



Effect of Corporate Governance Mechanisms on Tax Aggressiveness of Quoted Manufacturing Firms on the Nigerian Stock Exchange

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Authors' contributions

This work was carried out in collaboration between both authors. Author OCI designed the study, performed the statistical analysis, wrote the protocol and the first draft of the manuscript and managed the analyses of the study. Author OTG managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Aim: The study examined the effect of corporate governance mechanisms on tax aggressiveness among selected manufacturing firms in Nigeria.

Study Design: Ex-post facto research design was adopted for the study.

Place and Duration of Study: The study was conducted in Nigeria and the data used for the study were derived from the financial statements of Manufacturing companies listed on the Nigerian Stock Exchange (NSE) and the NSE fact book as at the end of the year, 2016. Forty-four (44) Listed Manufacturing Firms were used for the study based on the criteria that they had complete information on the variables of study, from 2005-2016 been the period covered by the study.

Methodology: The data in the study were obtained from the annual reports and accounts of the firms as well as the Nigerian Stock Exchange Fact Book. The data obtained were analyzed using the Ordinary Least Square technique with its Best Linear Unbiased Estimate (BLUE) Property. In addition, a regression model was developed to test the combined effects of corporate governance

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measures on tax aggressiveness of the selected manufacturing firms and the analysis was performed via STATA 13.0.

Results: The outcome of the analysis of data revealed that board size has no significant effect on tax aggressiveness while board diversity, independent director and proportion of non-executive directors to executive directors is having a significant impact on tax aggressiveness among quoted manufacturing firms in Nigeria.

Conclusion: The study concluded among others that quoted manufacturing firms in Nigeria should pay less attention to the size of their board, but rather focus on the quality and integrity of the members of the board. Besides, SEC and CBN code of corporate governance provisions should be strictly adhered to, by firms which provide that a firm should have one (1) and two (2) independent directors respectively. This is necessitated as the presence of independent directors ensures the independence of the board.

Keywords: Corporate governance; mechanisms; corporate tax; tax aggressiveness.

1. INTRODUCTION

Corporate tax aggressiveness is considered as one of the most severe compliance issue threatening Nigeria and most nations of the world [1,2]. This menace may manifest in the form of reducing tax liabilities, engaging in tax avoidance which remains prevalent among corporate firms given the magnitude of the income taxes which take away a more significant proportion of firm's pre-tax earnings and subsequently reduce their distributable profits [3,4]. However, there are several anti-avoidance tax laws in Nigeria and almost every nation of the world to discourage tax aggressiveness policies, yet, firms do engage in tax aggressiveness policies through the help of tax experts assisting them in arranging their activities in such a way that they can take advantage of the loopholes in the tax laws; thereby paying less taxes [5]. There were laws enacted tailored towards curtailing certain sharp practices, especially after the collapse of Enron Corporation, World Com among others. This scenario according to Lanis et al. [1], provoked the United States Congress to enact the Sarbanes-Oxley Act (SOX) also known as the Company Accounting Reform and Investor Protection Act (CARIPA), which imposed stricter rules on executive compensation and accountability, internal controls and punishment of fraud, besides strengthening monitoring by shareholders by a way of improving the precision and reliability of financial statements disclosed by quoted firms [6,7].

First, the SOX Act made it compulsory for Chief Executive Officers (CEOs) to sign corporate tax returns; and second, required the Board of Directors (BOD) to approve all tax services provided by the company's external auditor. This was so because prior to the enactment of the

SOX Act, a firm's external auditor could propose a corporate tax strategy, issue a tax opinion, and then approve the financial statement tax reserve, if any, for the strategy [8]. Therefore, due to the nexus between corporate governance and tax aggressiveness, provisions of the SOX Act which establishes a more rigorous overall governance rules, could have impact on tax aggressiveness [9]. Thus, the various rules of SOX Act applied not only to listed American firms, but also to foreign companies alike as companies in Nigeria were not left out. As such, Erle [10] posited that this greater conservatism reduced the propensity of manipulating the financial statements; as senior corporate officials were meant to focus more attention on aggressive tax planning.

