_{dt}$ and the other being $C^*_{nt} = C_{n-1} - C_0 = \beta Y_{dt}$.

However, the paper finds that whatever the savings motives are, they all are psychological savings motives. As a result, the empirical findings show that the psychological savings motives determine the level of consumption C_{nt}^{*} in period t, measured in terms of the level of consumption and savings $(C_{nt-1} - S_{t-1})$ in period $t-1$. The SMH generates a psychological consumption–savings relationship given by $C_{nt}^{*} = C_{nt-1} - S_{t-1}$. Here is the level of savings (S_{t-1}) is constant and identical to the level of the observed initial investment in the annual investment series $(C_0 = S_{t-1} \equiv I_1)$. Furthermore, the reader may verify the truth that the SMH (Alani) consumption function is $(C_{nt-1} = C_0 + Y_{dt})$ more accurate than the usual Keynesian consumption function $(C_{nt} = C_0 + Y_{dt})$ $when$ it comes to providing more accurate estimates for the MPC and C_0. Household savings depends not only on cash flow (national income accounting) but also on psychology. Saving is motivated by planning for the future (postponed) consumption. As a result, the behavior of the consumers is influenced by actions in the current period determined by habits or by decisions in the previous periods.

The median is one of the statistics that could be used in the robustness checks. Corlu (2009) states that the median is a robust estimator (procedure). The median values of the long-run MPC for the United Kingdom and the United States are very close to the global long-run MPC value of 0.66 (see Appendix C for details). The consumption and disposable income variables are found to be unstable. However, they are made stable by dividing each of the consumption functions or disposable income observation by $d(d(C_{nt}^{2}))$ or $d(d(Y_{dt}^{2}))$.

More importantly, Table 5.1 provides results showing that the statistic, estimators, and procedures used in estimating MPC are robust. That is because the long-run MPC_L is defined by $MPC_L = d(C_{nt})/d(Y_{dt})$. Meanwhile, during the short run MPC_S is defined by $MPC_S = MPC_L.APC$ where APC is the average propensity to consume. Most of the values in Table 5.1 fall around the global MPC estimate of 0.66 since economists believe that MPC and APC are equal in the long-run. Therefore, the global long-run MPC estimate is 0.66, the square root of the short-run global MPC value of 0.4343.

The extension of the Alani consumption function includes two more variables: $Y_{dt-1}$and $d(Y_{dt})$, still provides consistent results almost equal to the respective results produced by the original Alani consumption function. Finally, we review six empirical findings on India, the UK, and the US; to confirm that our results fall within the acceptable region for MPC values.

Yao, Wang, Weagly and Liao (2011) contend that the most common savings motives are saving for precautionary needs, educating children, and renting or purchasing a house. Other savings motives are: purchasing a car, retirement, purchasing durable goods, and leaving a bequest. Meanwhile, Boeree (1998, 2006) thinks that the savings motives in the hierarchy of importance are: physiological (basic), safety, security, love/social, esteem/luxuries, and self–actualization (Bolton & Houlihan, 2007). In logarithmic form, Singh (2004) estimated Fiji's long-run marginal propensity to consume (income elasticity of consumption) to be 0.432 from 1979 to 2001. Singh (2004) interprets the MPC as the long-run average effect of income of consumers, whereby a 1 percent increase in income would increase consumption by 0.43 percent. Therefore, Fiji's MPC is precisely equal to the global MPC.

Results from some previous studies provide robustness checks for the empirical findings obtained in the GLS regressions. In the short-run, the MPC out of real GDP is 0.501, 0.434, 0.4188, and 0.510, implying that the short-run 1% increase in the real GPD would cause consumption to increase by 0.501, 0.434, 0.418, and 0.50 in the case of Australia, Korea, New Zealand, and Singapore respectively.

Meanwhile, in the long-run, values of MPC out of the real GDP for Australia, Korea, New Zealand, and Singapore are 0.579, 0.640, 0.650, and 0.629, respectively, implying that a 1% increase in real GDP would cause consumption to increase by 0.579, 0.640, 0.657 and 0.629 respectively (Ahmed et al., 2015). These results are very close to the value of the global MPC constant estimate of 0.66.

Avazalipour (2011), using data from 1970 to 2001, STATA software, and an autoregressive distributed lag model Avazalipour (2011) estimates the MPC for Iran and India to be 0.541 and 0.672, respectively. Keho (2019) employs the autoregressive distributed lags (ARDL) testing approach to cointegration. This approach depicts a long-run relationship between private consumption and its determinants and an error correction model to estimate short-run dynamics. Keho (2019) finds that the estimated short-run elasticity of current consumption for income (MPC) is 0.473, while the estimated long-run MPC is 0.618. These results also are very close to the value of the long-run global MPC constant estimate of 0.66 and the short-run global MPC constant of 0.43, respectively. Polder (2017) examines the Swedish aggregate consumption function using a vector error-correction model (VECM) approach and the 1993Q to 2015Q4 estimation sample.

Thus, Pölder (2017) finds that Sweden's long-run consumption elasticity of disposable income within the given period is 0.42. Meanwhile, by using ARDL bound test approach and annual data from 1980 to 2010 for the organization of Islamic Cooperation (D-8), Altunç and Aydın (2014) find that estimates of MPC are as follows: 0.153, 0.757, 0.595, 0.409, 0.656, 0.669 and 0.365 for Bangladesh, Egypt, Indonesia, Iran, Malaysia, Palestine, and Turkey respectively.
Mukherjee and Bhattacharya (2018) used 1995 to 2010 data on India and found that the estimated value of MPC during this period was 0.63. Coskum, Atasoy, Morri and Alp (2018) employed regression analysis using the common correlated effect mean group. They used data from 1970Q1 to 2015Q5 on final household consumption for 11 advanced countries and found that consumption mainly was explained by wealth and that the MPC for the UK was 0.561. By employing OLS estimation using US data for the period, 1965Q1 to 2018Q3, Foster (2019) finds that within the given period estimate of US MPC is 0.59. These results also are very close to the value of the long-run global MPC of 0.66 and short-run global MPC constant of 0.43, respectively.

6. CONCLUSION

The paper attempts to estimate the consumption functions of India, Kenya, Saudi Arabia, South Africa, the United Kingdom, and the United States. In particular, estimates are conducted using the GLS technique on consumption and disposable income data in the six countries above over the 1970 to 2019 period. In the paper, the usual Keynesian consumption function is modified into the Alani Consumption function using the psychological saving motive of the hypothesis (SMH). For every consumer to attain his or her saving motive, he or she saves in period $t-1$ and transfers the savings to period t. The savings transferred from period $t-1$ to period t are composed of commodities that could be reused so that consumption in period t may be represented as period $t-1$ consumption level less constant saving $C_0 = S$.

Thus, consumption in period t is proportional to disposable income, and it is given by: $(C_{nt}^{*} = C_{nt-1} - C_0 = \beta Y_{dt})$ or $(C_{nt-1} = C_0 + \beta Y_{dt})$, now called the Alani Consumption function. When the SMH of consumption function was employed in estimating consumption function for India, Kenya, Saudi Arabia, South Africa, the UK, and the US, the following results (MPC estimates) were obtained: 0.655, 0.686, 0.673. 0.510, 0.569, 0.696. More importantly, we discover that the global estimate for MPC is 0.43, most likely due to the global demand for oil in the Arab world and demand for Chinese goods. The oil from the Arab economies and commodities from China constitute much of the global consumer goods.

