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Effect of Temporary Book-Tax Difference on Corporate Investment Expenditure in Nigeria

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ABSTRACT
This study investigated the effect of temporary book-tax difference on corporate investment expenditure in Nigeria. To achieve this, the study employed an *ex-post facto* research design. Data were sourced from the published audited annual financial statements and annual reports of the selected listed financial firms in Nigeria, covering the forty-nine (49) financial services firms in Nigeria as of that 31st December 2022. The study employed descriptive statistics and panel date regression techniques and other diagnostic tests in data analysis. Based on the analysis, the study reveals that, temporary book-tax difference (TBD), have significant predictors on corporate investment expenditure of listed financial firms in Nigeria. The results also affirmed that temporary book-tax difference (TBD) has a negative significant effect on corporate investment expenditure which implies that corporate investment expenditure decreases as these indicators increase and suggests that temporary book-tax difference must also be evaluated to minimize the gap. Therefore, financial firms in Nigeria must make frantic efforts to minimize the book tax difference through tax sheltering.
Keywords: Corporate investment, Expenditure, Temporary book-tax difference

1.0 INTRODUCTION

Corporate managers should strive to increase the value of the company for the benefit of its shareholders, according to previous research in management and business (Jensen & Meckling, 1976 in Nicholson & Kiel, 2004). The story has shifted considering new research on corporate governance and sustainability, two areas that have emerged as central to modern theories of corporate management. Businesses today are expected to generate long-term value for all stakeholders (Lanis & Richardson, 2012; Karami & Rekabdar, 2020). Managers of these companies should prioritise the interests of all stakeholders (Ingrid, 2017; Udochukwu et al., 2022). Corporate managers, according to this stakeholder approach, should treat their company's internal and external stakeholders fairly. Shareholders, workers, and executives are examples of internal stakeholders, whereas the government, suppliers, and host communities are examples of external stakeholders. This indicates that for-profit businesses no longer have wealth building or profit maximisation as their primary goal.

Temporary book-tax difference (TBD) is the component of book-tax difference (BTD) that occurs in connection to the timing of accumulated income and cost items (Sulistyowati & Hendrawati, 2018). It derives from specific discretionary accruals implemented by corporations and reflects the difference between accrual-based and cash-based recognition in accounting which is modifiable in the next year. According to Adegbite and Shittu (2017), business investment is a key engine of economic growth in many economies and taxation has a large effect on a firm's investment decisions. However, the amount to which corporation taxation influences company investment is primarily an unsettled subject in economics (Moon, 2019). Therefore, this study is an attempt to answer this question by presenting empirical evidence from a Nigeria financial services organisation.

2.0 Review of Related Literature

According to Moon (2019), one of the most pressing economic concerns is the extent to which corporate taxes affect company investment. According to Adegbite and Shittu (2017), the sensitivity of corporate taxation to business investment varies depending on a country's tax laws, tax policies, and tax incentives, which is especially true in Nigeria, where taxation is being adjusted (Osegbue et al., 2021). Specifically, how tax-aggressive behaviours affect corporate investment behaviour is an important topic (Federicil & Parisi, 2015).

For the purposes of this study, corporate investment expenditure was divided into three categories as follows:

i. Total Corporate Investment Expenditure (TCIE) as was used in Richardson (2006); Armstrong *et al*., (2012).

$$\begin{aligned}\text{Total Corporate Investment Expenditure (TCIE)} &= \text{Capital Expenditure (CE)} \\ &+ \text{Research and Development Expenditure (RDE)} \\ &+ \text{Assets Acquisition(AA)} - \text{Property Plants and Equipment (PPE)}\end{aligned}$$

ii. Investment Maintenance Expenditure (IME) captured as used by Richardson 2006.

$$\text{Investment Maintenance Expenditure (IME)} = \text{Depreciation} + \text{Amortization}$$

iii. New Investment Expenditure (NIE) adopted from Richardson (2006).

$$\begin{aligned}\text{New Investment Expenditure (NIE)} &= \text{Total Corporate Investment Expenditure (TCIE)} \\ &- \text{Investment Maintenance Expenditure (IME)}\end{aligned}$$