In Nigeria, the emphasis on the need for corporate governance reform sprung up with the incidence of fraudulent financial reporting as in the case of African Petroleum, Cardbury Plc., Oceanic Bank Plc. Afribank Nigeria Plc. among others. This was caused by poor management, high gearing ratios, overtrading, creative accounting, and fraud [11]. Presently, there are numerous codes of corporate governance in Nigeria such as Central Bank of Nigeria (CBN) reviewed Code 2014, for Banks established under the provision of the Bank and Other Financial Institution Act (BOFIA), Security and Exchange Commission (SEC) reviewed code 2011, directed at public companies with securities listed on the Stock Exchange; companies seeking to raise funds from the capital market through securities issuance or listing and all other public companies, National Insurance Commission (NAICOM) Code 2009, directed at all insurance, reinsurance, broking and loss adjusting companies in Nigeria, and Pension Commission (PENCOM) Code 2008, for all licensed pension operators. These codes

were established with the view to enhancing transparency and accountability in the financial sector, so that the Nigerian economy can forge ahead.

According to Bebeji, Mohammed, and Tanko [12], despite the provisions of the above-mentioned code of corporate governance, the role played by board members in the recent collapse of some financial institutions has spurred series of arguments. Croson and Gneezy [13] opined that board diversity can directly or indirectly impact an organisation's tax aggressiveness. Lanis et al. [1] showed that the inclusion of a higher proportion of outside members on the board of directors reduces the likelihood of tax aggressiveness. However, the relationship between the corporate governance mechanisms and tax aggressiveness has been less investigated in the manufacturing sector in Nigeria. Most studies on tax aggressiveness were conducted in developed countries [14,15, 16,1,17] and the few studies in Nigeria were done using the financial sector [11,12]. Therefore, the need for the study becomes vital to ascertain which of the corporate governance mechanisms have the tendency to significantly moderate/reduce the probability of tax aggressiveness and agency conflicts in the manufacturing sector in Nigeria.

1.1 Objective of the Study

The broad objective of this study is to examine the extent of the effect of corporate governance mechanisms on tax aggressiveness in Nigeria. Specifically, the study will:

1. Examine the extent of the effect of board size on tax aggressiveness among quoted manufacturing firms in Nigeria.
2. Assess the extent of the effect of board diversity on tax aggressiveness among quoted manufacturing firms in Nigeria.
3. Determine the extent of the effect of independent directors on tax aggressiveness among quoted manufacturing firms in Nigeria.
4. Ascertain the extent of the effect of the proportion of non-executive directors to executive directors on tax aggressiveness among quoted manufacturing firms in Nigeria.

1.2 Hypotheses of the Study

The following null hypotheses were formulated to guide the study:

- H₀₁:** Board size have no significant effect on tax aggressiveness among quoted manufacturing firms in Nigeria.
- H₀₂:** Board diversity has no significant influence on tax aggressiveness among quoted manufacturing firms in Nigeria.
- H₀₃:** Independent directors have no significant impact on tax aggressiveness among quoted manufacturing firms in Nigeria.
- H₀₄:** The proportion of non-executive directors to executive director have no significant effect on tax aggressiveness among quoted manufacturing firms in Nigeria.

2. REVIEW OF RELATED LITERATURE

2.1 Conceptual Review

2.1.1 Corporate governance

Corporate governance play a fundamental role in monitoring different actors and harnessing on planning procedures in an organization. Corporate governance has a global vision of the activities of management, but the question of its performance had been several debates and disputes in time and in space, as a way to rehabilitate the informational efficiency [18]. Corporate governance arises due to principle-agent problems. The problem between principal and agent initiate costs. Some researchers divide agency cost by two: monitoring cost and bonding cost. According to Chen, Chen, Cheng and Shevlin [19], corporate governance reduces monitoring cost by creating a higher level of control and transparency within the organisation.

Corporate governance is the way or manner in which organisations are controlled and directed. There are several corporate governance codes among which are the Securities and Exchange Commission governance codes and Bank codes of corporate governance. According to Okolie [20], the historical development of corporate governance in Nigeria can be viewed from four perspectives:

- **Pre-1990:** Before 1990, the prevailing Companies Act in Nigeria was the Companies Act, 1968;
- **1990 – 2003:** The Companies and Allied Matters Act, Cap. C20, Laws of the Federation of Nigeria 2004 was the product of a rigorous process championed by the Nigeria Law Reform Commission;

- **2003 – 2011:** The Code of Best practices on Corporate Governance in Nigeria (2003, SEC Code) issued by the Securities and Exchange Commission in 2003 significantly impacted the corporate governance scene in Nigeria; and
- **2011-till Date:** On April 1, 2011, the Securities and Exchange Commission issued the Code of Corporate Governance in Nigeria 2011 (2011 SEC Code) which replaced the 2003 SECI Code.
- According to OECD, there are four corporate governance principles, namely: fairness, transparency, accountability and responsibility. By applying all principles of corporate governance, the principle-agent problem may be resolved.

