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Empirical Analysis of Rational Expectation and Permanent Income Hypothesis in Lagos State, Nigeria

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Abstract: This study empirically analyses the rational expectation and permanent income hypothesis (PIH) in Lagos State, Nigeria using the ordinary least square method to estimate the long-run relationship and parsimonious error correction model to estimate short-run impacts. Our findings show that permanent income influences permanent monthly consumption in the short and long run but permanent monthly income does not impact temporary monthly consumption both in the short and long run. Financial regulation may be necessary to prevent a significant fall in the value of the portfolio of asset holdings by Lagos residents.

Keywords: Rational Expectation, Consumption, Permanent Income Hypothesis, Parsimonious Error Correction, Lagos State, Lagos Consumption Pattern, Lagos Resident

1. Introduction

Consumption is the act of using goods and services to satisfy man's innumerable needs according to Dernburg (1985). This encompasses the importance of consumption in welfare. The aggregate consumption expenditure level which includes expenditure on durable and non-durable goods is the largest component of Nigeria's GDP. Any shock to it might likely cause a fall in aggregate demand which may translate to recession. The Nigerian economy has been faced with the problem of the fall in aggregate consumption since the second quarter of 2016 until the time of this writing (2020). Depressed consumption not only prolonged Nigeria's recession but also denied the Lagos State Government with tax revenues earmarked for the state economic development projects.

There have been a plethora of works of literature on the determinants of consumption. John Maynard Keynes (1936) postulated a theory of consumption known as "Absolute Income Hypothesis" which states that current consumption depends on current income. James Duessenberry (1985) furthered Keynes's postulations by adding that the consumption of an individual depends on the consumption of the relatives. These two theories are regarded as a traditional theory of consumption that relates consumption with the current level of income. However, there was a revolution in the study of consumption with the development of the Life-Cycle Income Hypothesis by Ando and Modigliani (1963) and Permanent Income Hypothesis (PIH) by Milton Friedman in the 1950s; both theories were hinged on the Fisher (1930) Inter-temporal Consumption Theory (Mankiw, 2011).

The PIH focuses on the behavior of a household with an infinite time horizon. According to this theory, consumers plan their expenditures on the basis of their lifetime income expectations rather than received income period by period. Empirically test of the PIH relied on aggregate data (Hall, 1978; Flavin, 1981; Mankiw & Shapiro, 1985; West, 1988; Campbell & Deaton, 1989; Campbell & Mankiw, 1990; Gali, 1991). However, the models do not seem to fit the data very well and the PIH restrictions are mostly rejected.

Alternatively, Zeldes (1989), Runkle (1991), Attanasio and Weber (1993), and DeJuan and Seater (1999) used microdata to test the PIH by directly testing whether the first-order condition (Euler equation) of inter-temporal choice of consumption is continuously satisfied. Generally, empirical results of this type of model provide evidence in favor of the PIH. One of the reasons for the contrasting evidence is related to problems of aggregation bias. Additionally, insufficient allowance made for the dependence of consumption on individual characteristics, which causes a violation of the results of the empirical analyses on aggregate data (Attanasio & Weber, 1993; Attanasio & Browning, 1995; De-Juan & Seater, 1999).

Muth (1961) describes rational expectation (RE) as many economic situations in which the outcome depends partly on what people expect to happen. The theory of rational expectations is a collection of assumptions regarding how economic agents exploit available information to form their expectations. The implication of applying rational expectation to the PIH is that an income

innovation causes the same revision in consumption as in the hypothesis; that is, a change in consumption should be exactly equal to the amount of the change in permanent income warranted by news about future income and portfolio of assets (De-Juan & Seater, 1997). A forecast of a fall in income leads consumers to reduce their rate of consumption in the present. Thus, when income does actually fall, consumption will have already been adjusted downward. The same thing applies to the period when consumers forecast there might likely be a rise in the income level.