Empirically, Kimouche (2022) used the Sloan (1996) model to assess the relationship between differential tax and earning quality on a dataset consisting of 280 firm-year observations from 40 Algerian firms from 2013 to 2019. The study's independent variable was differentiated tax, and profits quality was divided into persistence and predictive capacity. The regression analysis revealed that Algerian firms' earnings exhibit a high degree of persistence and a low level of forecasting skills. It also showed that deferred tax has no statistically significant effect on earnings quality. However, Ali et al. (2021) investigated the relationship between the digitization of government services and tax evasion using the moderation impact of information and communication technologies (ICTs). The study's sample spans the years 2006–2017 and includes 1677 country-year observations. The findings of fixed effect analysis show that the six proxies for governments' long-term vision and the digitalization of government services all have a significant impact on reducing tax evasion. Furthermore, ICT adoption by society and citizens positively modifies the link between the digitization of government services and tax evasion; that is, the digitalization of government services has a greater effect on mitigating tax evasion in countries with higher ICT adoption. Furthermore, Giulia and Paola (2021) explored tax aggressiveness, or the downward management of

taxable income through tax planning activities, and its causes and consequences, focusing on public firms. They investigated the origins of tax evasion in a sample of private Italian family businesses. They discovered a negative relationship between tax evasion and the use of strategic planning and a combination of managerial control systems (both planning and reporting methods). We found no link between family CEOs and tax evasion. Moreso, Vu and Le (2021) examined the impact of tax planning on the firm value of non-financial firms listed in Vietnam, which was mitigated by state ownership. The effective tax rate was used to measure tax planning; state ownership was measured by the percentage of state equity holdings; and firm value was measured by Tobin's Q. Data for the study were collected from audited financial statements and other statistical documents of 513 firms between 2015 and 2019. Regression research using generalised least squares reveals that tax planning has a detrimental impact on corporate value. In a similar study Olivi and Amir (2021) investigated the relationship between transfer pricing transactions and tax aggression before and after the tax amnesty programme. Non-parametric approaches were used to investigate this research. The results of this study show that transfer pricing of multinational corporations after the tax amnesty programme is higher than before the event, with a significant difference. Another study found that there is no significant difference in the degree of tax aggression before and after the tax amnesty. Osegbue et al. (2018) used a variety of panel data regression models, including pooled ordinary least squares, random, and fixed effects models, to examine the impact of corporate tax evasion on the investment spending of listed enterprises in Nigeria and Ghana between 2010 and 2017. Corporate tax aggressiveness indices include book-tax difference, temporary tax difference tax savings, and effective tax rate, with business size serving as the control variable. The entire analysis concludes that tax aggression has a statistically significant impact on firm investment expenditure in both nations.

Prospect Theory

Daniel Kahneman and Amos Tversky proposed prospect theory, sometimes known as loss aversion, in 1979. Prospect theory is a behavioural model that explains how people choose between risky and uncertain options. Kahneman and Tversky believe that people consider in terms of expected utility in relation to a reference point, rather than the absolute outcome. The theory believed that people are naturally loss-averse because they dislike losses more than similar gains and are more likely to take risks to avoid losses. This theory is relevant to this position since the corporate environment is fraught with risk and uncertainty, including the possibility of tax evasion (tax fraud), and it is difficult to predict the certainty or consequences of events. Business managers must make difficult decisions when their values and goals differ. The prospect theory weighs likelihood and loss aversion situations to evaluate possibilities during decision-making. According to Kahneman and Tversky, companies make judgements based on how managerial brains process information, rather than the fundamental components and usefulness of each alternative for decision-making.

3.0 METHODOLOGY

Research Design

The *ex-post facto* research design was used in this study. The study, which spans a five-year period (2012-2022). used data from twenty quoted companies because it was possible to obtain the data from Nigerian firms. The study used data from the audited annual reports and accounts of the companies it was studying, adopting a secondary technique of data acquisition. For the eleven years starting in 2012 and ending in 2022, data were gathered on the variables of interest, which is book-tax difference. This was a suitable amount of time to give trustworthy data for this study. Multiple regression analysis, correlations, and descriptive statistics were used to analyze the panel data that was gathered. book-tax difference was used as independent variables, while corporate investment expenditure as used as dependent variable proxy by total investment expenditure.

Model Specification

The panel multiple regression models are specified as follows:

$$Y = \beta_o + \beta_1 X_1 + \mu_t \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (3.1)$$

Using the present research variables, the model in equation 3.1 above is presented as follows:

$$TIE_t = \beta_o + \beta_1 TBD_t + \mu_t \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (3.2)$$

Where: TIE_t = Total Investment Expenditure at time t, TBD_t = Temporary Book-tax Difference at time t, β_o = Constants, β_1 = Coefficient of the independent variables in the model, μ_t = Stochastic error associated with the model.