2.1.2 Tax aggressiveness

Tax aggressiveness refers the effort of corporate entities to reduce tax payments using aggressive tax planning activities and tax avoidance [19]. Chen et al. [19] noted that tax aggressiveness is the corporate manipulation entities engage themselves in order to lower tax income due to a kind of tax planning that can be considered as tax management. This concept may have multiple conceptualizations, references and even different ways to measure, but most of them have the same meaning and the same purpose but differs in their repercussions on the companies' health. According to Chen et al. [19], tax aggressiveness can be defined as a simple trigger tax management activities that corporate entities utilized for tax planning and is that tax aggressiveness reduces tax returns. Aggressive tax represents different handling activities to lower taxable income that can be legal or illegal.

In this study, the researcher considered tax aggressiveness as a strategy employed by the management of corporate organizations, a set of processes, practices, resources and choices whose objective is to maximize income after all corporate entities as well as their liabilities owed to the state and other stakeholders. The implementation of this kind of strategies is geared towards reducing the tax base which allows generation of high potential non-tax cost that arises from agency conflicts or tax-authority, such as penalties and rent extraction [21]. In fact, the most significant aim of tax aggressiveness as observed by Chen et al. [19], is aimed at increasing the net income of companies which creates a positive signal to foreign investors. It is worthy to note that tax

aggressiveness have similar meaning as tax planning, tax avoidance and tax shelters in that they meet the legal and ethical provisions established by the tax authorities. However the extreme level of tax aggressiveness is tax avoidance. Tax aggressiveness is characterized by an excessive use of tax avoidance's acts [22]. This study examined tax aggressiveness (TAG) as a proxy of corporate tax planning. Corporate TAG assesses the tax performance of firms. Thus, it is the best measure to evaluate the actual corporate tax burdens. Previous studies have used various methods for measuring corporate TAGs, where the numerator was the measure of the company's tax liability and the denominator was the measure of its income. As for this study, current-based TAG is used. It is defined as a ratio of current income tax expense (total income tax expense minus deferred tax expense) divided by pretax income.

2.1.3 Board size

The board size is a fundamental component of the features of the board which permits coping with aggressive managerial manipulation [23]. The Nigerian code of corporate governance practices recommended specific number of directors that must compose the board. This number presents the best size that promotes quick decision-making in the organization. Similarly, the literature argued that large boards are generally perceived as being less effective in the exchange of ideas, promoting coalition between board members [24] as well as impinging aggressive tax measures. In the same vein, Gonzalez and Garcia-Meca [25] believed that excessive board size can be an obstacle to speed and efficiency in decision-making of organization owing to the factor that it may cause coordination and communication problems among members of the board.

According to Jensen [26], large boards are less efficient than small ones. The same way, Beasley [27] found that the likelihood of financial fraud increases with the size of the board. A study by Zemzem and Ftouhi [28] showed that a small board lessens tax aggressiveness. On the other hand, Yermack [17] study revealed that a small size of the board is more effective than large board size. A study by Lanis and Richardson [1] found a significant association between the number of board size and tax aggressiveness. Furthermore, Dimitropoulos and Asteriou [29] study found a relationship between the board size and the informational power of the

accounting outcomes. Consequently, Xie, Davidson and DaDalt [30] found a negative association between board size and tax aggressiveness. Thus, the above position allowed the researcher to incorporate board size as a corporate governance measure in the study.

2.1.4 Independent directors

The independence of directors or the board has a number of internal and external directors. The independence of the directors provides effective control of managers as suggested by the agency theory. Undeniably, external members can ensure the competence and independence at the same time. Consequently, internal directors are frustrated by some dependence as their categorized rank relative to the management. The dependence of the directors prevent the ability of administrators against managerial decision-making. Recent empirical evidence in developed countries [31,32] have shown that firms with a very independent board are less exposed to violations of accounting and tax matters.

Minnick and Noga [33] believed that the independent directors may be willing adopt an effective tax management technique that is capable of improving business performance. These administrators at some point in time may provide useful knowledge from their own experiences and their industry that can guarantee improved business performance. Gonzalez and Garcia-Meca [25] asserted that board independence negatively affects earnings of management. On the other hand, Armstrong et al. [31] found that the board independence has a positive association with tax avoidance in the upper tail of the distribution of tax evasion and a negative association in the lower tail. These researchers affirmed that their results are consistent with the hypothesis that sophisticated and independent directors can detect decisions associated with tax aggressiveness and agency problems.