Permanent income is decomposed into assets of household and labor income. In the context of rational expectation and PIH, a lack of forward-looking behavior of future income causes consumption to fall. This situation was reflected in Nigeria's GDP when the economy experienced a recession in 2016. Many Nigerians' expectations about economic activities were on the positive side as the newly elected government promised the private businesses economic prosperity. However, the economic shock of Nigeria was witnessed from the second quarter of 2016 due to shock in the global oil price which fell from \$112 to about \$50 which dwindled the National Income of the country unexpectedly and left aggregate consumption to fall astronomically with rising in the price level to 17.1 percent in July 2016 (NBS, 2016).

Various authors have empirically investigated PIH. Gupta and Ziramba (2009), Paz (2006), and Khan and Mohammed (2011) rejected the hypothesis of permanent income in the United States, Brazil, and Pakistan respectively. However, the study of Manitsaris (2006), and Altunc and Aydin (2014) on fifteen European Union Member States and Organization of Islamic Cooperation respectively show evidence supporting PIH and adaptive expectation, stating that consumption in those countries depends on permanent income. Osei-Fosu *et al.* (2014) arrived at a similar conclusion in Ghana. The results confirmed that Ghanaians based their consumption habit on permanent income rather than transitory income.

More so, Nwala (2010) used the sample of six African Countries Cameroun, Ghana, Kenya, Nigeria, Senegal, and South Africa to examine the relationship between consumption and permanent income. The results reveal consumption depends on permanent income for five countries only. In contrast, the study of Wang (2011) in ten Asian countries reveals that current income influences consumption which is in opposition to PIH theory while Dejuan and Seater (1999) observed that the response of consumption to income innovation is found to be weaker for eleven West German States against the prediction of PIH.

In Nigeria also, researchers have put effort and resources into the investigation of the relationship between permanent income and consumption. Some of these studies are Alimi (2015) who applied PIH to consumption in Nigeria and South Africa with the use of Cagan's Adaptive Expectation to check for habits of consumers in both countries. Ayeni and Akeju (2017) examined the dynamic relationship between consumption and income for Nigeria using Habit Persistence and Permanent Income Hypotheses. For Nigeria, the findings of Alimi (2015) contradict Ayeni and Akeju (2017). Alimi (2015) reveals that consumers are forward-looking and base their consumption on permanent income while the results of Ayeni and Akeju (2017) show that consumption in Nigeria depends on current income than permanent income. That is, individuals base their consumption habits on their current income.

The motivation of the present study rest on the application of rational expectations on PIH as the Nigerian studies above failed to examine the influence of rational expectations on PIH. Further, there is a paucity of literature that empirically examines whether the consumption of Lagos residents depends on permanent or transitory income. Lagos State is popularly known to be the commercial hub of Nigeria. The city of Lagos alone is responsible for around 30% of Nigeria's GDP. If Lagos were a country, its economy—worth \$136-billion in 2018 would place it the seventh-largest in Africa, ahead of Cote D'Ivoire and Kenya (Lawal, 2019). Consequently, a fall in aggregate consumption in the state could translate to a fall in aggregate consumption in Nigeria. In the presence of rational expectation, a fall in the permanent income in the state could affect consumption significantly and the country at large. Thus, the empirical application of rational expectation to PIH in Lagos state has been poorly explored.

This gap in the literature is what this study seeks to empirically bridged. It is believed that an empirical inquisition of this nature will not only contribute to enriching this strand of literature but also be of immense importance in explaining policy implication, the effectiveness of transitory income transfers, assets accumulation and cost of borrowing, and the welfare of Lagos residents. Besides, the influence of the financial sector on aggregate output via the portfolio of assets of households in the presence of rational expectation will be explored.

In summary, this study attempts to show how the financial sector can influence the macroeconomy via the portfolio of assets when the consumers are rational in their expectations in Lagos State, investigate whether transitory income influences consumption significantly in the absence of rational expectation, and examine whether permanent income influences consumption significantly.

The rest of the paper is divided into four sections. Section 2 presents a succinct review of the literature. Section 3 presents the theoretical framework and methodology which includes research design, the population of the study, sampling process, estimation techniques, and method and measurement of data collected. Section 4 focuses on the descriptive and inferential analysis of the data collected, presentation, and discussions of results. Section 5 is the last and it centers on the conclusion and policy implication of findings.