One of the contributions the paper makes in the field of knowledge is the derivation of the savings motive hypothesis from the two-sector national income model using the consumer's psychological behavior instead of intuition to construct the household consumption model. The paper also provides more robust estimates for the global MPC.

As a result, the paper finds that the long-run MPC lies between 0.5 and 0.7 in most economies and that the short-run MPC globally is 0.43. Meanwhile, the papers find that the short-run MPC is the product of the long-run MPC and the average propensity to consume (APC). Therefore, the long-run MPC globally must be the square root of 0.45 since economists believe that the long-run MPC equals the APC. The proposes research on "Estimation of Global MPC by using GLS Method." Otherwise, the paper uses only two variables: household consumption and disabled income, in the empirical analyses instead of extending the consumption function model to include other independent variables such as interest rate, inflation, and wealth.

APPENDIX

APPENDIX A Mathematical Theoretical Framework

A1. Reconciling the Mainstream with the SMH of the Consumption Function

The mainstream and SMH of the consumption functions are reconciled by deriving the SMH consumption function from the neoclassical intertemporal budget constraint. There are two periods in a simple two-period model. Let the consumer's household disposable income be Y_{t-1} in period $t-1$ and Y_t in period t. On the other hand, let C_{nt-1} and C_{nt} be consumption in period $t-1$ and period t, respectively, while S represents savings. Therefore, the consumer's budget constraint can be represented as follows:

$$Y_{dt-1} = C_{nt-1} + S. \tag{1.1}$$

So that

$$S = Y_{dt-1} - C_{nt-1}. \tag{1.2}$$

In case the consumer is saving $S > 0$, while $S < 0$ when the consumer borrows. Saving or borrowing is executed at an interest rate (r) as costs.

Thus, the period t the budget constraint is:

$$Y_{dt} = C_n - (1+r)S. \tag{1.3}$$

So that

$$Y_t = C_n - (1+r)(Y_{dt-1} - C_{nt-1}). \tag{1.4}$$

Where $(1+r)S$ is the rate of returns on savings. Rearranging Equation (1.4) provides

$$(1+r)C_{nt-1} + C_{nt} = dY_t + (1+r)Y_{dt-1}. \tag{1.5}$$

Hence, dividing through Equation (1.5) by $1+r$ provides

$$C_{nt-1} + \frac{C_{nt}}{1+r} = Y_{dt-1} + \frac{Y_{dt}}{1+r}. \tag{1.6}$$

Equation (1.6) shows that the present value of lifetime consumption equals the present value of lifetime income. The value in terms of consumption goods in period $t-1$ is called the present value of consumption in period $t-1$. For simplicity $\frac{C_{nt}}{1+r}$ is taken to be equal to C_{nt-1}.

∴ $$C_{nt-1} = S + \frac{Y_{dt}}{1+r}. \quad (1.7)$$

Hence, $$C_{nt-1} = C_0 + \beta Y_{dt}. \quad (1.8)$$

Where $C_0 = S = S_1 = S_2 = \cdots$ is constant and $\beta = 1/(1+r)$. The C_0 is the constant amount of savings in period $t-1$ that is consumed in period t. Equation (1.8) represents the SMH of the consumption function.

It shows that the neoclassical intertemporal consumption function can be reconciled with the psychological SMH of the consumption function. It is the first time a consumption function is represented in this way.

A2. Statement of the Savings Motive Hypothesis

The saving motives hypothesis (SMH) is central to representing the SMH of the consumption function. In the SMH theory, for various reasons in period $t-1$, the household does save part of what it is meant to consume $C_0 = C_{nt-1} - C_{nt} = constant$ in order to carter for its saving motives (that is, finance what the saving is for) in period t. So that

$$C_{nt} = C_{nt-1} - C_0. \quad (2.1)$$

Thus, under the SMH, the disposable income (Y_{dt}) is equal to the aggregate level of consumption C_{nt} in period t. Therefore, after the households have made their adjustments in consumption, their average propensity to consume (APC) equals their marginal propensity to consume (MPC). Likewise, their average propensity to save (APS) would equal their marginal propensity to consume (MPS).

A3.1 Deriving Alani Consumption Function from National Income Accounting

Consumer behavior in the national income accounting consists of aggregate disposable income (Y_{dt}) which is the addition of household consumption C_{nt} and the aggregate household investment I_t, where the mental consumption (C^*_{nt}) function is given by $C^*_{nt} = C_{nt-1} - C_0$.

$$C_{nt} + I_t = Y_{dt}. \quad (3.1)$$

Substituting Equation (2.1) in Equation (3.1) where $C^*_{nt} = C_n + u_t$, provides

$$-C_0 + C_{nt-1} + I_t = Y_{dt}. \quad (3.2)$$

Equation 1 can be rewritten in terms of MPC (β) and marginal propensity to invest, MPI(α).

$$-C_0 + C_{nt-1} + I_t = \alpha Y_{dt} + \beta Y_{dt}. \quad (3.3)$$

Since $$\alpha + \beta = 1. \quad (3.4)$$

The MPC equals the APC, implying that $I_t = \alpha Y_{dt}$, making Equation (3.3) reduce to Equation (3.10) as follows: $$\alpha Y_{dt} + \beta Y_{dt} = Y_{dt} \quad (3.5)$$

$$\left(\frac{I_t}{Y_{dt}}\right) Y_{dt} + \left(\frac{C_{nt}}{Y_{dt}}\right) Y_{dt} = Y_{dt} \quad (3.6)$$

$$\alpha Y_{dt} = I_t \quad (3.7)$$

Rewriting Equation (3.3) by substituting I_t for αY_{dt} gives

$$-C_0 + C_{nt-1} + I_t = I_t + \beta Y_{dt}. \quad (3.8)$$

Thus $$-C_0 + C_{nt-1} = \beta Y_{dt}. \quad (3.9)$$

∴ $$C_{nt-1} = C_0 + \beta Y_{dt}. \quad (3.10)$$

A3.2 Deriving SMH Consumption function from the Intertemporal Budget Constraint

The SMH of the consumption function is now justified by using the intertemporal budget constraint ideas borrowed from (Varian, 2014, pp. 183–186). To do that, the consumer is assumed to be borrowing and lending money at an interest rate r. The budget constraint can be derived while keeping the consumption prices at period 1 for convenience.

Suppose that the consumer is a saver; his consumption level in period $t-1$ is C_{nt-1} and his disposable income in the period this is Yd_{t-1}.
In this case, if the individual is to earn some interest $r(Y_{dt} - C_{nt})$ in period t then he must save $Y_{dt-1} - C_{nt-1}$ at an interest rate r. Implying that the amount that he must save by the end of period $t-1$ is given by

$$(Y_{dt-1} - C_{nt-1}) = (Y_{dt} - C_{nt}) - r(Y_{dt} - C_{nt}). \quad (3.11)$$

Thus, the amount the consumer can consume in 2 is his disposable income in period 1 less than the savings in period 2 plus the interest earned on savings in period 2.

$$C_{nt-1} = Y_{dt} - (Y_{dt} - C_{nt}) + r(Y_{dt} - C_{nt}). \quad (3.12)$$

If the consumer decides to save, then he must plan to consume as follows:

$$C_{nt-1} = Y_{dt-1} - (1-r)(Y_{dt} - C_{nt}). \quad (3.13)$$

If the consumer borrows and spends on his consumption in period t, then his consumption is greater than his period income. The consumer is a borrower if $C_{t-1} > Y_{dt-1}$, the interest he has to pay will be $r(S_t - Y_t)$ and his dissaving function is given by

$$(S_{t-1} - Y_{dt-1}) = (S_t - Y_{dt}) - r(S_t - Y_{dt}). \quad (3.14)$$

Implying that if the consumer decides to borrow, then he must plan to dissave as follows:

$$S_{t-1} = Y_{dt-1} - (1-r)(S_t - Y_{dt}). \quad (3.15)$$

Subtracting Equations (3) from Equation (5) provides the following result.

$$C_{nt-1} - S_{t-1} = Y_{dt-1} - (1-r)(C_{nt} + S_t). \quad (3.16)$$

Therefore, the aggregate consumption function (CF) of the savers and borrowers will be

$$C_{nt-1} = S_{t-1} + (1-r)Y_{dt}. \quad (3.17)$$

Or

$$C_{nt-1} = C_0 + \beta Y_{dt}.$$

Equation (3.17) can be rewritten as given above and in Equation (3.10).