Besides, Richardson et al. [32] investigated the connection between tax aggressiveness and independent directors using Australian firms and found that the effect of the connection between the independence of directors, the establishment of an effective risk management system and internal control together reduced tax aggressiveness among Australian firms. In the same way, Lanis and Richardson [1] showed through a LOGIT regression model for a sample

of 32 firms, the inclusion of a high proportion of external members in the board reduces the possibility of tax aggressiveness. The results of Waweru and Riro [34] suggested that firms with a more independent board are less likely to manage their results. Thus, the above position allowed the researcher to incorporate independent directors as a corporate governance measures in the study.

2.1.5 Board diversity

The developing countries, such as Nigeria is beginning to recognize the fundamental role played by board diversity in an organization. Croson and Gneezy [13] showed that the women are more risk averse than men, particularly in certain economical domains, and they are less involved than men in non-ethics behaviors. Kastlunger, et al. [35] believed that women should expose higher levels of tax compliance. Nevertheless, the men should show important levels of tax evasion. The tendency of the men for the evasion of taxes is explained by several factors as the social differences. Mhamid and Hachana [36] argued that board diversity boost performance in the organization. In the context of tax planning, Aliani, M^hamid and Zarai [37], introduced the issue of gender diversity and female values. They concluded that the presence of women holds back the tax planning strategy within the firm. Thus, the above position allowed the researcher to incorporate board diversity as a corporate governance measures in the study.

2.1.6 Non-executive to executive directors

Non-executive to executive directors on the board refers to the total number of directors in relation to their level of independence [38]. An independent non-executive director is an independent director who has no affiliation with the organization except for their directorship. The 2011 SEC Code of Corporate Governance provides that there shall be at least one (1) independent non-executive director. On the contrary, the CBN Code of Corporate Governance [39] provided that there shall be at least two (2) independent non-executive director in the board. The purpose of the non-executive to executive directors is to ensure the independence; impartiality; wide experience; special knowledge and personal qualities. The belief is that non-executive to executive directors proportion is aimed at strengthening the integrity, accountability and transparency of the board; as insiders' influence is seen to be minimized.

According to Dalton and Dalton [40], an independent non-executive directors are the most important mechanisms for ensuring corporate accountability while [12] concluded that independent non-executive directors play a fundamental role in the effective resolution of agency problems of a firm and therefore their presence can lead to straightened and more effective decision-making in the firm. Non-executive directors are saddled with key responsibilities such as contributing to the strategic direction of the company; efficiently solving problems that arise; communicating with third parties; ensuring all the audit requirements are satisfied; remuneration of the executive directors; appointing the board of directors. Thus, the above position allowed the researcher to incorporate non-executive to executive directors as a corporate governance measures in the study.

2.1.7 Return on assets

Return on Assets (ROA) is a measure of the profitability level of a firm, measured by the relationship between the net income and the total assets. Richardson et al. [32] used another indicator to measure the profitability of the company. They used the relationship between the income before tax and the total assets. It is worth to note that effective tax rates (tax aggressiveness) are connected to the net book income, which justifies the measurement employed in our study. Thus, in this study, ROA was introduced as an intervening variable to moderate the effect of corporate governance on tax aggressiveness among quoted manufacturing firms in Nigeria.

2.2 Theoretical Framework

The theoretical framework of this study is premised on the agency theory (AGT). AGT emphasizes the agency problems arising from the separation of ownership and control. AGT emphasized the connection between providers of corporate finances and those entrusted to manage the affairs of the firm. According to the theory, agency relationship exist in terms of "a contract under which one or more persons (the principals) engage another person (the agent) to perform some service on their behalf which involves the delegation and concentration of control on the board of directors (agent)" as cited in [1]. Furthermore, AGT explained the variations in decisions; that the two parties often have

different goals and, different attitudes toward risk [19]

Positivist researchers have tended to focus on identifying circumstances in which the principal and agent are likely to have conflicting goals and then describe the governance mechanisms that limit the agent's self-serving behavior [41]. This stream has focused almost exclusively on the principal-agent connection existing at the level of the firm between shareholders and managers. For example, Jensen [26], who fall under the positivist stream, propose agency theory to explain, *inter alia*, how a public corporation can exist given the assumption that managers are self-seeking individuals and a setting where those managers do not bear the full effects of their actions and decisions.

The AGT also assumes that tax management is a firm's strategic choice that is defined by an employment contract (actual or implied) between shareholders and tax managers. Chen et al. [19] indicated the suboptimal level of employment contracts resulting from a firm's tax avoidance strategy for two reasons. First, managers should be assured with *ex ante* compensations for future efforts to reduce tax liabilities. Thus, the level of compensation is not tied with the level of managers' actual effort. Second, managers' attempt to reduce a firm's tax liabilities would compromise the integrity of its internal control systems. Thus, managers could create on purpose and take advantage of the opaque internal control function for their own personal gains at the expense of shareholders, thus making them tax aggressive.