2. Review of Previous Studies

The review of related literature points out two basic facts. One, aside Alimi (2015), and Ayeni and Akeju (2017) very few studies have empirically examined PIH on consumption patterns in Nigeria. However, quite a number of studies have examined the impact of income on consumption patterns. Some of the studies include Akekere (2012) who conducted a research on the impact of change in income on Private Consumption Expenditure in Nigeria from 1981 to 2010 with the use of Ordinary Least Square Regression techniques. Though evidence shows that income impacts private consumption positively, the use of the Ordinary Least Square Regression is not statistically sufficient or robust. Santos (2013) used a similar regression technique to test the Keynesian absolute income hypothesis in Nigeria from 1970 to 2011. Results revealed that the average propensity to consume, APC decreased with an increase in income, the marginal propensity to consume, and MPC was not stable. Tapsin (2014) estimated Nigeria's APC and MPC for the period 1980~2004 and found conformity with the Keynesian proposition for both parameters. However, this relied on a co-integration regression estimate with a dataset of only 25 years span which is not generally accepted under asymptotic analysis.

The search to find the most appropriate technique of analysis has led to the application of different techniques by different authors on the study of PIH. Osei-Fosu *et al.* (2014) used fully Modified Ordinary Least Square, Gupta and Ziramba (2009) used the Bayesian VAR technique, and Wang (2011) and Tapsin (2014) used Panel Least Square for ten Asian countries. Alimi (2015) applied Cagan's Adaptive Expectation on consumption habit, Ayeni and Akeju (2017) used Habit Persistence and Permanent Income Hypotheses.

The present study is different from what has been employed in previous studies to some degree. We followed Fosu *et al.* (2014) to employ an Ordinary Least Square (OLS) method to estimate the long-run relationship, Parsimonious Error Correction Model to estimate the short-run relationship. The adoption of the OLS method was due to the primary nature of the collected data. The short and long run estimations were also adopted in order to ascertain periodical effects or relationships between the variables in focus.

3. Methodology and Data

3.1. Analytical Framework

The theoretical basis of PIH is based on Milton Friedman's proposition and it states that consumption and income are divided into transitory and permanent,

$$C = C_T + C_P. \quad (1)$$

C_T, C_P are Transitory and Permanent Consumption, respectively

$$Y = Y_T + Y_P, \quad (2)$$

where Y_T, Y_P are Transitory and Permanent Consumption, respectively

$$C = f(Y_T, Y_P). \quad (3)$$

However, permanent income and consumption are regarded as average income and consumption while transitory income and consumption are regarded as the deviation from the average (Mankiw, 2002). Thus, the sum of the deviation will approximate zero. Therefore,

$$C = \delta Y_p. \quad (4)$$

Consumption is a function of permanent income the δ measures the marginal propensity to consume from permanent income. In this study, we divide permanent income into two parts: household assets and labor's earned income.

3.1.1. Application of Rational Expectation (RE) to Permanent Income Hypothesis (PIH)

Here, we start by stating the budget constraint of the household. We state the stock of assets in the possession of the household. Given that A_t is a household asset, Y_t is the labor income and C_t is the household consumption, then we have the following identity

$$A_{t+1} \equiv (1 + r_{t+1})(A_t + Y_t - C_t) \quad (5)$$

where r_{t+1} is the return on household assets at time $t + 1$ that is rewritten as:

$$A_t = C_t - Y_t + \frac{A_{t+1}}{1+r_{t+1}}. \quad (6)$$

In this case we assume that household's decisions are based on rational expectations, E_t . The expected return on asset is assumed to be constant r , thus the equation (6) is transformed to:

$$A_t = C_t - Y_t + \frac{1}{1+r} E_t A_{t+1}. \quad (7)$$

Applying repeated substitution method, we have

$$A_t = \sum_{k=0}^{\infty} \frac{E_t(C_{t+k} - Y_{t+k})}{(1+r)^k}. \quad (8)$$

Transversality condition makes the term $\frac{E_t(A_{t+k})}{(1+r)^k}$ go to zero as k gets large. Thus, we re-write the equation (8) as:

$$\sum_{k=0}^{\infty} \frac{E_t(C_{t+k})}{(1+r)^k} = A_t + \sum_{k=0}^{\infty} \frac{E_t(Y_{t+k})}{(1+r)^k} \quad (9)$$

Equation (9) is the inter-temporal budget constraint. It is read as the present value sum of current and future household consumption must equal the current stock of financial assets plus the present value sum of current and future labor income. It gives room for the derivation of consumption function by hypothesizing the relationship between expected future consumption values, $E_t(C_{t+k})$ and current consumption. We do this by optimizing the behavior of consumers.