Introducing the control variables, the model in equation 3.2 above is presented as follows:

$$TIE_t = \beta_o + \beta_1 TBD_t + \beta_2 (OPC/TA)_t + \beta_3 FLVE_t + \beta_4 LnFAGE_t + \mu_t \ldots\ldots\ldots\ldots (3.3)$$

Where: = *TBD* = Temporary Book-Tax Difference, *Operating Cash Flow deflated by Total Assets at time t,* $FLVR_t$ *= Financial Leverage at time t,* $LnFAGE_t$ *= Natural Logarithm Firm age at time t.*

4.0 DATA ANALYSIS AND INTERPRETATION

Descriptive Statistics

Table 4.1: Descriptive Statistics

stats	*tie*	*ime*	*tbd*	*ocf*	*flvr*	*lnfa*
Summary Stats						
Minimum	0.0102	0.0009	-0.1680	-0.1884	0.1277	0.0000
Maximum	0.4459	0.0468	0.404	0.4505	1.6616	4.654
Mean	0.0992	0.0066	0.0098	0.0429	0.6883	3.3209
Median	0.0559	0.0046	0.0036	0.0407	0.8143	3.3673
Standard Deviation (SD)	0.0977	0.0058	0.0685	0.0890	0.2365	0.8127
SE(Mean)	0.0066	0.0004	0.0046	0.0060	0.0159	0.0548
Normality Test						
Skewness	1.8793	3.5142	2.5138	0.6922	-0.4065	-1.5951
Pr(Skewness)	0.0000	0.0000	0.0000	0.0001	0.0142	0.0000
Kurtosis	5.8621	21.8061	13.4568	5.8443	3.3499	6.7422
Pr(Kurtosis)	0.0000	0.0000	0.0000	0.0000	0.2357	0.0000
------ joint ------						
chi2(2)	64.1700	-	-	27.7100	7.0200	59.4100
Prob>chi2	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0299***	***0.0000***
Shapiro-Wilk W test (Prob>z)	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***

Source: STATA 14.2 Outputs, 2026

Table 4.1 depicts the summary statistics conducted on the data. The "Overall" statistics are ordinary statistics that are based on 220 observations. The mean and the median of the ten (10) variables, the powerful statistical measures of mid-point even though vulnerable to extreme values of the listed twenty (20) financial firms in Nigeria in two hundred and twenty (220) observations were computed. The closeness between the mean and median in almost all the variables particularly the explanatory variables suggest the existence of uniformity in the performance of the financial firms in Nigeria which indicates that the disparity in the sizes of the firms has no effect on their tax management performance, indicating no material extreme values. On the other hand, the standard deviation, a measure of dispersion is not large suggesting that annual values of each of the variables are very close to the mid-point. These outcomes were supported by the quite small values of standard errors of the mean, the most valuable estimator and conformed to the theoretical proposition of getting lesser as the sample size advances to the population.

These variables recorded standard error values of less than 10% for all variables. Also, normality tests were performed to determine whether a data set is modelled for normal distribution. Skewness is a measure of the asymmetry of the probability distribution of a random variable about its mean. In other words, it shows the amount and direction of skew (departure from horizontal symmetry). Although many statistical functions require that a distribution be normal or nearly normal but if skewness is 0, the data are perfectly symmetrical. The skewness value can be positive or negative, or even undefined. Kurtosis explains the height and sharpness of the central peak, relative to that of a standard bell curve. Positive kurtosis portrays peakedness and heavy tails were as negative kurtosis show flatness and light tails, about the normal distribution. The null hypothesis of this test statistic states that the distribution is normal. Also, the decision rule is such that the p-value of the test is greater than the significance level which in this case is 5%. Table 4.2 also presents the outcome of skewness/kurtosis tests and Shapiro-Wilk W' test conducted to determine whether the skewness and kurtosis of a variable are consistent with the normal distribution. The probabilities (*Pr(Skewness) and Pr(Kurtosis))* of both skewness/kurtoses, in this case, equate to zero for all the entered variables and the joint probability (*Prob>chi2)* of all the variables also equates to zero. These outcomes suggest that the distribution is not normally distributed. Also, the Shapiro-Wilk 'W' normality tests carried out depicted p-values equate to zero for all the entered variables. This outcome strengthens the skewness/kurtosis tests results that the values are not approaching normal distribution.