2.3 Review of Empirical Studies

Quite a number of studies have examined corporate governance on tax aggressiveness, earnings manipulation and a host of other variables in developed and developing countries, however, few studies have been conducted using the manufacturing sector in Nigeria. For instance, Dridi and Adel [23], examined the influence of corporate governance on earnings manipulations using book-tax differences (BTD). Their study utilized a sample of 21 corporations quoted on the Tunisian stock market during the period 2003-2012 by employing regression analysis to test the prediction that the governance measures or variable reduces the possibility of earnings and tax aggressiveness. The study found that ownership structure is a fundamental corporate governance measure or

variable that affects BTD. In addition, the study found that BTD does not vary with board size and the cumulative effect of the function of chief executive and president of the board. More importantly, the study found that the percentage of outside directors is connected with managerial discretion.

Kerr, Price and Roman [42] investigated the relationship between the strength of corporate governance and tax avoidance among Mexican firms prior to the governance reform in 2000. The variables employed were size, changes in cash, market value of equity, tax reform and governance index among others. Using a regression approach, the study found that governance measures are generally unaffected by equity incentives. Also, that tax avoidance decreases significantly following the implementation of the governance reform in Mexico. The implication of their result is that there is a causal link between the strength of governance systems and tax evasion. Kourdoumpalou [43] explored the connection between corporate governance practices and the extent to which tax evasion among Greek quoted companies affect book-tax conformity. The study sample consisted of public companies quoted on Athens Stock Exchange (ASE) during the period 2000-2004 and the data of corporate governance practices was manually collected from company annual reports. Variables of stock held by shareholders, board size, CEO duality, stock held by board members, board compensation were utilized in this study. The study suggested that tax evasion is lower when the chairman of the board is also the owner of the company. Also, a strong negative connection was established between tax evasion and a) the percentage of stock held by the owner and its family members and b) the percentage of stock held by board members. In addition, the remuneration of the board members through the distribution of profits has been found to significantly decrease the evasion of taxes whereas tax evasion is higher when board members are also employees of the company.

Ying, [44] using 229 publicly quoted firms in China, investigated the effect of corporate governance on tax aggressiveness by adopting the agency perspective of the firm based upon the nexus of institutional arrangements in place in China. The study period was between 2006-2012 period (1080 firm-year observations). This study advanced a new, refined method of separating company book-tax differences (BTDs)

into a 'normal' component of BTDs that arises as a result of divergence between Chinese GAAP and tax rules, and an 'abnormal' BTD component which is presumed to arise as a result of earnings management and tax planning. The findings of the study showed that firms with political connections via controlling shareholder and the state ownership are more tax aggressive than other firms in China.

Ribeiro [45] examined the determinants of effective tax rates in a view to ascertaining the effect of firms' characteristics, corporate governance on tax aggressiveness in Portugal. With the inclusion of corporate governance attributes, this study obtained a more complete model in order to test what affects effective tax rates (ETRs). The study estimated regression using Generalized Least Squares (GLS) cross-section weights with time fixed effects via the inclusion of year dummy variables. The findings showed that firms' specific characteristics have influence on ETRs. Also, that larger and more profitable firms have higher ETRs. Unlike size and profitability, there is a negative relation between leverage, capital intensity, research and development expenses and ETRs.

Boussaidi and Hamed [18] examined the influence of some governance measures on corporate tax aggressiveness in Tunisia. The study was based on the analysis of a sample of Tunisian quoted companies for the period 2006-2012. The study adopted a regression model and the regression model was based on diversity in gender on corporate board, managerial and concentration ownership and tax aggressiveness activities. The findings suggested that board diversity and managerial ownership exhibit a positive relation with the effective tax rate while increases in concentration ownership tend to affect it negatively. In addition, there was no significant effect of corporate board size and external auditors profile on the tax aggressiveness activities.

A study was carried by Mulyadi, Anwar and Erminus [46] on corporate governance corporate tax management in Indonesia. This study measured corporate tax management by using effective tax rate (ETR and current ETR) while corporate governance by board size, independent directors, board compensation to sales and control variables, leverage and return on assets. By using several other control variables, the study utilized regression analysis and conducted the statistical analysis to examine

the association between corporate governance and corporate tax management. The findings showed that corporate governance have a significant relationship to corporate tax management.