3.1.2. Consumer Behaviour Optimization

In this study, the optimization welfare function W is given as

$$W = \sum_{k=0}^{\infty} \left(\frac{1}{1+\beta}\right)^k U(C_{t+k}), \quad (10)$$

where W is welfare function, $U(C_t)$ is the instantaneous utility obtained at time t , and β is a positive number that describes that households prefer a unit of consumption today to a unit tomorrow. Thus, we impose the intertemporal budget constraint we derived in equation (9) on the utility function of equation (10). Thus the utility function becomes our objective function and equation (9) becomes our constraint function then we form Lagrangian function L of the form below.

$$L = \sum_{k=0}^{\infty} \left(\frac{1}{1+\beta}\right)^k U(C_{t+k}) + \gamma [A_t + \sum_{k=0}^{\infty} \frac{E_t(Y_{t+k})}{(1+r)^k} - \sum_{k=0}^{\infty} \frac{E_t(C_{t+k})}{(1+r)^k}] \quad (11)$$

The current and future level of consumption C_{t+k} yields a first-order condition of the form, where is the utility derived from consuming an extra unit of the permanent income.

$$\left(\frac{1}{1+\beta}\right)^k U'(C_{t+k}) = \frac{\gamma}{(1+r)^k} \quad (12)$$

If $k = 0$, then we have

$$U'(C_t) = \gamma. \quad (13)$$

If $k = 1$, we have

$$U'(C_{t+1}) = \left(\frac{1+\beta}{1+r}\right)\gamma. \quad (14)$$

Combining equations (13) and (14) we get the following¹.

$$U'(C_t) = \left(\frac{1+r}{1+\beta}\right) U'(C_{t+1}). \quad (15)$$

¹ In this case equation (13) and (14) can be interpreted as the present utility function and the future discounted utility function respectively.

Equation (15) above shows the relationship between consumption today and consumption tomorrow. However, if we allow for uncertainty in the income of the households (labor income), the optimality condition becomes as specified in equation (16).

$$U'(C_t) = E_t\left[\frac{1+r}{1+\beta}\right] U'(C_{t+1}) \quad (16)$$

Equation (16) converges to the well postulated Euler's equation².

$$a + 2bC_t = E_t[a + 2bC_{t+1}] \quad (17)$$

Equation (17) is simplified to be:

$$C_t = E_t C_{t+1}. \quad (18)$$

Equation (18) implies that the expected value of all future consumption equals the present value of consumption this is because

$$C_t = E_t C_{t+k} \quad k = 1,2,3, \quad (19)$$

Equation (19) above is commonly known as the "Random Walk Theory of Consumption."

To apply RE to PIH we need to substitute $C_t = E_t C_{t+k}$ into intertemporal budget constraint (9) to obtain

$$\sum_{k=0}^{\infty} \frac{E_t(C_t)}{(1+r)^k} = A_t + \sum_{k=0}^{\infty} \frac{E_t(Y_{t+k})}{(1+r)^k} \quad (20)$$

To turn equation (20) to a more intuitive formulation we apply the geometric sum which is given as

$$\sum_{k=0}^{\infty} \frac{1}{(1+r)^k} = \frac{1}{1-\frac{1}{1+r}} = \frac{1+r}{r}. \quad (21)$$

Thus, our RE-PIH model is given as

$$C_t = \frac{r}{1+r} A_t + \frac{r}{1+r} \sum_{k=0}^{\infty} \frac{E_t(Y_{t+k})}{(1+r)^k}. \quad (22)$$

3.2. Model Specification

Our empirical model followed from the conceptual model in (22) with a focus on rational expectation and permanent income hypothesis, the following linear models were stated to estimate RE-PIH Model

$$\ln C_i = \beta_0 + \beta_1 \ln r_i + \beta_2 \ln A_i + \beta_3 \ln Y_i. \quad (23)$$

where $\beta_0, \beta_2, \beta_3 > 0$ while $\beta_1 < 0$.