Pairwise Correlations

Table 4.2. Correlation Matrix with P-values involving 220 Observations

	tie	*lme*	*Tbd*	*ocf*	*flvr*	*lnfa*
tie	1.0000					
ime	0.7190*	1.0000				
	0.0000					
tbd	-0.1783*	-0.2915*	1.0000			
	0.0080	*0.0000*				
ocf	-0.1923*	-0.0806	-0.0033	1.0000		
	0.0042	0.2339	0.9614			
flvr	-0.7467*	-0.6223*	0.2827*	0.1403*	1.0000	
	0.0000	0.0000	0.0000	0.0376		
lnfa	0.1695*	0.2247*	0.2597*	-0.0612	-0.1225	1.0000
	0.0118	0.0008	0.0001	0.3662	0.0697	

Source: STATA 14.2 Outputs, 2026

Table 4.2 portrays a significant relationship between predictor variable (temporary book-tax difference, operating cash flows all deflated by total assets financial leverage and natural logarithm of firm age and total investment expenditure of listed financial firms in Nigeria. Precisely, the temporary book tax difference, operating cash flows, and financial leverage depicts a negative significant relationship while the permanent book tax difference and natural logarithm of firm age displayed a positive significant connection with total investment maintenance expenditure. On the hand, the temporary book-tax difference, financial leverage, and the natural logarithm of firm age displayed a strong association with investment maintenance expenditure. Temporary book-tax difference and financial leverage have strong negative association with investment maintenance expenditure while the natural logarithm of firm age exhibited a strong positive relationship with investment expenditure. However, the relationship between the investment maintenance expenditure and book tax rate, tax savings and operating cash flows are non-significant.

Diagnostic Tests for Stationarity and Cointegration

Unit roots are one cause of non-stationarity. Unit roots test is a test for stationarity in a time series. A time series has stationarity if a shift in time doesn't cause a change in the shape of the distribution; that means that the time series has a constant mean and constant variance over time (Choi, 2001). This test is

particularly important for the calculation of reliable test statistics and, hence, can have a significant impact on model selection. We conducted the Levin-Lin Chu unit-root test given that our dataset is balanced with N > T. The null hypothesis of the Levin-Lin Chu unit-root test states that panels contain unit roots.

Ho: Panels contain unit roots — Number of panels = 20
Ha: Panels are stationary — Number of periods = 11
AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included — ADF regressions: 1-3 lag
Time trend: Included

Table 4.3: Levin-Lin-Chu unit-root test Based on Based on Augmented Dickey-Fuller tests

Variables	Unadjusted t	Adjusted t*	p-value	Lags
	Statistics	*Statistics*	*p-value*	*ADF regressions*
Tie	-24.8551	-18.7304	0.0000	3
Ime	-11.8000	-4.0483	0.0001	1
Etr	-16.0771	-10.6635	0.0153	3
Btd	-20.9004	-15.8683	0.0000	1
Tbd	-9.0744	-6.9029	0.0000	1
Pbd	-14.4381	-9.9187	0.0000	1
Ts	-20.8964	-15.8616	0.0000	1
Ocf	-15.5848	-8.4760	0.0000	1
Flvr	-36.2706	-33.5206	0.0000	3
Lnage	-14.1844	-11.2943	0.0000	1

Source: STATA 14.2 Outputs, 2026

Table 4.3 depicts the outcome of the Levin-Lin Chu unit-root test based on augmented Dickey-Fuller tests carried out on the data at lag 1 to 3. The results of this test statistics strongly reject the null hypothesis that the panels contain unit-roots for all the entered variables at lag 1-3. Therefore, we conclude that the data for all variables in the study are stationary.

Diagnostic Test for Heteroskedasticity

Table 4.4: Breusch-Pagan Test for Heteroskedasticity (All-Inclusive Model)

Ho: Constant variance			
Variables: fitted values of	tieta	tieta	imeta
chi2(1)	=	116.74	207.47
Prob > chi2	=	0.0000	0.0000

Source: STATA 14.2 Outputs, 2026

Table 4.4 depicts the Breusch-Pagan test result for heteroskedasticity for the model specification. Breusch-Pagan/Cook-Weisberg test was employed to ascertain whether the standard deviation of the data over the period is statistically constant (heteroskedasticity problem). Breusch-Pagan/Cook-Weisberg test assumes the p-value of above the significant levels to be free from heteroskedasticity problem among the datasets. In this case, the result shows a Prob>chi2 = 0.0000 which is very significant. This result signifies the presence of a heteroskedasticity problem on the dataset. If this is not corrected, it leads to biased standard errors. It was controlled employing the robust command while regressing to arrive at robust standard errors (Montgomery & Peck, 2007).