Salihu, Obid and Annuar [47] study appraised the influence of substantial government ownership on corporate tax avoidance. The data for the investigation emanated from the top 100 Malaysian forms over a three-year financial period. The results of the system GMM estimation of the dynamic panel data models using four similar measures of tax avoidance revealed an inconclusive finding. The connection between government ownership and corporate tax avoidance is documented for only two of the measures. A further qualitative enquiry through personal interview sessions with ten tax auditors revealed a similar inconclusive finding.

Kraft [48] explored the determinants of the effective tax rate (ETR) of German firms spanning the Germany's Corporate Tax Reform 2008 (GTR08) using regression models. The results showed that larger firms, growth firms, and firms with higher free cash flow (FCF) appear to have higher ETR. Leverage and operating lease expenses tend to be negatively associated with ETR. The findings showed that more profit Table firms appear to engage more in tax strategies that result in lower ETRs. Moreover, they indicated that multinational firms have more possibilities to reduce the tax burden, resulting in a negative association with ETR. Germany's tax reform of 2008 has a negative effect on ETR and impacts some firm-specific factors. For more levered firms, the association between leverage and ETR is positive affected by the ETR.

Sartaji and Hassanzadeh [49] investigated the connection between corporate governance and tax violations in Tehran Stock Exchange. Correlational research methodology was employed in the study. Using the Cochran sampling technique, a sample size was obtained and the data obtained from questionnaires deductive and descriptive statistical methods. The K-S test results showed that the test distribution is not normal. Due to this, the study utilized a multi-regression to test the hypothesis and found that ownership percentage executive managers, institutional ownership and boards of directors independence has no significant association with effective tax rate in Tehran Stock Exchange. However, boards of director's

independence has no significant association with effective tax rate in Tehran Stock Exchange.

Fakile and Uwuigbe [50] examined the interactions between corporate governance and taxation in Nigeria and found that the intersection of taxation and corporate governance have received renewed attention in recent years as a result of the concern with tax shelters and managerial malfeasance. Also, their study found that the impact of tax systems on corporate ownership patterns, and how ownership patterns in turn constrain corporate taxation, appears to warrant further analysis.

Khaoula [16] assessed the influence of corporate governance on tax planning in America. This study adopted the agency theory and the corporate social responsibility point view to assess how firms can achieve a successful tax planning strategy. Using a sample of 300 American firms during the period study 1996-2009, the study found that the presence of corporate social responsibility committee, stock options and independent directors constitute fundamental factors of corporate tax planning. However, the study did not find any significant association between board size and the ETRs.

Zarai [51] study provided a wide-range investigation, by establishing a link between corporate tax planning and debt endogeneity. This study proposed a tax framework for studying debt endogeneity. Using a sample of standard and poor (S & P) 500 firms, the results of the simultaneous equation demonstrated that leverage; return on assets and net operating loss are the main factors determining corporate tax planning.

Khaoula and Ali [52] investigated if board of directors' attributes have an effect on corporate tax planning in Tunisia. Using a sample of 32 firms quoted on the Tunisian stock exchange market from 2000-2007, the outcome of the analysis showed that duality and diversity on the board of directors significantly influences tax planning. First, duality exhibits a negative relation with effective tax rates; second, diversity on the board showed a positive association. In addition, this study did not find any association between board size, independent directors and corporate tax planning.

Balakrishnan, Blouin and Guay [53] examined whether tax aggressiveness of firms have less transparent information environments and the

extent that this greater financial complexity cannot be adequately communicated to outside parties, such as investors and analysts, transparency problems can arise. Using variables of tax aggressiveness, information asymmetry, analyst forecast errors, and earnings quality, the study suggests that aggressive tax planning decreases corporate transparency. In addition, the study revealed that managers at tax aggressive firms attempt to mitigate these transparency problems by increasing the volume of tax-related disclosure. On the overall, the study found a trade-off between financial transparency and aggressive tax planning.

Using multiple measures to capture tax aggressiveness and founding family presence, Cheng, et.al (2010) study set out to find if family firms are less tax aggressive than their non-family counterparts during the period 1996-2000 for 1,003 Chinese firms. The study employed regression model and the result showed that family owners are willing to forgo tax benefits in order to avoid the non-tax cost of a potential price discount, which can arise from minority shareholders concern with family rent-seeking masked by tax avoidance activities.

Noor, Nur and Nor [54] investigated corporate effective tax rates (ETRs) of Malaysian public companies listed on Bursa Malaysia during official assessment system and self-assessment system tax regimes. This study was aimed at investigating the level of corporate ETRs during official assessment system and self-assessment system tax regime and. This study utilized a pooled sample data of 316 companies during the period 1993-2006. In determining the two tax regime, the investigation period was classified into two: the period from 1993-2000 (official assessment system tax regime) the period from 2001-2006 (self-assessment system tax regime). This study finds that corporate ETRs are below the statutory tax rate (STR) in both tax regimes. In addition, the study revealed that ETRs during the self-assessment system tax regime is lower than the official assessment system tax regime.

