Corporate Tax Aggressiveness and Corporate Investment Expenditure in Nigeria and Ghana

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ABSTRACT: This paper analyzes the effect of cash flow from corporate tax aggressiveness on corporate investment expenditure in Nigeria and Ghana from 2010 to 2017. The sampled outcome is measured by estimating pooled ordinary least squares, as well as random and fixed effects models. The study uses dynamic models to draw significance because it corrects for endogeneity, cross-sectional dependence, serial correlation, and heteroscedasticity by including instruments that are uncorrelated with the regressors in the underlying routine during estimation. The corporate tax aggressiveness indicators are tax saving, effective tax rate, book-tax difference, and temporary tax difference - with firm size as the control variable. Findings, among others, reveal that tax aggressiveness has a statistically significant influence on corporate investment expenditure in both countries. This provides evidence that tax aggressiveness is positive and that its coefficients are statistically significant to the tax aggressiveness variables; in particular, tax saving and effective tax rate maintained consistent positive and statistically significant relationships to corporate investment expenditure across all model specifications. In other words, an increase in tax saving and effective tax rate boost the total and new investment expenditure in both countries.

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Other findings show that a large difference between income reported on financial statements and income reported on tax return reduces corporate total and new investment expenditure in both countries. Furthermore, a proportionate increase in investment maintenance expenditure occurs when a book-tax gap changes in Nigeria. This is because managers reduce taxable income in order to increase investment maintenance expenditure. For the control variables, firm size boosts corporate investment expenditure in both countries.

JEL classification: M4, G3.

Keywords: Corporate Tax Aggressiveness, Corporate Investment Expenditure, Nigeria, Ghana, Pooled OLS, Static Models.

1 Introduction

Corporate investment is the allocation of money with the expectation of some form of benefit in the future known as a return. Helpman et al. (2004) stated some motives on why and how firms engage in investments. These include trade friction, the value of exercising corporate control, wealth maximization, and so on. Investment is geared towards firms' growth, wealth growth, and job creation. One of the unresolved questions in economics is the degree to which corporate taxation affects corporate investment (Moon, 2019). This study re-emphasizes a recurring debate regarding to what extent tax aggressiveness would stimulate corporate investment. Federicil and Parisi (2015) reported that corporate investment is one of the main drivers of the economy; they further note how tax aggressiveness that affects corporate investment behavior of firms is a question of importance. They reported that taxation has a large effect on a firm's investment decisions. Corporate taxes impinge directly on the incentive to accumulate capital and to perform research in many countries.

According to Adegbite and Shittu (2017), corporate investment is a strong driver of economic growth in many economies (especially in developing economies like Nigeria and Ghana), while taxation is a crucial factor when making corporate investment decisions. Corporate tax aggressiveness means the reduction of tax liability through firms' tax policies; which includes using financial instruments as a vehicle for a tax advantage. Researchers have established that the inflows of corporate investment are influenced by many factors; including taxation, macroeconomic stability, skilled labor and a flexible labor market, available natural resources, purchase power of local markets, legal and regulatory framework, and degree of openness - among others. This corporate investment inflow contributes to the development of technology, employment, wealth creation, infras-

tructural growth, and the social well-being of the people in the country. The sensitivity of corporate taxation to corporate investment varies depending on the tax laws, tax policies, and tax incentives of countries; this is especially true for countries like Nigeria and Ghana, where taxation is undergoing several reforms. Nigeria and Ghana are among the countries in West Africa where the influence of corporate taxation on corporate investment expenditure is categorized at the growing stage. Many previous studies have documented the effect of tax aggressiveness on investment, such as Armstrong et al. (2012) in the U.S.; Holland and Vann (1998) clearly explained the two broad corporate taxation drivers on corporate investment decisions. First, investors emphasize the benefit of tax incentives in the form of tax aggressiveness of firms; this increases investments and gives rise to regional development, employment creation, technology transfer, and export promotion. Second, investors emphasize the unimportant form of tax aggressiveness in investment decisions; Welch and Wessels (2000) reported that the effect of corporate taxes on corporate investment can be complicated. They stated that higher tax rates on a given taxable income stream increase the attractiveness of the tax aggressiveness investment, but reduce the attractiveness of resulting future payoffs. Their study explained that managers in Europe complain that their ability to invest is limited by an expected high tax burden. Beatty et al. (1997) clearly reported the cash flow from tax aggressiveness on investment expenditure of U.S. firms prior to 1985, showing that firms with high taxation payments invest less than equivalent firms. Khurana and Moser (2009), in the U.S., discover that firms are more tax aggressive on short-term investment and less tax aggressive on long-term investment. Richardson (2006) reported little evidence showing that cash saved from tax aggressiveness is distributed to external stakeholders by creating the potentials for retained free cash flow to be over-invested in the future; furthermore, its supplemental analysis found that tax aggressiveness is effective in mitigating the extent of over-investment and others. The results explained differently how cash flow from corporate tax aggressiveness practices influences corporate investment expenditure, especially firms in the U.S. environment. None of the studies factored in African countries, considering the developing stages of their fiscal policies to the best of the researchers' knowledge. The question of whether cash flow from tax aggressiveness practices increases total investment expenditure more than investment maintenance expenditure or new investment expenditure in Nigeria and Ghana has become the pivot of this study; to compare how cash flow from corporate tax aggressiveness affects corporate investment expenditure in these two countries. The extent to which managers utilize this cash flow from tax aggressiveness on corporate investment expenditure becomes a central question that needs an answer, especially when considering that Nigeria and Ghana are the biggest West African economies. Is it more on total investment expenditure, investment maintenance expenditure, or new investment expenditure? This study focuses on the re-investment of the cash flow from corporate tax aggressiveness because of the issues that lead to how cash flow from corporate tax aggressiveness affects corporate investment expenditure. What