Test for Model Mis – Specification

Table 4.5: Ramsey RESET Mis-specification Test

Ramsey RESET test using powers of the fitted values of eps			
Ho: model has no omitted variables		**tieta**	**imeta**
F(3, 208)	=	18.01	18.57
Prob > F	=	0.0000	0.0000

Source: STATA 14.2 Outputs, 2026

Table 4.5 presents the outcome of Ramsey Reset test used to ascertain if the comprehensive model is appropriately specified i.e., over or under fitted. The reset test implies acceptance of the null hypothesis that the model has no omitted variables. The result of these test shows F (3, 208) = 18.01 & 18.57 with P-values (0.0000) which implies that the model is not over-specified. Alternatively, the result could be ascertained manually by truncating a few independent variables and estimating another regression and visual examination of the old and new (full) residuals for $F_{calc} < F$ (3, 208) using the formula.

$$F_{calc} = \frac{(R^2_{new} - R^2_{old}) / \text{number of new predictors}}{(1 - R^2_{new}) / (n - \text{number of betas in the new model})}$$

Test for Multi-collinearity

Multicollinearity is an unsteady condition of the regression model, estimates, and over-bloated standard errors for the coefficient (Gujarati and Porter, 2009). They further stated that it usually emanated from model specification, data collection methods, restrictions in the population and sample size, and the common trend of the regressors over time. The variance inflation factor measures the degree of the (strong) linear relationship between one predictor variable and one or more explanatory variables. As a rule of thumb, Montgomery and Peck (2007) suggested 5 < VIF < 10. This implies that VIFs value between 1 and 5 is moderate but above 5 is severe.

Table 4.6: Variance Inflation Factor

Variable	*VIF*	*1/VIF*
tbd	8.23	0.000004
flvr	1.21	0.825739
lnfa	1.14	0.877631
ocf	1.06	0.944081
Mean VIF		***4.35***

Source: STATA 14.2 Outputs, 2026

A test of multicollinearity was conducted using the variance inflation factor approach (VIF) as depicted in Table 4.6. In this instance, the explanatory variables have resultant variance inflation factors ranging between 1.06 and 10.58 and a mean VIF of 4.35 < 5.0 for the comprehensive model. These results indicate the presence of severe multicollinearity problems connected to temporary book-tax difference deflated by the total assets and tax savings to total assets but moderate multicollinearity between the explanatory (independent) variables in the regression model which is acceptable. Nonetheless, in case of severe multicollinearity problem, Gujarati and Porter (2009) posit that it is likely to be resolved by removing one or more variables, employing a priori information from theory, transforming variables, adding new data, and principal components analysis or by employing factor analysis and ridge regression among others.

Diagnostic Test for Serial Autocorrelation

Serial autocorrelation is the statistical description of the extent to which values of the same variables correlate across different observations over time. In cross-sectional data, serial autocorrelation can also

arise when the observations are correlated in some other respects other than time across panels. Hence, conventional analyses such as the ordinary least square (OLS) regression that assume independence of observations are prone to autocorrelation problems. In statistics, the Durbin-Watson tests are usually employed to test for autocorrelation in a time series whereas the Wooldridge tests are commonly used to measure serial autocorrelation in cross-sectional panel data. The Durbin-Watson tests generate a test statistic such that $0 < d < 4$. Values closer to 2 (the middle point) indicate minor autocorrelation, and values closer to 0 or 4 suggest larger positive or negative autocorrelation respectively. *In this case, the value of this test statistics is* 2.043605 *and 1.86585 for the two models both closer to 2 than 0. These outcomes indicate the absence of autocorrelation of the time dimension.* However, where this problem exists, it will be corrected by using a regression technique that adjusted for Durbin-Watson statistics.