In applied form, equation (23) becomes

$$\ln EMC_i = \beta_0 + \beta_1 \ln PINT_i + \beta_2 \ln NSH_i + \beta_3 \ln PPUS_i + \beta_4 \ln EPIM_i + \beta_5 \ln UPIM_i \quad (24)$$

$$\ln UMC_i = \beta_0 + \beta_1 \ln PINT_i + \beta_2 \ln NSH_i + \beta_3 \ln PPUS_i + \beta_4 \ln EPIM_i + \beta_5 \ln UPIM_i \quad (25)$$

where *EMC* is Expected Monthly Consumption

UMC is Unexpected Monthly Consumption

PINT is the Prevalent Interest Rate

NSH is the Number of Shares Holding

PPUS is the Price Per-Unit of Shares which represent the financial assets holding

EPIM is the Expected Income Earned per Month

² Earlier studies such as Hall (1978) have modified equation 16 above to depict a version Euler's equation of consumption. See Robert Hall 1978 theory of consumption for a detailed discussion.

UPIM is the Unexpected Income Earned per Month, and $\beta_0, \beta_2, \beta_3 > 0$ $\beta_4 > 0$ $\beta_5 > 0$ while $\beta_1 < 0$.

While expected monthly income represents the permanent income and estimated unexpected monthly income represents transitory income, the number of shareholdings, price per unit of share represent the number of assets holding. The choice of the number of shareholdings and price per unit of share to represents assets of individuals is due to the ease of estimating the rate of return on asset holding, availability of data, and what the survey respondents shared with the data collection team.

According to the PIH theory, unexpected policy changes in income affect future consumption. While unexpected income earned per month have dramatic changes in future consumption, the fluctuation or instability of prevalent interest rate in the Nigeria financial sector can also distort income and future consumption. Between 2017 and 2020, Nigeria witnessed several fluctuations in the interest rate on fixed deposits, treasury bills, and stocks. While during the Covid-19 pandemic locked-down and beyond, the return on fixed deposit went down from the usual 9~10% in Nigeria banks to below 3% in 2020, treasury bills rate for both 90-day and 180-day went down to below 0.6% (Nairametrics, 2020). These fluctuations in the returns on several assets held by investors who are Lagos residents affected their permanent consumption.

3.3. Sampling Technique and Population of the Study

The population of the study covers all residents in Lagos State Nigeria. The population selected was designed to obtain adequate and diverse views pertaining to rational expectation and PIH in the state. A random sampling technique is adopted for the study.

3.3.1. Sample Size Determination

The determination of the sample size is determined with the aid of the Taro Yemini framework. The equation proposed by Taro Yemini for calculating the sample size is given as $n = \frac{N}{1+N \cdot e^2}$, where n = sample size, N = Population, e = significant level which can be 1, 5 or 10 percent but significant level is 5 percent.

Data collected by the National Population Commission, reveal that Lagos State population stood at 9,013,534 in 2006, thus, requiring a sample size of 400 people for a 5 percent significance level. Accordingly, we randomly sampled 400 people using an online survey.

3.3.2. Validity and Reliability Test

The subject of validity is brought up with regards to the type of the test, the motivation behind the test, and the target population. We apply Cronbach's Alpha to a pilot survey to verify the validity and reliability of our survey instrument.

3.4. Estimation Technique

In order to develop strong, robust, and reliable models that capture the relationship specified in the model above, this research adopts the econometric techniques of Non-Monotonic modeling. In building these models, Ordinary Least Squares is used as the estimation technique. The data collection process of the study focused on middle-income and high-income earners in Lagos State. The reason for this selective sample method is as a result of the fact that the middle income and high-income earners are the ones that mostly engaged in investment in the stock of assets (i.e., they have a portfolio of assets at their possession with a rate of return) and moderately have higher purchasing power in Lagos State.