investment expenditures are necessary to maintain new, existing, and total investment expenditure? Does cash flow from corporate tax aggressiveness practices affect new, existing, and total investment expenditure in Nigeria and Ghana? Are they significant? To what extent of significance? Is it positive or negative? The main aim of this study is to determine the effects of corporate tax aggressiveness on corporate investment expenditure in Nigeria and Ghana, while the specific objectives are:

1. To determine the effect of the tax saving on corporate investment expenditure.
2. To determine the effect of the effective tax rate on corporate investment expenditure.
3. To determine the effect of the book-tax differences on corporate investment expenditure.
4. To ascertain the effect of the temporary tax differences on corporate investment expenditure.

A set of null hypotheses was formulated for the study as follows:

1. Tax saving does not have a significant effect on corporate investment expenditure.
2. Effective tax rate does not have a significant effect on corporate investment expenditure.
3. Book-tax differences do not have a significant effect on corporate investment expenditure.
4. Temporary tax differences do not have a significant effect on corporate investment expenditure.

The study covers 119 non-financial firms in Nigeria and 25 non-financial firms in Ghana from 2010 to 2017. The study excludes financial services firms due to their nature of financial reporting. To analyze the corporate investment expenditure effect, we show how cash flow from corporate tax aggressiveness drives corporate investment expenditure in Nigeria and Ghana. Our empirical approaches are (1) the sample contains non-financial quoted companies on the Nigeria and Ghana stock exchange; (2) the focus is on the corporate investment expenditure, that is, 2010 to 2017; and (3) three empirical techniques are applied: pooled ordinary least squares (POLS), random effects (RE), and fixed effects (FE). This study used dynamic models to draw the significance because it corrects for endogeneity, cross-sectional dependence, serial correlation, and heteroscedasticity by including instruments that are uncorrelated with the regressors in the underlying routine during estimation. The increase in value of shareholders' investments from tax aggressiveness, as well as the question of if retained back for reinvestment in the organization during these periods, deem it an interesting phenomenon to be investigated. The set of empirical analyses examines whether tax saving, effective tax rate, book-tax differences, temporary tax differences, and firm size (control variables) are effective in mitigating corporate investment expenditure. All data are taken from companies' financial statements.

The rest of the study is structured as follows. Section 2 reviews relevant empirical literature. Section 3 outlines the empirical approach and data. Section 4 discusses the results. Finally, section 5 concludes.

2 Literature Review

Several studies on the effects of tax aggressiveness and corporate investment expenditure have been carried out with opposing results; this is often attributable to the scope of the study, changes in variables, and econometric methodologies that are adopted. Some studies analyze corporate investment in relation to investment opportunities and investment realization, to mention a few. For instance, Beatty et al. (1997) reported cash flow from tax aggressiveness on investment expenditure of U.S. firms prior to 1985, as firms with high taxation payments invest less than equivalent firms. They stated that the Tax Reform Act of 1986 significantly altered firms' investment behavior because cash flow from tax aggressiveness was realized. Firms took advantage of the investment tax credit, as well as the accelerated depreciation schedules (investment expenditure necessary to maintain assets in place) in 1986. Their result found evidence that the 1986 Tax Reform Act significantly affects the investment expenditure in U.S. firms. Ayers et al. (2010), while researching investors' trading and book-tax differences, investigated the association between book-tax differences and investors trading. Their study stated that extant research found that book-tax differences are associated with investors trading, which used long-window association tests. Their result shows that book-tax differences are an important mechanism for investors when it comes to evaluating earnings surprises. Osegbue et al. (2018) concluded that cash effective tax rate, long term effective tax rate, tax savings temporary, and permanent tax difference are insignificant; on the other hand, the tax book gap is significant to earnings management in Nigeria. Richardson (2006) worked on over-investment of free cash flow of U.S. firms between 1988 and 2002 with 58,053 observations. The primary focus of the study covers the extent to which over-investment and the role of governance is involved in mitigating over-investment. The result shows a positive effect of free cash flow on new investment expenditure. They reported that the majority of free cash flow is retained in the form of financial assets because little evidence shows that free cash flow is distributed to external stakeholders; consequently, this creates the potential for retained free cash flow to be over-invested in the future. This assumed cash flow from tax aggressiveness increases new investment expenditure. Research by Firmansyah and Bayuaji (2019) covers tax aggressiveness and investment opportunity set in Indonesian manufacturing companies. The result shows that an increase in tax aggressiveness increases the investment opportunity set. However, the study stated that companies with high investment opportunities have a lesser chance to practice tax aggressiveness than companies with a low investment opportunities. Khurana and Moser (2009) worked on the shareholder investment horizons and tax aggressiveness using U.S.