Table 4.7: Wooldridge test (All-Inclusive Model)

Wooldridge test for autocorrelation in panel data			
Ho: no first-order autocorrelation			
F(1, 7)	=	93.064	1845.54
Prob > F	=	0.0000	0.0000

Source: STATA 14.2 Outputs, 2026

Further, the Wooldridge tests of serial autocorrelation in panel data were carried out. The Wooldridge tests assumed a null hypothesis of no first-order autocorrelation. In this instance, Table 4.7 depicts the outcome of the test. The result reveals a non-significant p-value (Prob > F = 0.0000) which is less than 0.05 significant levels indicating that the panel data is not free from first-order autocorrelation. *Hence, we upheld the alternative hypothesis.* Nevertheless, it was resolved by conducting a regression model that adjusted for first-order autocorrelation (ar1).

Diagnostic of Test for Heteroskedasticity in Panel Data

Table 4.8. Breusch and Pagan Lagrangian Multiplier test for Random effects

	Var	sd = sqrt(Var)	
Tieta	.0095529	.0977389	
E	.0010871	.0329716	
U	.0010849	.0329376	
	Test: Var(u) = 0		
		chibar2 (01) =	340.80
		Prob > chibar2 =	0.0000

Source: STATA 14.2 Outputs, 2026

The Breusch and Pegan Lagrangian Multiplier test doubles as the test for the presence of panel heteroskedasticity and test to facilitate the decision between the *Random Effects Model (REM)* and the *Pooled Ordinary Least Square (POLS*). The Breusch-Pagan Lagrange multiplier (LM) test has the *null hypothesis that variances across entities are zero* which means no statistically significant difference across units (no panel effect). The decision rule is that if the Breusch Pagan Lagrange Multiplier (LM) result is significant at 5% level of significance, the null hypothesis will be rejected.

As depicted in table 4.8, the result of this test shows $chi^2\ (1) = 340.80$ *and Prob >* $chibar^2 = 0.0000$. The result shows the null hypothesis is rejected as it is strongly significant at the 5% level of significance, which implies that the random effect model is appropriate for the model estimation. *Therefore, we decide that the Random Effect Model (REM*) *is better.* Again, these results also provide evidence of heteroskedasticity problems in the panel data. In this case, we therefore, reject the null hypothesis of the test is homoscedasticity and concludes that the panel dataset has heteroskedasticity problems. However,

this problem was be controlled by adopting a robust regression model that checked the panel-level heteroskedasticity.

Fixed Effects Vs Random Effects Tests of Model Estimation

Table 4.9: Hausman Test of All-Inclusive Model Validity

Variable	(b) fe	(B) Re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
tbd	-110.1463	-142.2445	32.09825	0.019358
ocf	0.0281372	0.0235908	0.0045464	0.030029
flvr	-0.0771574	-0.1616139	0.0844565	0.0059191
lnfa	-0.0160179	-0.0001993	-0.0158186	0.0040423

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 129.44

Prob>chi2 = 0.0000

Source: STATA 14.2 Outputs, 2026

Table 4.9 facilitates a choice between the *Fixed Effects Model (FEM)* and the *Random Effects Model (REM)*. The Hausman test has the null hypothesis that the preferred model is fixed effects vs the alternative fixed effect. The Hausman test results show $chi^2(8)$ = 129.44 *and Prob.>*chi^2 = 0.0000 which suggest that the fixed effect model is not appropriate therefore strengthens the decision that the *Random Effect Model (REM*) is the most appropriate model for the panel dataset.

Model Estimation

The random effect (RE) regression model assumes that the variation across entities is random and uncorrelated with the predictor or regressor included in the model.

The random-effects model equation is:

$$Y_{it} = \beta_k X_{it} + \alpha i + u_{it} + \varepsilon_{it}$$

Where: α_i (i =1….20) is the unknown intercept for each entity (20 firm-specific intercepts), Y_{it} is the regressand (TIE), *i* = represents the firms (1- 20) and *t* is the time series (2012-2022), X_{it} represents the independent and control variables, β_k is the coefficients for independent and control variables, u_{it} is the Between-firms error term, and ε_{it} represents the Within-firms error term.