A3.3 Comparing SMH Model with the Keynesian Consumption Function

The usual Keynesian consumption function is given by

$$C_{nt} = C_0 + \beta Y_{dt}. \quad (3.18)$$

The difference between the SMH (Alani) and the Keynesian consumption function is $d(C_{nt})$.

$$C_{nt} - C_{nt-1} = d(C_{nt}). \quad (3.19)$$

A3.4 Deriving the MPC From Its Definition, i.e. From Equations (3.10) and (3.18).

Mathematically, the MPC can be defined as follows:

From Equation (3.10): $$MPC = \frac{d(C_{nt-1})}{d(Y_{dt})} = \beta. \quad (3.20)$$

From Equation (3.18): $$MPC = \frac{d(C_{nt})}{d(Y_{dt})} = \beta. \quad (3.21)$$

A3.5 Derivation of Marginal Propensity to Consume (MPC) in Logarithm Form

In order to appropriately transform the new consumption function into the logarithm form, all the variables are represented in logarithm form, making MPC the Slope of the Consumption Function the subject while all the variables are in logarithm form. Taking the logarithm of variables in Equation 3.10 provides:

$$\log(C_{nt-1}) = C_0 \log(1) + \beta \log(Y_{dt}). \quad (3.22)$$

∴ $$\log(C_{nt-1}) = \beta \log(Y_{dt}). \quad (3.23)$$

∴ $$\frac{\log(C_{nt-1})}{\log(Y_{dt})} = \beta. \quad (3.24)$$

Hence $$\frac{\log(C_{nt-1})}{\log(Y_{dt})} = \beta \log(10). \quad (3.25)$$

A3.6 Introducing Physical Causality in Psychological Causality of the Keynesian Model

Here for the market equilibrium to be attained, the consumption function should be such that $C_{nt}^{*} \equiv C_{n-1} - C_0 \equiv \beta Y_{dt}$. For such an equilibrium condition to be attained, the savings function in terms of the quantities consumed must be given by $S = C_0 = C_{nt-1} - C_{nt}$.

∴ $$C_{nt-1} = C_o + \beta Y_{dt}. \quad (3.26)$$

But $$d(Y_{dt}) = Y_{dt} - Y_{dt-1}. \quad (3.27)$$

∴ $$Y_{dt} = Y_{dt-1} + d(Y_{dt}). \quad (3.28)$$

Substituting Equation (3.28) in Equation (3.26) yields

$$C_{nt-1} = C_o + \beta\left(Y_{dt-1} + \gamma d(Y_{dt})\right). \quad (3.29)$$

Or $$C_{nt-1} = C_o + \beta Y_{dt-1} + \beta_1(Y_{dt} - Y_{dt-1}). \quad (3.30)$$

Or $$C_{nt-1} = C_o + \beta Y_{dt-1} + \beta_1(Y_{dt} - Y_{dt-1} - Y_{dt-2} + Y_{dt-2}). \quad (3.31)$$

Or $$C_{nt-1} = C_o + \beta Y_{dt-1} + \beta_1 Y_{dt-2} + \beta_1[Y_{dt} - Y_{dt-1} - Y_{dt-2}]. \quad (3.32)$$

$$C_{nt-1} = C_o + \beta Y_{dt-1} + \beta_1 Y_{dt-2} + \beta_1[Y_{dt} - Y_{dt-1} - Y_{dt-3} - \rho(Y_{dt-2} - Y_{dt-3})]. \quad (3.33)$$

Or $$C_{nt-1} = C_o + \beta Y_{dt-1} + \beta_1 Y_{dt-2} - \beta_2 d(Y_{dt-2}) + \beta_1[Y_{dt} - Y_{dt-1} - Y_{dt-3}]. \quad (3.34)$$

∴ $$C_{nt-1} = C_o + \beta Y_{dt-1} + \beta_1 Y_{dt-2} - \beta_2 d(Y_{dt-2}). \quad (3.35)$$

∴ $$C_{nt-1} = C_o + \beta Y_{dt} + \beta_1 Y_{dt-1} - \beta_2 d(Y_{dt-1}). \quad (3.36)$$

A3.7 Developing the Inverse Adjustment Theory for Estimation of MPC

Replacing the variables with the inverse of their parameters provides more accurate regressing the parameters on 1 provides more accurate parameter estimates. For the Cobb–Douglas represented by Equation (3.37), transformation can be made to test the influence of the consumption or investment growth on disposable income as shown in Equation (3.41).

$$Y_{dt} = I_{t-1}^{\alpha} C_{nt-1}^{\beta}. \quad (3.37)$$

To transform Equation (3.37) into a testable form, we differentiate variables w.r.t time

$$d(Y_{dt}) = \alpha I_{t-1}^{\alpha-1} C_{nt-1}^{\beta} d(I_{t-1}) + \beta I_{t-1}^{\alpha} C_{nt-1}^{\beta-1} d(C_{nt-1}) + \varepsilon_t. \quad (3.38)$$

Manipulation of Equation (3,38) provides

$$d(Y_{dt}) = \alpha \frac{I_{t-1}^{\alpha} C_{nt=1}^{\beta}}{I_{t-1}} d(I_t) + \beta \frac{I_{t-1}^{\alpha} C_{nt-1}^{\beta}}{C_{nt-1}} d(C_{nt-1}) + \varepsilon_t. \quad (3.39)$$

Or $$d(Y_{dt}) = \alpha \frac{Y_{dt}}{I_{t-1}} d(I_{t-1}) + \beta \frac{Y_{dt}}{C_{nt-1}} d(C_{nt-1}) + \varepsilon_t. \quad (3.40)$$

Hence, growth in disposable income can be rewritten as a function of growth I_{t-1}in and C_{nt-1}.