firms from 1995 to 2008. They attempted to discover whether tax aggressiveness is more for short-term investors and less for long-term investors using the ordinary least square regression on both the dependent and explanatory variables. Their result shows that corporate tax aggressiveness is more for short-term investors than long-term investors; stating that investors with a short-term investment horizon incentivize management for more tax aggressiveness, while investors with a long-term investment horizon engage more in monitoring managers in order to constrain corporate tax aggressiveness. Welch and Wessels (2000) focus on the cross-sectional determinants of corporate capital expenditure, a multinational comparison of Japan, mainland Europe, Great Britain, Canada, and the U.S. The study tends to predict cross-sectional investment innovations across the various countries. They found corporate taxes to be the only variable capable of predicting capital expenditure innovations. The study reported that firms with high corporate taxes are likely to move towards increasing their asset-adjusted capital investment expenditure. McGuire et al. (2014) focuses on investment opportunity sets, operating uncertainty, and capital market pressure: determinants of investments in tax shelter activities. The study examines the association of tax aggressiveness and tax shelter on corporate investment using U.S. firms. Their result shows that tax shelter activities are one of the factors that influence corporate investment behavior. They also reported that lower tax aggressiveness activities are associated with firms with greater investment opportunities and high operating uncertainty. Similarly, Simone et al. (2018) worked the effect of income-shifting tax aggressiveness on corporate investment of U.S. firms by using unconsolidated affiliates of multinational firms. The result finds consistent evidence of a positive effect of income-shifting tax aggressiveness on corporate investment. This is because an increase in income-shifting tax aggressiveness increases corporate investment. Additionally, Goldman (2016) who focused on tax aggressiveness and investment efficiency of U.S. firms, with a total sample size of 12,876 firm-year observations, reported that tax aggressiveness leads to more investment with high access to investable funds. The study suggested that tax aggressiveness is associated with overinvestment, which can lead to lower future abnormal returns. The result shows a positive association of tax aggressiveness on total investment, stating that poor management investment decision-making leads to unintended consequences to tax aggressiveness. For instance, Ayers et al. (2010) and Beatty et al. (1997) are of the view that corporate taxes are not important in the investment decision on average, while Ayers et al. (2010) concentrated on book-tax differences and investors trading. Firmansyah and Bayuaji (2019), as well as McGuire et al. (2014), worked on tax aggressiveness and investment opportunity set. Sorbe and Johansson (2016) examined whether corporate taxes on investment are influenced by international tax planning with an international perspective. Khurana and Moser (2009) focus on tax aggressiveness and investment horizon of institutional shareholders, with more emphasis on short-term investors and long-term investors. The following studies of Goldman (2016), Richardson (2006), and Simone et al. (2018) show the uniqueness of finding out how re-investment of

the cash flow from corporate tax aggressiveness affects new, existing, and total investment expenditure in Nigeria and Ghana. Thus, in this study, we propose to test the role of Nigeria and data for the period of 2010 to 2017. To our knowledge, this study is one of the very studies that explore the effect of cash flow from corporate tax aggressiveness on corporate investment expenditure in Nigeria and Ghana.

3 Methodology and Data

The study uses data comprised of 119 non-financial firms in Nigeria and 25 non-financial firms in Ghana from 2010 to 2017, with all variables sourced from the firms' published financial statements. The study excluded financial services firms due to their nature of financial reporting. The data of the sample relative to all firms on the Osiri database for the same sample period (i.e., 2010 to 2017) is provided. The reason for starting with the 2010 fiscal year is due to the approval of the National Tax Policy (NTP) in January 2010 in Nigeria, as well as the introduction of sur-tax on International Incoming Traffic (SIIT) and Communications Services Tax (CST) in Ghana.

3.1 The Indicators

In line with similar studies (Goldman, 2016; Richardson, 2006; Simone et al., 2018), the main variables are total investment ($TotalInvest$), new investment ($NewInvest$), and investment maintenance ($InvestMaint$). These are the measures of investment expenditure. On the other hand, tax saving ($TaxSav$), effective tax rate (ETR), book-tax gap (BTG), and temporary tax difference ($TempDiff$) are the measures of corporate tax aggressiveness indicators. For robustness, control variable firm size ($FirmSize$) is included.

Total investment captures the sum of all outlays on capital expenditure, acquisitions, as well as research and development that results in fewer receipts from the sale of property, plant, and equipment, used by Armstrong et al. (2012) and Richardson (2006):

$$TotalInvest_t = CapExp_t + Acq_t + R\&D_t - SalePPE_t$$

where: $TotalInvest_t$ - total investment in year t, $CapExp_t$ - capital expenditure (book value of property, plant, and equipment plus depreciation and amortization expenses) in year t, Acq_t - acquisition of property, plant, and equipment in year t, $R\&D_t$ - research and development in year t, $SalePPE_t$ - sale of property, plant, and equipment in year t.