Engel-Granger single equation co-integration was used to check whether independent variables are co-moving together along with dependent variables in the long run. This is to justify the use of the Ordinary Least Square (OLS) method for long-run estimation and the Error Correction Model for short-run estimation.

More so, stationarity of economic variables is key for long-run predictions; non-stationarity indicates the data collected are not viable for long-run prediction; that is the presence of a unit root in the data collected. Testing for a unit root can be used to establish the order of integration.

Since test results of Engel-Granger (See Appendix) indicate that the data is highly integrated or co-moving in the long run, we tend to use the OLS method for our long run estimation and Error Correction Method for our short-run estimation.

One of the OLS assumptions is that the variance of the error term is constant for all observations. If this assumption does not hold, we tend to face the problem of heteroscedasticity (non-constant variance). This leads to unbiased but inefficient estimates of the coefficients, and biased estimates of the standard errors (and, thus, incorrect statistical tests and confidence intervals).

In order not to run into the problem we performed a heteroscedasticity diagnostic test (See Appendix) to check if the variance of the error term is constant. Our findings reveal that the variance is constant.

3.5. Sources and Measurement of Data

This study used data collected from a survey in 2017 among Lagos Residents via google forms. The questionnaire included closed-ended questions and a number of open-ended questions. Closed questions were used because they enable quick processing of responses and less ambiguity in responses, thereby making the data easy to analyze. It was also easy for respondents to fill the questionnaires in short periods. It is possible for respondents to have different views with regard to the same question, and these views could also differ from the predetermined response options given in the questionnaire. In order to limit the possibility of getting unreliable responses, open-ended questions were also included.

4. Results and Discussions

The research aims to empirically examine rational expectation and PIH in Lagos State. A total number of 208 questionnaires were sampled via an online survey (google form); though the estimated sampled questionnaires were 399, only a response rate of 52.1 percent was achieved, while some items respondents left blank. Section A of the analysis deals with the description of the variables in the questionnaire while section B deals with the econometric analysis and hypothesis testing. Table 1 shows the descriptive statistics for the model variables (n = 208).

Table 1. Description of variables used in the PIH (n = 208).

Variables	Definition	Mean	Standard Deviation
UMC	Unexpected Monthly Consumption	40,529.00	52,611.10
EPIM	Expected Income Earned Per Month	114,226.00	110,353.10
NSH	Number of Shares Holding	1,920.00	1,488.13
EMC	Expected Monthly Consumption	45,299.00	42,299.14
PINT	Prevalent Interest Rate	8.00	3.29
UPIM	Unexpected Income Earned Per Month	152,058.00	192,443.40
PPUS	Price Per Unit of Share	5.00	5.89

* values in current (2017) Nigerian naira

4.1. Long-Run Model Estimation

In Table 2, Model 1 shows a 10 percent increase in earned income monthly expected (EIPM) and increased expected consumption by 5.9 percent. The financial sector's impact on permanent consumption through price per unit of shares of the respondents was positive; a 10 percent increase in price per unit share (PPUS) is associated with an expected 4.2 percent increase in consumption. The remaining independent variables; the number of shares holding (NSH), the Prevalent Interest Rate (PINT), and Unexpected Income Earned Per Month (UPIM) had no statistically significant impact on expected monthly income, ECM in the long run. The insignificant impact of unexpected income per month, UPIM on permanent consumption, ECM conforms to PIH theory; unexpected income does not have an impact on permanent consumption.

Model 2 shows that NSH, PPUS, UPIM, and PINT all significantly impact unexpected consumption, as expected. Model 2 also corroborates the PIH since the expected permanent income earned EIPM does not have a significant impact on transitory consumption and transitory income, represented by UPIM has a significant impact on transitory consumption.

Table 2. Long-run estimation of Parsimonious Error Correction Model.

	Model 1	Model 2
	$LogEMC_i$	$LogUMC_i$
Constant	2.44**	7.84***
LOG(EPIM)	.59***	.10
LOG(NSH)	-.03	-.34***
LOG(PINT)	.09	.18**
LOG(PPUS)	.42***	.33***
LOG(UPIM)	.05	.25***
R-squared	.33	.21
Adjusted R-squared	.31	.19
F-statistic	19.97***	10.76***
D-W Statistic	1.57	1.78

* $p < .10$. ** $p < .05$. *** $p < .01$.