Here lags are used because the principle of physical causation is considered at play.

$$\frac{d(Y_{dt})}{Y_{dt}} = \alpha\frac{d(I_{t-1})}{I_{t-1}} + \beta\frac{d(C_{nt-1})}{C_{nt-1}} + \varepsilon_t. \tag{3.41}$$

A3.7.1 Derivation of the MPC=APC Econometric Model by Using Calculus

This derivation reconciles the Keynesian consumption function with the neoclassical production function, where I_t represents the quantity of capital and C_{nt} estimates labor man-hours.

$$Y_{dt} = f(I_t, C_{nt}) + \epsilon_t. \tag{3.42}$$

Total differentiation of Equation (3.42) with respect to time provides

$$d(Y_{dt}) = \frac{\partial(Y_{dt})}{\partial(I_t)}d(I_t) + \frac{\partial(Y_{dt})}{\partial(C_{nt})}d(C_{nt}) + u_t. \tag{3.43}$$

Introduction of investment (I_t) and consumption C_{nt} in Equation (3.43) gives

$$d(Y_{dt}) = \frac{\partial(Y_{dt})}{\partial(I_t)}I_t\frac{d(I_t)}{I_t} + \frac{\partial(Y_{dt})}{\partial(C_{nt})}C_{nt}\frac{d(C_{nt})}{C_{nt}} + v_t. \tag{3.44}$$

Dividing through Equation (3.44) by Y_{dt} yields an equivalent of Equation (3.41) as follows:

$$\frac{d(Y_{dt})}{Y_{dt}} = (\frac{\partial(Y_{dt})}{\partial(I_t)}\frac{I_t}{Y_{dt}})\frac{d(I_t)}{I_t} + (\frac{\partial(Y_{dt})}{\partial(C_{nt})}\frac{C_{nt}}{Y_{dt}})\frac{d(C_{nt})}{C_{nt}} + e_t. \tag{3.45}$$

Since $d(Y_{dt})$ and $\partial(Y_{dt})$ are approximately the same; they cancel out and multiplying Equation (3.45) by Y_{dt} gives rise to Equation (3.46), from which inverse function can be derived.

$$1 = \frac{Y_{dt}}{\partial(I_t)}\frac{I_t}{Y_{dt}}\frac{d(I_t)}{I_t} + \frac{Y_{dt}}{\partial(C_{nt})}\frac{C_{nt}}{Y_{dt}}\frac{d(C_{nt})}{C_{nt}} + \varepsilon_t. \tag{3.46}$$

Since $d(C_{nt})$ and $\partial(C_{nt})$ are approximately the same; they cancel out. Similarly, since $d(C_{nt})$ and $\partial(C_{nt})$ are approximately the same; they cancel out. Thus, Equation (4.45) becomes

$$1 = \frac{I_t}{Y_{dt}}\frac{Y_{dt}}{I_t} + \frac{C_{nt}}{Y_{dt}}\frac{Y_{dt}}{C_{nt}} + \varepsilon_t. \tag{3.47}$$

Consequently, Equation (3.47) reduces to Equation (3.48) and produces the inverse adjustment theory for MPC estimation.

$$1 = \alpha\frac{Y_{dt}}{I_t} + \beta\frac{Y_{dt}}{C_{nt}} + \varepsilon_t. \tag{3.48}$$

The inverse adjustment theory produces more reliable coefficients.

APPENDIX B Summary of Regression Results

B1. Regression Results for the Modified (Alani) Keynesian Function

Dependent Variable: $C_{nt-1}/d(d((Y_{dt})^2))$		
Variable	Coefficient	T–Statistic
$(1)/d(d((Y_{dt})^2))$	1.16×10^{12}	19.27
$Y_{dt}/d(d((Y_{dt})^2))$	0.655	97.12
$R^2 = 1.00, DW = 2.19, F = 9.19 \times 10^5, H_T = 0.28,$		
$Included\ Observations = 57, Sample\ Period: 1962 - 2018$		

India: Table 1.1

Dependent Variable: $(C_{nt-1}/d(log(Y_{dt})))/d(d((I_{t-1})^2))$		
Variable	Coefficient	T–Statistic
$1/d(log(Y_{dt})))/d(d((I_{t-1})^2))$	2.81×10^{11}	9.563
$(Y_{dt}/d(log(Y_{dt})))/d(d((I_{t-1})^2))$	0.686	31.38
$R^2 = 1.00, DW = 1.77, F = 1.19 \times 10^5, H_T = 0.89,$		
$Included\ Observations = 56, Sample\ Period: 1963 - 2018$		

Kenya: Table 1.2

Dependent Variable: $C_{nt-1}/d(d(I_{t-1} \times \log(C_{nt-1}))^2))$		
Variable	Coefficient	T–Statistic
$(1)/d(d(I_{t-1} \times \log(C_{nt-1}))^2))$	5.38×10^{10}	4.451
$Y_{dt}/d(d(I_{t-1} \times \log(C_{nt-1}))^2))$	0.510	23.55
$R^2 = 0.99, DW = 2.22, F = 8634, H_T = 0.37,$		
$Included\ Observations = 47, Sample\ Period: 1973 - 2019$		

Saudi Arabia: Table 1.3

Dependent Variable: $C_{nt-1}/d(d(Y_{dt} - C_{nt-1})^2))$		
Variable	Coefficient	T–Statistic
$(1)/d(d(Y_{dt} - C_{nt-1})^2))$	1.84×10^{11}	6.759
$Y_{dt}/d(d(Y_{dt} - C_{nt-1})^2))$	0.673	42.51
$R^2 = 1.00, DW = 2.01, F = 3.11 \times 10^5, H_T = 0.18,$		
$Included\ Observations = 46, Sample\ Period: 1974 - 2019$		

South Africa: Table 1.4

Dependent Variable: $(C_{nt})/d(d(C_{nt})^2))$		
Variable	Coefficient	T–Statistic
$1/d(C_{nt})/d(d(C_{nt})^2))$	6.51×10^9	1.412
$(Y_{dt})/d(d(C_{nt})^2))$	0.235	2.027
$(Y_{dt-1})/d(d(C_{nt})^2))$	0.569	5.084
$d(Y_{dt-1})/d(d(C_{nt})^2))$	0.026	0.200
$R^2 = 1.00, DW = 2.15, F = 5.57 \times 10^5,\ H_T = 0.571,$		
$Included\ Observations = 48, Sample\ Period: 1972 - 2019$		

United Kingdom: Table 1.5 Application of Equation 3.15

Dependent Variable: $C_{nt-1}/d(d((Y_{dt} - I_{t-1})^2))$		
Variable	Coefficient	T–Statistic
$(1)/d(d((Y_{dt} - I_{t-1})^2))$	3.31×10^{11}	8.388
$Y_{dt}/d(d((Y_{dt} - I_{t-1})^2))$	0.696	163.3
$R^2 = 1.00, DW = 1.82, F = 7.99 \times 10^6, H_T = 0.06,$		
$Included\ Observations = 46, Sample\ Period: 1973 - 2018$		

United States: Table 1.6

B2 Second Set of Results. Regression Results for the Keynesian MPC

Dependent Variable: $(d(C_{nt})/d(Y_{dt}))/d(d((Y_{dt}/C_{nt})^2))$		
Variable	Coefficient	T–Statistic

$(1)/d(d((Y_{dt}/C_{nt})^2))$	0.694	28.10

$R^2 = 0.93, DW = 2.26,\ H_T = 0.83,$
$Included\ Observations = 57, Sample\ Period: 1962 - 2018$

India: Table 2.1

Dependent Variable: $(d(C_{nt})/d(Y_{dt}))/d(d((Y_{dt}/I_{t-1})^2))$

Variable	Coefficient	T–Statistic
$(1)/d(d((Y_{dt}/I_{t-1})^2))$	0.673	27.56

$R^2 = 0.93, DW = 1.98,\ H_T = 0.27,$
$Included\ Observations = 56, Sample\ Period: 1963 - 2018$