Investment maintenance captures the investment expenditure that is necessary to maintain assets in place. We measure investment maintenance similarly to Richardson (2006), who used amortization and depreciation to proxy investment maintenance since it captures the investment expenditure necessary to maintain assets in place:

$$InvestMaint = \text{amortization and depreciation}$$

New investment is the difference between total investment and investment maintenance (Richardson, 2006):

$$NewInvest_t = TotalInvest_t \text{ - } InvestMaint_t$$

where: $TotalInvest$ - total investment, $InvestMaint$ - investment maintenance.

$$TotalInvest = InvestMaint + NewInvest$$

Table 1: Definition of investment expenditures

Total Investment Expenditure ($TotalInvest$) =
+ Capital Expenditures ($CapExp$) + Acquisitions (Acq) + Research and Development Expenditure ($R\&D$) - Sale of Property, Plant, and Equipment ($SalePPE$)
Investment to Maintain Existing Assets in Place ($InvestMaint$) =
+ Amortization and Depreciation

Source: Richardson (2006).

Table 2: Decomposition of investment expenditures

				New Investments ($NewInvest$)		
Total Investment Expenditure	=	Investment to Maintain Existing Assets in Place	+	Expected Investment on New Projects	+	Over-investment in New Projects

Source: Authors' calculations.

Tax saving is calculated as the difference between the statutory tax rate and the effective tax rate ($TaxSav$ = 30% and 25% - ETR). Where a firm operates across a number of jurisdictions with varying statutory rates, tax rate differentials can provide a tax saving that is recognized in investment (Atwood and Reynolds, 2008; Ftouhi et al., 2010; Ilaboya et al., 2016; Kawor and Kportorgbi, 2014; Lennox et al., 2013):

$$TaxSav = 30\% \text{ - } ETR$$

The effective tax rate is computed as the total tax expenses divided by the income before tax, reflecting the aggregate proportion of the accounting income payable as taxes. It captures tax aggressiveness, as it relates to accounting earnings (Salihu et al., 2015; Chen et al., 2010; Dyreng et al., 2010):

$$ETR = \text{Tax Paid} \div EBIT$$

The book-tax gap is calculated as a difference between income reported on financial statements and income reported on tax returns (i.e., book income less taxable income. Taxable income is calculated as current tax expense divided by corporate statutory rate (30% and 25%). We used the book-tax gap to measure the abusive tax aggressiveness behavior of sample-quoted firms. The statutory tax rate is 30% for Nigeria and 25% for Ghana (Desai, 2003; Mills et al., 2002; Plesko, 2004; Seidman, 2008; Talisman, 1999; Waluyo, 2016).

$$BTG = EBIT - TI$$

where: TI = Tax Paid ÷ 30% and 25%.

Temporary tax difference is calculated as deferred tax expense divided by the corporate statutory rate (Deferred Tax ÷ 30% and 25%). We use this to measure how temporary tax difference affects investment expenditure because the nature of most methods used on firms' investment is due to a time difference that reverses in the near future (Seidman, 2008):

$$TempDiff = \text{Deferred Tax} \div 30\% \text{ and } 25\%$$

For the control variable, $FirmSize$ is the total assets measured at the start of the year. We used firm size as a control measure to tax aggressiveness because firm size drives investment expenditure (Welch and Wessels, 2000).

3.2 Summary Statistics and Correlation Analysis

The relative statistics of these indicators are shown in Table 4 for both countries. The average total investment expenditure ($TotalInvest$) for Nigeria is \$123,499 million, which is higher than Ghana with their \$50,544 million. The average investment expenditure that is necessary to maintain assets in place ($InvestMaint$) for Nigeria is \$8,081 million, which is higher than Ghana with their \$2,974 million. The average new investment expenditure ($NewInvest$) in Nigeria is \$113,337 million and \$47,570 million in Ghana.

Furthermore, the average tax saved ($TaxSav$) is higher in Nigeria at 11.18%, whereas Ghana is at 0.17%. Regarding the effective tax rate (ETR) variables, Nigeria has a higher average percentage of the aggregate proportion of accounting income that is payable as taxes at 1.6% - while Ghana's is at 0.06%. The average book-tax gap (BTG) is higher in Nigeria, at \$7,286 million, while Ghana is at \$2,898 million. The average temporary tax difference ($TempDiff$) is higher in Nigeria at \$461,388 million and is lower in Ghana at \$1,698 million. The correlation matrix seen in Table 5 shows that there is a strong negative association between tax saving and effective tax rate in Ghana; meanwhile, there is a weak negative association between tax saving and effective tax rate in Nigeria. In addition, a weak positive association between BTG and tax savings, and a weak negative association between BTG and ETR can be seen.

3.3 The Model

There is an extensive amount of literature within the fields of economics and finance that have examined firm-level investment decisions, e.g., Hubbard (1998); Richardson (2006). Expected investment expenditure on new projects is considered to be an increasing function of growth opportunities. The underlying construct of growth opportunities refers to the present value of the firm's options to make future investments (Myers, 1977; Richardson, 2006; Armstrong et al., 2012). Since corporate investment expenditures are influenced by taxation (which is often determined by factors like tax saving, effective tax rate, book-tax gap, temporary tax difference, and firm size), there are reasons to believe in a positive effect between corporate tax aggressiveness and corporate investment expenditure. To determine the impact on corporate investment expenditure on the basis of the samples, we used the above literature to estimate expected corporate investment expenditure according to the following regression specification:

$$Y_{it} = \alpha_0 + \alpha_1 K_{it} + \alpha_2 L_{it} + \alpha_3 P_{it} + \alpha_4 Z_{it} + \alpha_5 X'_{it} + u_{it} \tag{1}$$

where: Y_{it} - corporate investment expenditure ($TotalInvest$, $InvestMaint$, $NewInvest$), $\alpha_1 K_{it}$ - tax saving, $\alpha_2 L_{it}$ - effective tax rate, $\alpha_3 P_{it}$ - book-tax gap, $\alpha_4 Z_{it}$ - temporary tax difference, $\alpha_5 X'_{it}$ - control variable (firm size), u_{it} - general error term.