Table 4.10: Panel Regression Results of Tax Sheltering Indicators, Control Variables and Corporate Investment Expenditure of Listed Financial firms in Nigeria

Regressors	Method	Pooled OLS	Fixed Effect	Random Effect (Recommended *Model*)	*PCSEs (Preferred Model)*
	p-value	0.488	0.174	0.126	*0.000**
tbd	t-statistic	-0.69	-1.36	1.53	*-4.48*
	coefficient	-106.2525	-110.1463	-0142.2445	*-79.70631*
	p-value	0.081	0.315	0.426	*0.152*
ocf	t-statistic	-1.75	1.01	0.74	*-1.43*
	coefficient	-0.0886617	0.0281372	0.0235908	*-.0113669*
	p-value	0.000*	0.001*	0.000*	*0.000**
flvr	t-statistic	-14.97	-3.36	-7.30	*-18.51*
	coefficient	-0.3049537	-0.0771574	-0.1616139	*-.1652166*
	p-value	0.11	0.062	0.979	*0.000**
infa	t-statistic	1.61	-1.88	-0.03	*6.19*
	coefficient	0.0092339	-0.0160179	-0.0001993	*.0102448*
	p-value	0.000	0.000	0.0000	*0.000*
_cons	t-statistic	10.95	6.64	7.02	*22.42*
	Coefficient	0.2848017	0.2054517	0.2121882	*.177882*

R-Squared	*57.67*	*0.2615*	*0.5479*	*0.3877*
F-statistic (Prob)/ Wald chi2 (Prob)	*35.93 (0.0000)*	*3.31(0.0015)*	*59.16 (0.0000)*	*38.06 (0.0000)*
rho (fraction of variance due to u_i)		*.87062491*	*.49943843*	
Poolability Test (Breusch-Pagan LM)			*340 (0.0000)*	
Hausman test		*129.44 (0.0000)*		
Original Durbin-Watson statistic		*2.04*		
No of Observations = 220		*Number of Firms = 20*		
*Dependent Variable: KCE, significant at *1%, **5%, t-statistics*				

Source: STATA 14.2 Outputs, 2026

We employed the *Multiple Regression, Correlated Panels Corrected Standard Errors (PCSEs) Model adjusted Autocorrelation (AR 1) statistics, Panel-level heteroskedastic and correlated across panels* to correct the positive first-order autocorrelation (ar1) as identified in the Wooldridge tests, multicollinearity as identified in the variance inflation factor and heteroskedasticity as indicated by the Breusch-Pagan test and Breusch and Pegan Lagrangian Multiplier test. The model also corrected the errors of variance due to differences across panels, that is, the intra-class correlation suggested by *rho (fraction of variance due to u_i)* in the *Fixed Effects (FE) .8706 and Random Effects (RE) .4494 Models.*

The results of the model estimation are presented in table 4.10. The summarized results aim to address the objectives of the study as captured in the model thus:

TIE = -0.1779 - 0.0026ETR +11.6081BTD – 79.7061TBD – 7.9577PBD – 12.3341TS - 0.1136OCF - 0.1652FLVR + 0.0104LNAGE

R-Squared = 0.3877

F (Prob) = 38.06 (0.0000)

Prob > F = 0.0000

From the statistics above, the R-squared (the multiple coefficients of determination) is 0.3877. In specific terms, it suggests that 38.77% of changes in total investment expenditure of the listed financial firms in Nigeria can be explained by the regressors (*temporary book tax difference, operating cash flows, financial leverage, and natural logarithm of firm age*). However, the F-statistics = *38.06 and Prob. = 0.0000* is lower than = 0.05 which strengthens the overall statistical significance and reinforces the relevance of the predictors in the model. This also means that the 38.77% explanatory power of the regressors is statistically significant in explaining changes in the total investment expenditure of the listed financial firms in Nigeria. Hence, this model is best fitted to explain the relationship between the regressors and the regressand included in the model.

Robustness Tests of the Model

Robustness tests were carried out using investment maintenance expenditure as the regressand.

Table 4.11: Multiple Regression, Correlated Panels Corrected Standard Errors (PCSEs) using Investment Maintenance Expenditure (IME) as the Regressand

	Panel-corrected					
Variables	***Coef.***	***Std. Err.***	***z***	***P>|z|***	***[95% Conf.***	***Interval]***
Etr	-0.000722	0.000275	2.62	0.009	-0.001261	-0.000182
Btd	-0.621013	1.783506	0.35	0.728	-4.116620	2.874595
Tbd	-16.911630	6.767604	2.50	0.012	-30.175890	-3.647370
Pbd	-1.688577	0.676802	2.49	0.013	-3.015084	-0.362070
Ts	7.636584	5.229276	1.46	0.144	-2.612608	17.885780
Ocf	0.001429	0.002398	0.60	0.551	-0.003270	0.006129
Flvr	-0.006772	0.002319	2.92	0.004	-0.011317	-0.002226
Lnfa	0.001651	0.000479	3.45	0.001	0.000712	0.002590
_cons	0.006274	0.001768	3.55	0.000	0.002808	0.009739