Kenya: Table 2.2

Dependent Variable: $(d(C_{nt})/d(Y_{dt}))/d(d((Y_{dt}/C_{nt})^2))$

Variable	Coefficient	T–Statistic
$(1)/d(d((Y_{dt}/C_{nt})^2))$	0.694	28.10

$R^2 = 0.93, DW = 2.26,\ H_T = 0.83,$
$Included\ Observations = 57, Sample\ Period: 1962 - 2018$

Saudi Arabia: Table 2.3

Dependent Variable: $(d(C_{nt})/d(Y_{dt}))/d(d((Y_{dt}/I_t)^2))$

Variable	Coefficient	T–Statistic
$(1)/d(d((Y_{dt}/I_t)^2))$	0.579	33.81

$R^2 = 0.96, DW = 1.98,\ H_T = 0.04,$
$Included\ Observations = 48, Sample\ Period: 1972 - 2018$

South Africa: Table 2.4

Dependent Variable: $(d(C_{nt})/d(Y_{dt}))/d(d((C_{nt-1} - I_{t-1})^2))$

Variable	Coefficient	T–Statistic
$(1)/d(d((C_{nt-1} - I_{t-1})^2))$	0.700	70.10

$R^2 = 0.99, DW = 2.13,\ H_T = 0.09,$
$Included\ Observations = 47, Sample\ Period: 1963 - 2018$

United Kingdom: Table 2.5 Application of Equation 3.15

Dependent Variable: $(d(C_{nt})/d(Y_{dt}))/d(d((Y_{dt})^2))$

Variable	Coefficient	T–Statistic
$(1)/d(d((Y_{dt})^2))$	0.672	21.27

$R^2 = 0.90, DW = 2.03,\ H_T = 0.13,$
$Included\ Observations = 47, Sample\ Period: 1972 - 2018$

United States: Table 2.6

B3. Third Set of Results. Results for the Short-run Keynesian MPC in the World

Dependent Variable: $(\log(C_{nt-1})/\log(Y_{dt}))/d(d((Y_{dt} - I_{t-1})^2))$

Variable	Coefficient	T–Statistic
$\log(10)/d(d((Y_{dt} - I_{t-1})^2))$	0.4314	26701.0

$R^2 = 1.00, DW = 1.89,\ H_T = 0.72,$
$Included\ Observations = 56, Sample\ Period: 1963 - 2018$

India: Table 3.1 (Not Correct)

Dependent Variable: $(\log(C_{nt})/\log(Y_{dt}))/d(d((Y_{dt})^2))$

Variable	Coefficient	T–Statistic
$\log(10)/d(d((Y_{dt})^2))$	0.4310	6525.54

$R^2 = 1.00, DW = 2.12,\ H_T = 0.18,$
$Included\ Observations = 56, Sample\ Period: 1963 - 2018$

Kenya: Table 3.2

Dependent Variable: $(\log(C_{nt})/\log(Y_{dt}))/d(d((Y_{dt}/I_t)^2))$

Variable	Coefficient	T–Statistic

$\log(10)/d(d((Y_{dt}/I_t)^2))$	0.4253	17224.3
$R^2 = 1.00, DW = 1.93,\ H_T = 0.19,$		
$Included\ Observations = 48, Sample\ Period: 1972 - 2019$		

Saudi Arabia: Table 3.3

Dependent Variable: $(\log(C_{nt})/\log(Y_{dt}))/d(d((Y_{dt}/I_t)^2))$		
Variable	Coefficient	T–Statistic
$\log(10)/d(d((Y_{dt}/I_t)^2))$	0.4301	58064.0
$R^2 = 1.00, DW = 2.14,\ H_T = 0.03,$		
$Included\ Observations = 48, Sample\ Period: 1972 - 2019$		

South Africa: Table 3.4

Dependent Variable: $(\log(C_{nt})/\log(Y_{dt}))/d(d((Y_{dt})^2))$		
Variable	Coefficient	T–Statistic
$\log(10)/d(d((Y_{dt})^2))$	0.4305	6525.54
$R^2 = 1.00, DW = 2.01,\ H_T = 0.02,$		
$Included\ Observations = 48, Sample\ Period: 1972 - 2018$		

United Kingdom: Table 3.5

Dependent Variable: $(\log(C_{nt})/\log(Y_{dt}))/d(d((Y_{dt} * C_{nt})^2))$		
Variable	Coefficient	T–Statistic
$\log(10)/d(d((Y_{dt} * C_{nt})^2))$	0.4305	20523.1
$R^2 = 1.00, DW = 1.86,\ H_T = 0.57,$		
$Included\ Observations = 46, Sample\ Period: 1973 - 2018$		

United States: Table 3.6

B4. Fourth Set of Regression Results for the Keynesian MPC in the Adjustment Theory

Dependent Variable: $1/d(d((Y_{dt} - I_{t-1})^2))$		
Variable	Coefficient	T–Statistic
$(1/Y_{dt})/d(d((Y_{dt} - I_{t-1})^2))$	7.32×10^{11}	12.27
$(Y_{dt}/C_{nt-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.546	53.32
$(Y_{dt}/I_{t-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.036	13.56
$(Y_{dt}/d(Y_{dt}))/d(d((Y_{dt} - I_{t-1})^2))$	0.001	9.876
$R^2 = 1.00, DW = 2.18,\ F = 1.36 \times 10^7,\ H_T = 0.01,$		
$Included\ Observations = 56, Sample\ Period: 1963 - 2018$		

India: Table 4.1

Dependent Variable: $1/d(d((Y_{dt} - I_{t-1})^2))$		
Variable	Coefficient	T–Statistic
$(1/Y_{dt})/d(d((Y_{dt} - I_{t-1})^2))$	2.03×10^{10}	5.590
$(Y_{dt}/C_{nt-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.6567	67.26
$(Y_{dt}/I_{t-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.0215	8.630
$(Y_{dt}/d(Y_{dt}))/d(d((Y_{dt} - I_{t-1})^2))$	-0.0001	1.774
$R^2 = 1.00, DW = 1.87,\ 48568,\ H_T = 0.25,$		
$Included\ Observations = 56, Sample\ Period: 1963 - 2018$		

Kenya: Table 4.3

Dependent variable: $(1/d(d(I_{t-1})))/d(d((Y_{dt})^2))$		
Variable	Coefficient	T–Statistic
$((1/Y_{dt})/d(d(I_{t-1})))/d(d((Y_{dt})^2))$	4.02×10^{10}	2.058
$((Y_{dt}/C_{nt-1})/d(d(I_{t-1})))/d(d((Y_{dt})^2))$	0.5414	23.77
$((Y_{dt}/I_{t-1})/d(d(I_{t-1})))/d(d((Y_{dt})^2))$	-1.18×10^{-25}	-1.171
$((Y_{dt}/d(Y_{dt}))/d(d(I_{t-1})))/d(d((Y_{dt})^2))$	0.0016	1.771
$R^2 = 0.99, DW = 2.24,\ F = 2086,\ H_T = 0.32,$		
$Included\ Observations = 47, Sample\ Period: 1973 - 2019$		

Saudi Arabia: Table 4.3

Dependent Variable: $1/d(d((Y_{dt} - I_{t-1})^2))$		
Variable	Coefficient	T–Statistic
$(1/Y_{dt})/d(d((Y_{dt} - I_{t-1})^2))$	8.57×10^{10}	3.293
$(Y_{dt}/C_{nt-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.535	53.32
$(Y_{dt}/I_{t-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.052	11.88
$(Y_{dt}/d(Y_{dt}))/d(d((Y_{dt} - I_{t-1})^2))$	-5.38×10^{-5}	3.483
$R^2 = 1.00, DW = 1.85,\ F = 2.84 \times 10^5,\ H_T = 0.07,$		
$Included\ Observations = 47, Sample\ Period: 1973 - 2018$		