Furthermore, the following estimation approaches are adopted. (1) The sample is split along three model delineations: total investment expenditure, investment maintenance expenditure, and new investment expenditure to allow for the comparison of findings across corporate investment expenditure. (2) To systematically draw the significance of corporate tax aggressiveness on corporate investment expenditure, the study adopts the use of static models. The estimation methods are used by similar studies and the study uses panel data of 932 (Nigeria) and 200 (Ghana) observations (N) across eight years (T); hence, $N > T$. The 932 observations in Nigeria being used instead of 952 observations were a result of missing data from some companies. Similarly, the adoption of these techniques serves as robustness checks for one another in order to observe the consistency of the effective corporate tax aggressiveness on corporate investment expenditure. The static models are the pooled ordinary least squares (POLS), which do not allow for heterogeneities across the panels; furthermore, the fixed effects (FE) and random effects (RE) model are used, which recognize panel heterogeneities. To methodically draw the significance of corporate tax aggressiveness on corporate investment expenditure, the study adopts the use of dynamic models. Similar studies use these estimation approaches, e.g., Adeleye et al. (2020). At the same time, the one-step difference generalized method of moments (difference-GMM) estimator technique is adopted (Arellano and Bond, 1991); this technique corrects for endogeneity, cross-sectional dependence, serial correlation, and heteroscedasticity by including instruments that are uncorrelated with the regressors in the underlying routine during estimation. Another argument for engaging dynamic panel

data modeling is due to the potentially endogenous estimators of the OLS technique, which may be upwardly biased. For the difference-GMM, the validity of the instruments used determines the consistency of the parameters that emanate from such an estimator. Two specification tests, i.e., the Hansen statistic and second-order serial correlation AR(2), have been put forward by Arellano and Bond (1991) in order to examine the validity of the instruments. Failure to reject the null hypotheses of over-identifying restrictions is valid and no second-order serial correlation gives credence to the results. Finally, the adoption of dynamic techniques serves as robustness check to observe the consistency of the effect of corporate tax aggressiveness on corporate investment expenditure.

4 Results and Discussion

4.1 Pooled OLS Results

The results for the pooled OLS estimator are shown in Table 6. Columns 1, 2, and 3 are specific to Ghana; columns 4, 5, and 6 are specific to Nigeria. Results in columns 1, 2, 3, 4, 5, and 6 are specific to the total investment expenditure, investment maintenance expenditure, and new investment expenditure - with firm size as the control variable. Results - being consistent with findings from similar studies, e.g., Goldman (2016); Simone et al. (2018) - show positive and statistically significant relationship (at the 1% level) between tax aggressiveness and corporate investment expenditure variables in both countries. Several key findings are obtained from the results. (1) The positive coefficients of the $TaxSav$ in Nigeria indicate that an increase in corporate tax aggressiveness has a greater stimulating impact on the corporate investment expenditure. (2) The negative coefficients of the BTG in Ghana are likely an indication of the reduction in the corporate investment expenditure. (3) The estimation for $FirmSize$ is an indication that an increase in the total assets of both countries has a positive boost on corporate investment expenditure. Overall, we find that cash flow from corporate tax aggressiveness drives corporate investment expenditure.

On tax saving, $TaxSav$ is both positive and statistically significant for the total investment expenditure, investment maintenance expenditure, and new investment expenditure regressions at the 1% and 5% level - respectively - in Nigeria; this aligns with what was expected *a priori*. This validates the role tax saving plays in corporate investment expenditure. Tax saving, in this sense, is a major consideration in driving corporate investment expenditure in Nigeria. Therefore, corporate investment expenditure increases in Nigeria as a result of an increase in corporate tax savings. Contrarily, the results obtained on $TaxSav$ in Ghana shows the coefficient is positive and statistically not significant for the total investment expenditure and new investment expenditure regressions. Cooperate investment expenditures that are necessary to maintain assets in place show that the coefficient is negative and statistically not significant. This implies that a proportionate