Source: STATA 14.2 Outputs, 2026

The summarized results of the robustness check conducted using Investment Maintenance Expenditure as the regress and are depicted in Table 4.11. Hence the model is as restated below:

IME = 0.006274 - 0.000722ETR - 0.006213BTD - 16.911630TBD – 1.688577PBD + 7.636584TS + 0.001429OCF - 0.006772FLVR + 0.001661LNAGE

R-Squared = 0.2538

F(8) = 28.93

Prob > chi2 = 0.0003

From the statistics above, the R-squared (the multiple coefficients of determination) is 0.2538. In specific terms, it suggests that 25.38% of changes in investment maintenance expenditure of the listed financial firms in Nigeria can be explained by the regressors (*temporary book tax difference, operating cash flows, financial leverage, and natural logarithm of firm age*). However, the F-statistics = *28.93 and Prob. = 0.0003* is lower than = 0.05 which strengthens the overall statistical significance and reinforces the relevance of the predictors in the model. This also means that the 25.38% explanatory power of the regressors is statistically significant in explaining changes in the investment maintenance expenditure of the listed financial firms in Nigeria. Hence, this model is best fitted to explain the relationship between the regressors and the regress and included in the model. Notably, three regressors (*temporary book-tax difference, financial leverage, and natural logarithm of firm age*) exhibited somewhat significant effect on the investment maintenance expenditure of the listed financial firms in Nigeria as can be deduced from the *coefficients and p-values.*

Test of Hypotheses

Table 4.12: Multiple Regression, Correlated Panels Corrected Standard Errors (PCSEs) of Tax Sheltering Indicators and Corporate Investment Expenditure of Listed Financial Firms in Nigeria

	Panel-corrected					
Variables	***Coef.***	***Std. Err.***	***z***	***P>|z|***	***[95% Conf.***	***Interval]***
Tbd	-12.272100	3.264527	-3.76	0.000	-18.670460	-5.873744
Ocf	0.000485	0.001346	0.36	0.718	-0.002152	0.003123
Flvr	-0.005318	0.000762	-6.98	0.000	-0.006812	-0.003824
Lnfa	0.001312	0.000253	5.18	0.000	0.000816	0.001809
_cons	0.006238	0.000903	6.91	0.000	0.004469	0.008008

Source: STATA 14.2 Outputs, 2026

H_{01}: Temporary book-tax difference has no significant effect on corporate investment expenditure of listed financial firms in Nigeria.

Decision rule engrosses accepting the alternate hypothesis (H_1) if the coefficient for temporary book-tax difference (TBD) is either positive or negative, the modulus of the t-Statistic > 2.0, (i.e. |t| > 2), and the P-value of the t-Statistic < 0.05 (i.e. |t| < 0.05). Otherwise, accept H_0 and reject H_1 (Gujarati, Porter, and Gunasekar, 2009). Regarding the coefficient (β), table 4.12 above indicates that a unit change in the temporary book-tax difference (TBD) will increase the corporate investment expenditure of the listed financial firms in Nigeria by -12.272106. Precisely, this variable exhibited a very strong negative influence on the corporate investment expenditure of the listed financial firms in Nigeria with a p-value = 0.000. Since the p-value < 0.05 at 0.000, and t-statistic < |2| at -3.76, we accept the alternate hypothesis and conclude that the temporary book-tax difference (TBD) exerted a significant negative effect on the corporate investment expenditure of the listed financial firms in Nigeria.

5.0 CONCLUSION AND RECOMMENDATIONS

Following the findings of the study, it was possible to conclude that the *temporary book-tax difference (TBD) has* significant predictors of corporate investment expenditure of listed financial firms in Nigeria. The results also affirmed that *temporary book-tax difference (TBD),* have a negative significant effect on corporate investment expenditure which implies that corporate investment expenditure decreases as these indicators increases. Therefore, we conclude that the *temporary book-tax difference* could be used to boost business growth opportunities and expansion in the listed financial firms in Nigeria when practiced within the provisions of the law. The study suggestion is derived from the findings:

i. Temporary book-tax difference must also be evaluated to minimize the gap. Therefore, financial firms in Nigeria must make frantic efforts to minimize the book tax difference through tax sheltering.

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