South Africa: Table 4.4

Dependent Variable: $1/d(d((Y_{dt} - I_{t-1})^2))$		
Variable	Coefficient	T–Statistic
$(1/Y_{dt})/d(d((Y_{dt} - I_{t-1})^2))$	5.60×10^{9}	2.011
$(Y_{dt}/C_{nt-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.634	35.04
$(Y_{dt}/I_{t-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.031	6.805
$(Y_{dt}/d(Y_{dt}))/d(d((Y_{dt} - I_{t-1})^2))$	-6.51×10^{-6}	0.243
$R^2 = 1.00, DW = 1.93,\ F = 1.01 \times 10^6,\ H_T = 0.12,$		
$Included\ Observations = 47, Sample\ Period: 1973 - 2018$		

United Kingdom: Table 4.5

Dependent Variable: $1/d(d((Y_{dt} - I_{t-1})^2))$		
Variable	Coefficient	T–Statistic
$(1/Y_{dt})/d(d((Y_{dt} - I_{t-1})^2))$	-7.65×10^{10}	10.73
$(Y_{dt}/C_{nt-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.6341	26.65
$(Y_{dt}/I_{t-1})/d(d((Y_{dt} - I_{t-1})^2))$	0.0322	5.242
$(Y_{dt}/d(Y_{dt}))/d(d((Y_{dt} - I_{t-1})^2))$	0.0002	1.290
$R^2 = 1.00, DW = 1.78,\ F = 2.93 \times 10^7,\ H_T = 0.01,$		
$Included\ Observations = 46, Sample\ Period: 1973 - 2018$		

United States of America: Table 4.6

B5. Fifth Set of Regression Results MPC in Modified Keynesian Consumption Function

Dependent Variable: $(C_{nt}/I_{t-1})/d(d((C_{nt})^2))$		
Variable	Coefficient	T–Statistic
$(1/I_{t-1})/d(d((C_{nt})^2))$	7.82×10^{11}	0.824
$(Y_{dt}/I_{t-1})/d(d((C_{nt})^2))$	0.060	97.12
$(Y_{dt-1}/I_{t-1})/d(d((C_{nt})^2))$	0.684	8.922
$(d(Y_{dt})/I_{t-1})/d(d((C_{nt})^2))$	0.218	3.729
$R^2 = 1.00, DW = 2.07, F = 3.17 \times 10^6, H_T = 0.04,$		
$Included\ Observations = 57, Sample\ Period: 1962 - 2018$		

India: Table 5.1

Dependent Variable: $(C_{nt}/d(C_{nt}))/d(d((C_{nt-1} - I_{t-1})^2))$		
Variable	Coefficient	T–Statistic
$(1/d(C_{nt}))/d(d((C_{nt-1} - I_{t-1})^2))$	4.33×10^{9}	1.819
$(Y_{dt}/d(C_{nt}))/d(d((C_{nt-1} - I_{t-1})^2))$	0.647	8.681
$(Y_{dt-1}/d(C_{nt}))/d(d((C_{nt-1} - I_{t-1})^2))$	0.206	2.832
$(d(Y_{dt})/d(C_{nt}))/d(d((C_{nt-1} - I_{t-1})^2))$	-0.020	-0.150
$R^2 = 1.00, DW = 1.75, F = 686 \times 10^8, H_T = 0.16$		
$Included\ Observations = 56, Sample\ Period: 1963 - 2018$		

Kenya: Table 5.2

Dependent Variable: $(C_{nt})/d(d((C_{nt-1})^2))$		
Variable	Coefficient	T–Statistic
$(1)/d(d((C_{nt-1})^2))$	-1.33×10^{10}	-2.510
$(Y_{dt})/d(d((C_{nt-1})^2))$	0.030	1.163
$(Y_{dt-1})/d(d((C_{nt-1})^2))$	0.648	16.50
$(d(Y_{dt}))/d(d((C_{nt-1})^2))$	-0.223	-2.890

$R^2 = 0.997, DW = 1.73, F = 6774, H_T = 0.46,$
$Included\ Observations = 48, Sample\ Period: 1972 - 2019$

Saudi Arabia: Table 5.3

Dependent Variable: $(C_{nt}/I_{t-1})/d(d((C_{nt})^2))$		
Variable	Coefficient	T–Statistic
$(1/I_{t-1})/d(d((C_{nt})^2))$	7.99×10^{10}	-4.226
$(Y_{dt}/I_{t-1})/d(d((C_{nt})^2))$	0.667	5.933
$(Y_{dt-1}/I_{t-1})/d(d((C_{nt})^2))$	0.189	1.522
$(d(Y_{dt-1})/I_{t-1})/d(d((C_{nt})^2))$	0.708	-5.357
$R^2 = 1.00, DW = 1.98, F = 2.85 \times 10^5, H_T = 0.31,$		
$Included\ Observations = 48, Sample\ Period: 1972 - 2019$		

South Africa: Table 5.4

Dependent Variable: $(C_{nt}/I_{t-1})/d(d((C_{nt})^2))$		
Variable	Coefficient	T–Statistic
$(1/I_{t-1})/d(d((C_{nt})^2))$	4.27×10^9	1.274
$(Y_{dt}/I_{t-1})/d(d((C_{nt})^2))$	0.152	2.092
$(Y_{dt-1}/I_{t-1})/d(d((C_{nt})^2))$	0.644	9.138
$(d(Y_{dt})/I_{t-1})/d(d((C_{nt})^2))$	0.422	3.460
$R^2 = 1.00, DW = 1.98, F = 1.38 \times 10^6, H_T = 0.21,$		
$Included\ Observations = 48, Sample\ Period: 1972 - 2019$		

United Kingdom: Table 5.5

Dependent Variable: $(C_{nt}/d(C_{nt}))/d(d((C_{nt})^2))$		
Variable	Coefficient	T–Statistic
$(1/d(C_{nt}))/d(d((C_{nt})^2))$	2.34×10^{11}	14.68
$(Y_{dt}/d(C_{nt}))/d(d((C_{nt})^2))$	0.658	11.34
$(Y_{dt-1}/d(C_{nt}))/d(d((C_{nt})^2))$	0.097	1.670
$(d(Y_{dt-1})/d(C_{nt}))/d(d((C_{nt})^2))$	-0.226	-2.013
$R^2 = 1.00, DW = 1.97, F = 4.13 \times 10^6, H_T = 0.10,$		
$Included\ Observations = 47, Sample\ Period: 1972 - 2018$		

United States of America: Table 5.6

B6. Regression Results for the Keynesian Saving Motives MPC

Dependent Variable: $((C_{nt-1} - S_{t-1})/d(C_{nt-1}))/d(d((Y_{dt})^2))$		
Variable	Coefficient	T–Statistic
$(Y_{dt}/d(C_{nt-1}))/d(d((Y_{dt})^2))$	0.658	13467
$R^2 = 1.00, DW = 2.06,\ H_T = 0.01,$		
$Included\ Observations = 57, Sample\ Period: 1962 - 2018$		