increase in $TaxSav$ increases total and new investment expenditure while reducing cooperate investment maintenance expenditure in Ghana. The results obtained on ETR in Nigeria show that the coefficient is positive and statistically significant (at the 1% and 5% level); this indicates that a proportionate increase in corporate investment expenditure occurs when ETR changes by 1% and 5% on average - *ceteris paribus*. On the other hand, ETR in Ghana shows that the coefficient is positive and statistically not significant for the total investment expenditure and new investment expenditure regressions. Cooperate investment maintenance expenditure shows that the coefficient is negative and statistically not significant, which implies that a proportionate increase in ETR increases total and new investment expenditure. Meanwhile, it reduces cooperate investment maintenance expenditure in Ghana. BTG is negative and statistically significant for the total, maintenance, and new investment expenditure regressions in Ghana at the 5%, 1%, and 10% level - respectively. While BTG in Nigeria shows a negative statistical significance for the total investment expenditure and new investment expenditure regressions. In addition, it shows a positive statistical significance for the investment maintenance expenditure at the 1% level. This implies that a proportionate decrease in total investment expenditure and new investment expenditure occurs when BTG changes by 1%; furthermore, a proportionate increase in investment maintenance expenditure occurs when BTG changes by 1%. On $TempDiff$ for Ghana, the coefficient is negatively significant for the total investment expenditure and new investment expenditure regressions; in addition to being positively not significant for the investment maintenance expenditure at the 1% level. For Nigeria on $TempDiff$, the coefficient is positively significant for the total investment expenditure and new investment expenditure regressions; in addition to being negatively significant for the investment maintenance expenditure at the 1% and 10% level - respectively. On the control variable, $FirmSize$ shows a positive statistically significant impact on corporate investment expenditure, which implies that a proportionate increase in corporate investment expenditure occurs when a company's $FirmSize$ changes, in both countries. Across all model specifications, the F-statistics indicate that the regressors are jointly significant in explaining corporate investment expenditure.

4.2 Random And Fixed Effects Results

Having controlled for panel heterogeneities, the results of the estimation, based on the sample, for the augmented model using the fixed effects (FE) and random effects (RE) estimators are displayed in Table 7. The findings, being quite similar to those obtained using the pooled OLS estimator on the sample, reveal the consistency of both BTG and $FirmSize$ as statistically significant. A proportional decrease in total, maintenance, and new investment expenditure occur when BTG changes in Ghana. Furthermore, a proportionate decrease in total investment expenditure and new investment expenditure occurs when BTG changes in Nigeria. The (positive) effects of BTG indicate that a large difference between income reported on financial statements and income reported on tax

return enhance cooperate investment maintenance expenditure in Nigeria. Furthermore, a proportionate increase in corporate investment expenditure occurs when company's $FirmSize$ changes, in both countries.

The (positive) effects of $TaxSav$ and ETR are statistically not significant on total investment expenditure and new investment expenditure in both countries. On the other hand, the (negative) effects of $TaxSav$ and ETR are statistically not significant on cooperating investment maintenance expenditure in Nigeria. On the goodness-of-fit, the model specifications show that the proportion of variation in the dependent variable (explained by the regressors) ranges from 96%, 86%, and 95% in Ghana; and 23%, 70%, and 23% in Nigeria. The F-statistics indicate that the regressors are jointly significant in explaining corporate investment expenditure.

4.3 System GMM Results

Controlling for possible endogeneity, heteroscedasticity, and omitted variables (results from the sys-GMM estimator) shown in Table 8, reveals that corporate investment expenditure is persistent in the two countries; showing positive and statistically significant coefficients of the lagged dependent variables. BTG is the only corporate tax aggressiveness indicator that exhibits a negative and statistically significant effect on investment expenditure. $TaxSav$ and ETR show a positive and statistically not significant, while that of $TempDiff$ has both negative and positive effect on investment expenditure. $FirmSize$ shows a proportionate increase in corporate investment expenditure in both countries. An explanation for this result could be that the unobserved heterogeneity in the data is now controlled. Previous interpretation holds. Last, the goodness of fit of the models shows that the J-statistics indicate that the regressors are jointly significant in explaining corporate investment expenditure. There is no evidence of second-order serial correlation; given the indicated p-values, while the null hypothesis of instruments validity cannot be rejected at the 5% significance level. Hence, the results obtained from these augmented regressions can be used for inferences.

5 Conclusions

This study examined the effect of tax aggressiveness on corporate investment expenditure in Nigeria and Ghana. Contribution was made to the corporate investment expenditure literature in both countries by using panel data of 119 and 25 non-financial quoted companies from 2010 to 2017 in Nigeria and Ghana, respectively, and four tax aggressiveness indicators (tax saving, effective tax rate, book-tax differences, and temporary tax differences); with the addition of firm size being used as a control variable. We report some compelling and robust findings, which substantiate that tax aggressiveness has a statistically significant influence on corporate investment expenditure in both countries. This

provides evidence that tax aggressiveness is positive, and that its coefficient is statistically significant to the tax aggressiveness variables. In particular, the tax saving and effective tax rate variables maintained a consistently positive and statistically significant relationship to corporate investment expenditure across all model specifications. In other words, an increase in tax saving and effective tax rate boosts total investment expenditure and new investment expenditure in both countries. Other findings are that a large difference between income reported on financial statements and income reported on tax returns reduces cooperate total and new investment expenditure in both countries. Furthermore, in Nigeria, a proportionate increase in investment maintenance expenditure occurs when the book-tax gap changes. This is because managers reduce taxable income in order to increase investment maintenance expenditure. On the control variable, the firm size boosts corporate investment expenditure in both countries.