Dyreg, Hanlon and Maydew [55] study examined whether individual top executives have incremental effects on their firms' tax avoidance that cannot be explained by characteristics of the firm. In order to identify executive effects on firms' effective tax rates, the study constructed a dataset that tracks the movement of 908

executives across firms over time. The results indicated that individual executives play a significant role in determining the level of tax avoidance that firms undertake. The economic magnitude of the executive effects on tax avoidance is large. Moving between the top and bottom quartiles of executives results in approximately an 11 percent swing in GAAP effective tax rates; thus, executive effects appear to be an important determinant in firms' tax avoidance.

A study was conducted by Attiya and Iqbal [56] on ownership concentration, corporate governance and firm performance in Pakistan during the period 2003 - 2008. The ordinary least square estimation technique was employed in the analysis of data. Ownership variables such as ownership concentration (T5), managerial shareholding (Dir) separately to access block-holders and directors' ownership were employed. The results suggested that there is negative relationship between ownership concentration and quality of corporate governance.

Desai, Dyck and Zingales [21] analyzed the interaction between corporate taxes and corporate governance in United States of America using a regression model. The study showed that the characteristics of a taxation system influence the size of private benefits managers are able to extract. The study found that a higher tax rate increases the amount of income a manager would divert, while stronger tax enforcement reduces it and, in so doing, can raise the stock market value of a company in spite of the increase in the tax burden. In addition, the study showed that companies and market reactions to tax enforcement variation in Russia provide evidence that is consistent with this prediction. Also, the study revealed that corporate governance system affects the level and sensitivity of tax revenues to tax variation.

3. RESEARCH METHODS

3.1 Research Design

This study employed expo-facto research design. This design was adopted because it seeks to analyze already existing events where the researcher cannot manipulate the data. The data used were gotten from the annual reports and accounts of manufacturing firms quoted on the floor of the Nigerian Stock Exchange.

3.2 Population of the Study

The population for this study consisted of all the manufacturing firms quoted on the floor of the Nigerian Stock Exchange (NSE) at 2016. These manufacturing firms are those categorized as Conglomerates, Consumer Goods, Industrial Goods and Construction and Real Estates. As at 2016, there were about fifty-seven (57) manufacturing firms in this category that are quoted on the floor of the Nigerian Stock Exchange (NSE, 2016).

3.3 Sample and Sampling Technique

The sample size for this study is forty (44) manufacturing firms quoted on the floor of the Nigerian Stock Exchange (NSE). However, the random sampling technique was adopted for sample selection based on the need to have an unbiased sample size which affords each member of the population an even chance of being selected and also based on the availability of the required information to achieve the objective of the study. Therefore, only firms with financial statements covering the time period of 2005 to 2016 were selected based on access to their annual reports and accounts.

3.4 Study Variables and Data Source

Tax aggressiveness (TAG), Board Size (BSIZE), Board Diversity (BDIV), Independent Directors (INDEP), proportion of Non-executive Directors to Executive Directors (NEDED) were measured by their values as obtained from annual reports and the Nigerian Stock Exchange Fact Book. The data for the study are secondary data and are sourced from the annual reports of the manufacturing firms for the period 2005 to 2016.

3.5 Model Specification

The study examined the effect of corporate governance on tax aggressiveness of quoted manufacturing firms in Nigeria over a period of twelve (12) years from 2005 to 2016. This study employed panel data analysis which is a combination of time series and cross sectional data analysis. A multiple regression equation was set up to investigate the hypothesized relationships between the dependent variable (tax aggressiveness) and independent variables (board size, board diversity, independent directors and proportion of non-executive directors to executive directors) in this study. The

general form of the panel data analysis model is specified as:

$$Y_{it} = \beta_0 + \beta BC_{it} + \mu_{it} \quad (1)$$

Where:

- Y_{it} = dependent variable (Tax aggressive measure)
- β_0 = constant
- β = coefficient of the explanatory variable
- BC_{it} = explanatory variable in the model
- μ_{it} = error term (assumed to have zero mean and is independent across time period)

The researcher builds on the model of Zemzem, & Ftouhi [28] which is specified as:

$$\text{LogETR}_{it} = \alpha_0 + \alpha_1 \text{Log BSIZE}_{it} + \alpha_2 \text{Log INDEP}_{it} + \alpha_3 \text{Log DIV}_{it} + \alpha_4 \text{Log DUA}_{it} + \alpha_5 \text{Log ROA}_{it} + \alpha_6 \text{Log FSIZE}_{it}$$