India: Table 6.1

Dependent Variable: $((C_{nt-1} - S_{t-1})/d(Y_{dt} - S_{t-1}))/d(d((C_{nt-1})^2))$		
Variable	Coefficient	T–Statistic
$(Y_{dt}/d(Y_{dt} - S_{t-1}))/d(d((C_{nt-1})^2))$	0.657	44.00
$R^2 = 0.97, DW = 2.21,\ H_T = 0.00,$		
$Included\ Observations = 56, Sample\ Period: 1963 - 2018$		

Kenya: Table 6.2

Dependent Variable: $((C_{nt-1} - S_{t-1})/d(d(C_{nt-1})))/d(d((Y_{dt}))$		
Variable	Coefficient	T–Statistic
$((C_{nt-1} - S_{t-1})/d(d(C_{nt-1})))/d(d((Y_{dt}))$	0.489	41.42
$R^2 = 0.97, DW = 2.10,\ H_T = 0.01,$		
$Included\ Observations = 47, Sample\ Period: 1973 - 2019$		

Saudi Arabia: Table 6.3

Dependent Variable: $((C_{nt-1} - S_{t-1})/d(d(C_{nt-1})))/d(d((Y_{dt}))$

Variable	Coefficient	T–Statistic
$((C_{nt-1} - S_{t-1})/d(d(C_{nt-1})))/d(d((Y_{dt}))$	0.621	117.4
$R^2 = 0.997, DW = 1.87,\ H_T = 0.97,$		
$Included\ Observations = 47, Sample\ Period: 1973 - 2019$		

South Africa: Table 6.4

Dependent Variable: $(C_{nt-1} - S_{t-1})/d(d((Y_{dt})^2))$		
Variable	Coefficient	T–Statistic
$(Y_{dt})/d(d((Y_{dt})^2))$	0.574	326.3
$R^2 = 0.9985, DW = 2.17,\ H_T = 0.15,$		
$Included\ Observations = 48, Sample\ Period: 1972 - 2019$		

United Kingdom: Table 6.5

Dependent Variable: $(C_{nt-1} - S_{t-1})/d(d((C_{nt-1})^2))$		
Variable	Coefficient	T–Statistic
$(Y_{dt})/d(d((C_{nt-1})^2))$	0.672	470.3
$R^2 = 0.9998, DW = 1.83,\ H_T = 0.30,$		
$Included\ Observations = 46, Sample\ Period: 1973 - 2018$		

United States: Table 6.6

APPENDIX C Descriptive Statistic

C1. Descriptive Statistic for India During the 1960 to 2018 Period

Statistic	C_n	Y_d	APC	MPC_L	MPC_S
Mean	2.38E+13	3.55E+13	0.736701	0.707724	0.429945
Median	1.65E+13	2.17E+13	0.763734	0.602309	0.430484
Maximum	8.02E+13	1.29E+14	0.845885	4.731429	0.431845
Minimum	6.13E+12	7.24E+12	0.578717	-1.55389	0.426877
Std. Dev.	1.92E+13	3.26E+13	0.080411	0.775005	0.001471
Skewness	1.305574	1.316326	-0.689349	2.445462	-0.780972
Kurtosis	3.813362	3.626416	2.029309	15.79352	2.165285
Jarque-Bera	18.07583	17.69785	6.870709	453.3554	7.579678
Probability	0.000119	0.000144	0.032214	0	0.022599
Observations	58	58	58	58	58

C2. Descriptive Statistic for Kenya During the 1960 to 2018 Period

Statistic	C_n	Y_d	APC	MPC_L	MPC_S
Mean	1.34E+12	1.61E+12	0.834415	0.287592	0.431460
Median	1.17E+12	1.31E+12	0.846648	0.735039	0.431637
Maximum	3.74E+12	4.68E+12	0.902407	4.52234	0.432702
Minimum	3.15E+11	3.67E+11	0.699203	-20.58493	0.428547
Std. Dev.	8.92E+11	1.12E+12	0.042488	3.18599	0.000812
Skewness	0.994706	1.122763	-0.632422	-5.237551	-0.931409
Kurtosis	3.163928	3.364888	2.965058	33.96082	4.093119
Jarque-Bera	9.629537	12.50753	3.869202	2581.726	11.27375
Probability	0.008109	0.001923	0.144482	0	0.003564
Observations	58	58	58	58	58

C3. Descriptive Statistic for Saudi Arabia During the 1970 to 2019 Period

Statistic	C_n	Y_d	APC	MPC_L	MPC_S
Mean	4.43E+11	7.59E+11	0.590401	0.360403	0.42564
Median	3.57E+11	5.36E+11	0.591088	0.396482	0.42576
Maximum	1.10E+12	1.85E+12	0.747723	5.390872	0.42959
Minimum	7.76E+10	1.48E+11	0.339225	-2.74042	0.41643
Std. Dev.	2.88E+11	5.22E+11	0.093402	1.070216	0.00282
Skewness	0.88902	0.97642	-0.46536	1.318817	-1.2513
Kurtosis	2.724762	2.485712	3.246577	12.94813	5.2694
Jarque-Bera	6.609243	8.326071	1.892733	216.2581	23.3019
Probability	0.036713	0.01556	0.388149	0	9E-06
Observations	49	49	49	49	49

C4. Descriptive Statistic for South Africa During the 1970 to 2019 Period

Statistic	C_n	Y_d	APC	MPC_L	MPC_S
Mean	1.43E+12	1.88E+12	0.757067	0.683185	0.429989
Median	1.24E+12	1.59E+12	0.75561	0.611553	0.430077
Maximum	2.56E+12	3.32E+12	0.820477	4.163193	0.431225
Minimum	6.12E+11	8.79E+11	0.67541	-3.39029	0.428199
Std. Dev.	6.14E+11	8.11E+11	0.036644	1.043738	0.000779
Skewness	0.519526	0.619061	-0.39556	-0.27238	-0.66126
Kurtosis	1.88157	1.879313	2.600574	8.956786	2.818264
Jarque-Bera	4.758131	5.69397	1.603515	73.05095	3.638374
Probability	0.092637	0.058019	0.44854	0	0.162158
Observations	49	49	49	49	49

C5. Descriptive Statistic for the United Kingdom During the 1970 to 2019 Period

Statistic	C_n	Y_d	APC	MPC_L	MPC_S
Mean	8.21E+11	1.03E+12	0.79625	0.382489	0.43071
Median	7.62E+11	9.63E+11	0.79384	0.644367	0.43070
Maximum	1.33E+12	1.68E+12	0.83083	1.240905	0.43133
Minimum	4.04E+11	5.17E+11	0.77106	-8.67317	0.43013
Std. Dev.	3.02E+11	3.80E+11	0.01182	1.393001	0.00024
Skewness	0.166064	0.166962	0.69875	-5.80915	0.29682
Kurtosis	1.570119	1.570807	3.47376	38.05753	3.32613
Jarque-Bera	4.399525	4.397948	4.44564	2784.864	0.93667
Probability	0.110829	0.110917	0.1083	0	0.62605
Observations	49	49	49	49	49

C6. Descriptive Statistic for the United States During the 1970 to 2018 Period

Statistic	C_n	Y_d	APC	MPC_L	MPC_S
Mean	7.08E+12	9.21E+12	0.77235	0.589282	0.43053

Median	6.52E+12	8.41E+12	0.77222	0.67381	0.43050
Maximum	1.24E+13	1.63E+13	0.80787	2.161635	0.43111
Minimum	3.07E+12	3.91E+12	0.74682	-1.92083	0.43008
Std. Dev.	2.86E+12	3.80E+12	0.01402	0.553668	0.00024
Skewness	0.244114	0.233373	0.2357	-1.98519	0.28677
Kurtosis	1.679941	1.66476	2.57293	12.24308	2.82402
Jarque-Bera	3.961846	4.001434	0.80922	202.3969	0.71985
Probability	0.137942	0.135238	0.66724	0	0.69773
Observations	48	48	48	48	48

In the six tables above, the sets of statistics are on the household consumption function (C_n), household disposable income (Y_d), average propensity to consume APC, marginal propensity to consume in the long-run MPC_L, and marginal propensity to consume in the short-run MPC_S.