5.1 Implications of the Study

The Nigeria Investment Policy 2019 and the Ghana Investments Promotion Centre Act 2013 provide a regulatory framework that drives investments in both countries. Many previous studies have documented the effect of corporate taxation on corporate investment expenditure; however, the uniqueness of this study is that it considers the implication of corporate tax aggressiveness on corporate investment expenditure for both countries. This study has implications that will benefit investors in explaining how cash flow from tax aggressiveness drives total, maintenance, and new investment expenditure in Nigeria and Ghana for investment decisions. The increase in corporate tax savings increases corporate investment in Nigeria. This is implied to be due to the Nigeria Investment Policy 2019; which states that companies' profits, whose supplies are exclusively inputs to the manufacturers of products for export, are exempted from tax. On the flip side, Ghana Investments Promotion Centre Act 2013 has an implication with the agreement that an increase in effective tax rate increases both total and new investment expenditure.

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Table 3: Dependent and independent variables

Nature of variables	Name of variables	Measurement of variables	Expected sign
Dependent	Corporate Invest Exp	$TotalInvest_t = CapExp_t + Acq_t + R\&D_t$ - $SalePPE_t$ $InvestMaint$ = amortization and depreciation $NewInvest = TotalInvest$ - $InvestMaint$	
Independent	$TaxSav$	30% and 25% - ETR	+
	ETR	Tax Paid ÷ $EBIT$	+
	BTG	$EBIT - TI$, where: TI = Tax Paid ÷ 30% and 25%	-
	$TempDiff$	Deferred Tax ÷ 30% and 25%	+
	$FirmSize$	Total Assets	+

Source: Authors' calculations.

Table 4: Statistics summary

	Ghana		Nigeria	
Variable	Mean	Std Dev.	Mean	Std Dev.
$TaxSav$	0.0017	0.0169	11.1873	2.6419
ETR	0.0006	0.0169	0.0007	0.0203
BTG	2898.254	23536.75	7286.612	84538.24
$TempDiff$	1698.548	9169.979	461388.2	9460869
$FirmSize$	137513.1	360494.8	1459.191	5649.726
$TotalInvest$	50544.51	151249.7	123499.7	861818.0
$InvestMaint$	2974.407	8643.369	8081.479	25342.16
$NewInvest$	47570.10	145368.2	113337.4	830171.8

Note: $TaxSav$ - tax savings; ETR - effective tax rate; BTG - book-tax gap; $TempDiff$ - temporary tax difference; $FirmSize$ - firm size; $TotalInvest$ - total investment; $InvestMaint$ - investment maintenance; $NewInvest$ - new investment.
Source: Authors' calculations.

Table 5: Correlation matrix

Ghana								
	$TaxSav$	ETR	BTG	$TempDiff$	$FirmSize$	$TotalInvest$	$InvestMaint$	$NewInvest$
$TaxSav$	1.0000							
ETR	-0.9994	1.000						
BTG	0.1386	-0.1411	1.0000					
$TempDiff$	-0.0629	0.0656	-0.4396	1.0000				
$FirmSize$	-0.0491	0.0578	-0.4325	0.4515	1.0000			
$TotalInvest$	-0.0191	0.0265	-0.3839	0.1819	0.8044	1.0000		
$InvestMaint$	-0.0426	0.0506	-0.5971	0.4984	0.9282	0.6958	1.0000	
$NewInvest$	-0.0173	0.0246	-0.3639	0.1597	0.7818	0.9990	0.6644	1.0000
Nigeria								
	$TaxSav$	ETR	BTG	$TempDiff$	$FirmSize$	$TotalInvest$	$InvestMaint$	$NewInvest$
$TaxSav$	1.0000							
ETR	-0.0031	1.0000						
BTG	0.0280	-0.0058	1.0000					
$TempDiff$	0.0322	-0.0027	0.7101	1.0000				
$FirmSize$	0.0940	0.0052	0.3560	0.2491	1.0000			
$TotalInvest$	-0.0101	0.0110	0.0636	0.0563	0.4412	1.0000		
$InvestMaint$	0.0407	0.0116	0.5246	0.3509	0.5056	0.1611	1.0000	
$NewInvest$	-0.0123	0.0110	0.0605	0.0479	0.4527	0.9647	0.1613	1.0000

Note: $TaxSav$ - tax savings; ETR - effective tax rate; BTG - book-tax gap; $TempDiff$ - temporary tax difference; $FirmSize$ - firm size; $TotalInvest$ - total investment; $InvestMaint$ - investment maintenance; $NewInvest$ - new investment.
Source: Authors' calculations.

Table 6: Main regression OLS results (dep. variable: corporate investment expenditure)