4.2. Short-Run Estimation: Parsimonious Error Correction Model

Table 3 presents the short-run estimation of equation (3) using the Parsimonious Error Correction Model method. The expected monthly consumption reveals that the degree of adjustment of the permanent monthly consumption to the equilibrium level in the event of a short-run disturbance is about 9 percent in a year. The degree of adjustment is statistically significant at the 5 percent and 10 percent levels.

Similarly, the short-run effect of permanent income earned per month and price per unit of share on expected monthly consumption are statistically significant at 5 percent level. However, the short-run effect of the number of shares per month, prevalent interest rate, and unexpected income per month was not significant. Table 3 short-run effects on expected monthly income, ECM mirror the long-run estimate in Table 3 and further confirm the PIH model for Lagos State.

The error correction results of the unexpected monthly consumption reveal that the degree of adjustment of the unexpected monthly consumption to the equilibrium level in the event of a short-run disturbance of unexpected consumption is about 13.3 percent in a year. Similarly, the short-run effects of permanent income earned per month, price per unit of share, and unexpected income per month on unexpected consumption are significant at the 5 percent level. However, the short-run effect of permanent monthly income and the prevalent interest rate was insignificant at the conventional level of significance. These short-run results are also consistent with the long-run effect summarized in Table 3 and therefore show additional evidence justifying the PIH model for Lagos State.

Table 3. Short-run estimation of Parsimonious Error Correction Model.

	Model 1	Model 2
	<i>LogEMC_i</i>	<i>LogUMC_i</i>
Constant	2.54**	7.97***
LOG(EPIM)	.59***	.08
LOG(NSH)	.00	-.30***
LOG(PINT)	.07	.16
LOG(PPUS)	.43***	.33***
LOG(UPIM)	.02	.22***
U(-1)	.09**	.13***
Adjusted R-squared	.33	.20
F-statistic	18.47	9.71
D-W Statistic	1.62	1.81

* $p < .10$. ** $p < .05$. *** $p < .01$.

5. Conclusions

Our findings show that permanent income influences permanent consumption in the short and long run but permanent income does not impact temporary consumption both in the short and long run. Also, transitory income or unexpected income does not impact permanent consumption both in the short and long run. This conforms to the postulates of PIH. Further, Lagos State resident formed their expectation rationally on permanent and unexpected consumption based on the future changes in the number of shares they hold and the price per unit of their shares. That is, the state residents change their permanent monthly consumption when they expect that price per unit of shares changes in the short and long run and their temporary/unexpected monthly consumption when they expect changes in the number of shares, they hold and price per unit of the shares in their portfolio both in the short and long run. Thus, the financial market impacts the assets of Lagos residents to a great degree.

Certain policies seem appropriate. The significant impact of permanent monthly income on permanent consumption suggests the government can influence the consumption spending of Lagos State residents by taxing their permanent income. Taxing their permanent income will generate more revenue for the state for infrastructural development. They should increase the tax level on the permanent income. However, the issue of tax is not included in the model and scope of the study. Further research on how government influences permanent income through taxation may be needed.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix

Table A1. Engel-Granger single equation co-integration diagnostic test.

Variables	tau-statistic	z-statistic
LOG(EMC)	-11.90***	-165.89***
LOG(EPIM)	-13.79***	-197.47***
LOG(NSH)	-8.18***	-101.58***
LOG(PINT)	-4.26	-41.18**
LOG(PPUS)	-14.47***	-208.63***
LOG(UPIM)	-3.99	-68.21***

Authors' calculation using Eviews and sample data

See Table 1 for variable definition.

* p < .10. ** p < .05. *** p < .01.

Table A2. Heteroskedasticity test.

Breusch-Pagan-Godfrey	
F-statistic	4.05***
Obs*R-squared	18.99***
Scaled explained SS	13.21**

Authors' calculation using Eviews and sample data

See Table 1 for variable definition.

* p < .10. ** p < .05. *** p < .01.

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