REFERENCES

Ahmed, M., Baloch, A., Khan, K., & Memon, M. H. (2015). The Estimation of Aggregate Consumption Function for High Income Countries. *International Journal of Engineering Technology Sciences*, *5*(2), 85–100.

Al Gahtani, G., Bollino, C. A., Bigerna, S., & Pierru, A. (2019). *Estimating the Household Consumption Function in Saudi Arabia*. https://doi.org/10.30573/KS--2019-DP50

Altunç, Ö. F., & Aydın, C. (2014). An estimation of the consumption function under the permanent income hypothesis: The case of countries. *Journal of Economic Cooperation and Development*, *35*(3), 29–42.

Ando, A., Modigliani, F. (1963). The Life Cycle Hypothesis of Saving: Aggregate Implication and Tests. *American Economic Review*, *53*(1), 55–84.

Avazalipour, M. S. (2011). *A Comparative Study on Consumption Function in India and Iran*. *6*(11), 545–556.

Bilgili, F., & Baglitas, H. H. (2015). Testing Permanent Income and Random Walk Hypothesis for Turkey for the Period 1998:1–2012:1. *The Second International Conference in Economics (EconWorld2-15)*.

Boeree, C. G. (1998). *B.F. Skinner*. http://webspace.ship.edu/Cgboer/Skinner

Boeree, C. G. (2006). *Personality Theories: Hans Eysenck and Others*. http://www.ship.edu/~cgboeree/perscontents.html

Bolton, S. C., & Houlihan, M. (2007). *Sharon Bolton and Maeve Houlihan ; (2007) ' ' Beginning the Search for the H ' ' In : Sharon Bolton and Maeve Houlihan (eds). Searching for the Human in Human Resource Management : Theor ... November 2015*.

Corlu, M. S. (2009). Robust Statistic: What they are and Why They are so Important. *South West Educational Research Association 32nd Annual Conference*, 4–7.

Coskum, Y., Atasoy, B.S., Morri, G., Alp, E. (2018). Wealth Effects on Household Final, Stock and Housing Market Channels. *International Journal for Financial Studies*, *6*(57).

Drakopoulos, S. A. (2021). *Theories of Consumption* (No. 1082015).

Duesenberry, J. S. (1948). *Income Consumption Relations and Their Implications. In income, Employment and Public Policy: Essays in Honor of A.H. Hansen* (A. Lloyd (ed.)). W.W.

Norton and Metzler Company.

Duesenberry, J. S. (1949). *Income, Saving and Theory of Consumption Behavior*. Harvard University Press.

Fernandez–Corugedo, E. (2004). *Consumption Theory*. Central Bank of England.

Fisher, I. (1930). *The Theory of Interest*. Macmillan.

Foster, J. (2019). *The US Consumption Function: A New Perspective*. The University of Queensland, Brisbane.

Friedman, M. (1957). *A Theory of Consumption Function*. Princeton University Press.

Hadden, J. J. (1965). *A study of the consumption function in Canada*.

Hall, R. E. (1978). Stochastic Implications for of the Life Cycle–Permanent Income Hypothesis: Theory and Evidence. *Journal of Political Economy*, *86*, 971–987.

Hynes, A. H. (1998). The Emergence of the Neoclassical Consumption Function: the Formative Years, 1940–1952. *Journal of the History of Economic Thought*, *20*(1), 25–49.

Jouini, J. Ismail, M. (2020). Growth – Savings Nexus in the Arab Region: Empirical Evidence from Panel Data. *Arab Monetary Fund*, 1–37.

Keho, Y. (2019). *Dynamic relationship between government spending and private consumption : Evidence from Cote d ' Ivoire*. *9*(1), 197–202.

Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money*. Macmillan.

Keynes, J. M. (1961). *The General Theory of Employment, Interest and Money*. Macmillan.

Keynes, J. M. (1964). *The General Theory of Employment, Interest and Money*. Harcourt Brace Jovanovich.

Khan, K., Lunfang, D., Khan, I., & Khan, H. N. (2018). Testing the Empirical Validity of Permanent Income Hypothesis and Absolute Income Hypothesis for China. *The Empirical Economics*, *17*(4), 453–460. https://www.researchgate.net/publication/325392147

Klein, L.R. Goldberger, A. S. (1955). *An Econometric Model of the United States, 1929–1952*.

Kuznets, S. (1946). *National Product Since 1869 (assisted by L. Epstein and E. Zenks)*. National Bureau of Economic Research.

Kyrk, H. A. (1923). *Theory of Consumption*. Houghton Mifflin Company.

Landsen, J. (2016). *An Investigation of the Norwegian Consumption Function: Income Distribution and Wealth Effects*. Statistics Norway.

Liu, Y. (2012). *A Critique of the Neoclassical and a Revision of the Keynesian Theories of Employment. Electronic Theses and Dissertations. 373* [University of Denver]. https://digitalcommons.du.edu/etd/373

Matlanyane, R. A. (2005). *A Macroeconometric Model for the Economy of Lesotho: Policy Analysis and Implications*. University of Pretoria, South Africa.

Modigliani, F., Brumberg, R. H. (1954). *Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data., Post-Keynesian Economics* (K. K. Kurihara (ed.)). Rutgers University Press.

Modigliani, F. (1947). Fluctuations in the Saving Ratio: A Problem in Economic Forecasting.

The Johns Hopkins University Press, *14*(4), 413–420.

Muellbauer, J., & Lattimore, R. (1995). The consumption function: A theoretical and empirical overview. In M. H. Pesaran & M. R. Wickens (Eds.), *Hand- book of Applied Econometrics* (1st ed., pp. 221–311). Blackwell.

Pölder, R. (2017). *An Investigation of the Swedish Consumption Function: An Error-Correction Approach*.

Sekantsi, L. P. (2016). Determinants of Private Consumption Expenditure in Lesotho. *Journal of Corporate Governance. Insurance and Risk Management (JCGIRM)*, *3*(2), 58–75.

Singh, B. (2004). *Modelling Real Private Consumption Expenditure - an Empirical Study on Fiji* (2004/05).

Smart, W. (1916). *Second Thought of an Economist*. Macmillan.

Varian, H. R. (2014). *Intermediate Microeconomics: A Modern Approach: Ninth International Student Edition*. W.W. Norton & Company. https://books.google.com/books?hl=de&lr=&id=A0feCgAAQBAJ&oi=fnd&pg=PR9&dq=intermediate+microeconomics+varian+ninth+edition+international+student+edition&ots=hnFCFMuJgb&sig=DNgL3elEVVAUVJUdkEFWq9s8weA%0Ahttps://www.worldcat.org/oclc/879663971%0Aciteulike-art

Yao, R., Wang, F., Weagly, R.O., Liao, L. (2011). Household Saving Motives: Comparing American and Chinese Family Consumers. *Family and Consumer Science Research Journal*, *40*(1), 28–44.