	Ghana			Nigeria		
	TotalInvest	*InvestMaint*	*NewInvest*	*TotalInvest*	*InvestMaint*	*NewInvest*
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
c	-1.8136	-2.158	-1.5978	-7.5200*	-3.1550***	-7.5185*
	(-0.00)	(-0.02)	(-0.00)	(-3.81)	(-0.07)	(-3.80)
TaxSav	3.5803	-7.258	3.5875	2.0800*	2.8962**	2.0500*
	(0.30)	(-0.02)	(0.30)	(3.00)	(1.97)	(2.95)
ETR	3.1486	-4.6760	3.1954	2.0700*	2.9097**	2.0400*
	(0.27)	(-0.13)	(0.27)	(2.99)	(1.98)	(2.95)
BTG	-0.6064**	-0.0721*	-0.5342***	-2.1875*	0.1669*	-2.3544*
	(-1.98)	(-7.68)	(-1.73)	(-3.67)	(13.19)	(-3.95)
TempDiff	-2.9348*	0.0155	-2.9504*	0.0090***	-0.0004*	0.0094***
	(-5.12)	(0.88)	(-5.10)	(1.68)	(-3.90)	(1.76)
FirmSize	0.3644*	0.0196*	0.3447*	70.8210*	2.1644*	68.6566*
	(17.48)	(30.65)	(16.40)	(10.19)	(14.64)	(9.86)
R-squared	0.66	0.89	0.63	0.11	0.43	0.10
Adj-R-squared	0.65	0.88	0.62	0.11	0.42	0.10
F-statistic	24.09	318.69	67.50	24.09	139.79	22.63
P(f-statistic)	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*
N(n)	200(25)	200(25)	200(25)	932(119)	932(119)	932(119)

Note: The values of t-statistics are reported in parentheses below the coefficient estimates. *, **, and *** signify that the coefficient estimates are statistically significant at the 1%, 5%, and 10% levels - respectively.
Source: Authors' calculations.

Table 7: Fixed and random effects results (dep. variable: corporate investment expenditure)

	Ghana			Nigeria		
	(FE)	(RE)	(FE)	(FE)	(RE)	(FE)
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
c	2.6454**	-3.1218	2.7304**	-3.9303	1.2044*	-4.0508
	(2.22)	(-0.33)	(2.19)	(-1.38)	(2.59)	(-1.42)
$TaxSav$	4.2047	3.7029	4.0556	2.2717	-5.3757	2.2770
	(0.75)	(0.09)	(0.73)	(0.21)	(-0.03)	(0.21)
ETR	3.7274	2.417	3.6093	2.2138	-4.8942	2.2187
	(0.50)	(0.00)	(0.64)	(0.21)	(-0.02)	(0.21)
BTG	-0.9596*	-0.0692*	-0.8926*	-2.3383**	0.0484*	-2.3867**
	(-8.30)	(-8.1201)	(-7.74)	(-2.20)	(2.79)	(-2.25)
$TempDiff$	-0.7404*	0.0076	-0.7397*	0.0080	-0.0002*	0.0083
	(-2.91)	(0.43)	(-2.92)	(1.43)	(-3.20)	(1.48)
$FirmSize$	0.2094*	0.0206*	0.1873*	130.3948*	1.0099*	129.3859*
	(16.61)	(27.77)	(14.90)	(14.45)	(6.84)	(14.32)
R-squared	0.96	0.86	0.95	0.23	0.70	0.23
Adj-R-squared	0.95	0.86	0.95	0.12	0.66	0.11
F-statistic	141.06	245.75	131.42	2.05	16.05	2.00
P(f-statistic)	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*
Hausman test	0.0000*	0.1685	0.0000*	0.0000*	0.0000*	0.0000*
N(n)	200(25)	200(25)	200(25)	932(119)	932(119)	932(119)

Note: The values of t-statistics are reported in parentheses below the coefficient estimates. *, **, and *** signify that the coefficient estimates are statistically significant at the 1%, 5%, and 10% levels - respectively.
Source: Authors' calculations.

Table 8: GMM results (dep. variable: corporate investment expenditure)

	Ghana			Nigeria		
	$TotalInvest$	$InvestMaint$	$NewInvest$	$TotalInvest$	$InvestMaint$	$NewInvest$
Independent variables	(7)	(8)	(9)	(10)	(11)	(12)
c	3204	-135.8337	3340.592	217452**	5270.43***	212359**
	(0.25)	(-0.34)	(0.25)	(1.98)	(1.86)	(2.02)
$TaxSav$	1927530	109610	1817920	-17323.92***	-42.3414	-17688.82**
	(0.18)	(0.33)	(0.17)	(-1.81)	(-0.17)	(-1.93)
ETR	1716059	93727	1622331	326017.2	15064.54	308455
	(0.16)	(0.28)	(0.15)	(0.26)	(0.47)	(0.26)
BTG	-0.8210*	-0.0869*	-0.7340*	-1.2924*	0.1269*	-1.2409*
	(-2.77)	(-9.38)	(-2.45)	(-2.94)	(11.24)	(-2.96)
$TempDiff$	-4.3757	0.0271	-4.4029*	0.0024	-0.0001	0.0013
	(-5.73)*	(1.14)	(-5.70)	(0.66)	(-1.11)	(0.36)
$FirmSize$	0.3643*	0.0194*	0.3449*	73.9071*	1.6383*	73.3522*
	(18.30)	(31.29)	(17.13)	(15.43)	(13.28)	(16.02)
R-squared	0.70	0.91	0.95	0.20	0.39	0.21
Adj-R-squared	0.69	0.90	0.95	0.20	0.38	0.21
J-statistic	194.00	194.00	131.42	928.00	928.00	928.0000
Prob(J-statistic)	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*
N(n)	200(25)	200(25)	200(25)	934(119)	934(119)	934(119)

Note: The values of t-statistics are reported in parentheses below the coefficient estimates. *, **, and *** signify that the coefficient estimates are statistically significant at the 1%, 5%, and 10% levels - respectively.
Source: Authors' calculations.