Following the model given by Zemzem & Ftouhi (2013), the researcher specified the model for the study as:

$$\text{TAG} = \beta_0 + \beta_1 \text{BSIZE} + \beta_2 \text{BDIV} + \beta_3 \text{INDEP} + \beta_4 \text{NEDED} + \mu \quad (2)$$

In line with equation 2 above, the model of our study is further expressed mathematically below:

$$\text{TAG} = f(\text{Corporate Governance Measures}) \quad (3)$$

The regression model for the empirical analysis is therefore given as follows:

$$\text{TAG} = f(\text{BSIZE, INDEP, BDIV, NEDED}) \quad (4)$$

Restating equation (4) after introducing an intervening variable (Return on Asset: ROA), it becomes:

$$\text{TAG}_{it} = \alpha_0 + \alpha_1 \text{BSIZE}_{it} + \alpha_2 \text{BDIV}_{it} + \alpha_3 \text{INDEP}_{it} + \alpha_4 \text{NEDED}_{it} + \alpha_5 \text{ROA}_{it} + \mu_{it} \quad (5)$$

A-priori expectation of the relationship is that $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0$; In other words, the study expects that the parameter (α) of the explanatory variables (BSIZE, BDIV, INDEP, NEDED and ROA), will have a significant impact on effective tax aggressiveness.

Where:

TAG= Tax Aggressiveness (dependent variable: measured by effective tax

	rate and is given as Total Tax Expense/Pre-Tax Income
BSIZE=	Total number of directors on the board at the end of financial year for company <i>i</i> in time <i>t</i>
BDIV=	Board diversity is measured in terms of percentages of women in the board for company <i>i</i> in time <i>t</i> ,
INDEP=	Percentage of independent directors on the board for company <i>i</i> in time <i>t</i> ,
NEDED=	Proportion of Non-executive (Outsider) directors to executive (insider) director for company <i>i</i> in time <i>t</i>
ROA=	Return on Assets of the firms <i>i</i> in time <i>t</i>
<i>it</i> =	Represent all the 40 firms in the sample and 12 years time period respectively
μ_{it} =	Error term

3.6 Method of Data Analysis

The data collected for the study representing corporate governance and tax aggressiveness were analyzed using descriptive statistics including mean, median, standard deviation, minimum, maximum, skewness, kurtosis and Jacque Bera test. The study hypotheses were tested using inferential statistics which include the regression tests and the test of correlation. A fixed effect and random effect regression analysis were employed to evaluate the impact of corporate governance on tax aggressiveness, while the correlation analysis was carried out to establish the degree of association of board characteristics proxies with that of tax aggressiveness and as well test for multicollinearity. The study adopted a panel data analysis which employs fixed effect and random effect regression technique. The data were analyzed using STATA 13.0 statistical software.

4. DATA PRESENTATION AND ANALYSIS

4.1 Preliminary Analysis

Table 1 above reports the descriptive statistics of the dependent variable (Tax Aggressiveness: TAG) and independent variables (Board Size: BSIZE; Board Diversity: BDIV; Independent Directors: INDEP; Proportion of Non-Executive Directors to Executive Directors: NEDED) and intervening variable (Return on Asset: ROA). From the Table above, the mean value of TAG, BSIZE, BDIV, INDEP, NEDED and ROA were 0.9555, 11.235, 1.3755, 1.0605, 2.5305 and 0.042 respectively while the median values were 0.1575, 10.5, 1.05, 1.05, 2.3625 and 0.021

respectively. It is obvious from the descriptive statistics that TAG recorded the highest maximum (341.849) and minimum (-27.615) values while BDIV and INDEP recorded the lowest values (0) respectively. The implication of the zero values is that some manufacturing firms do not possess board diversity and independent directors. In addition, the enormous variation of the variables over the period under investigation can be captured in the maximum and minimum values of the variables. The implication is that there are significant variation in all the variables over the period under investigation.

Furthermore, the standard deviation of all the variables were 16.8105, 3.612, 1.2705, 1.05, 1.3125 and 0.1155 respectively for TAG, BSIZE, BDIV, INDEP, NEDED and ROA. The implication of the above result of the standard deviation is an indication that the variables are not constant over time. Since all the variables are not constant over time, this circumstance permitted the researcher in examining the relationship and effect of corporate governance and tax aggressiveness.

Furthermore, we conducted heteroskedasticity test using the Jarque-Bera statistics whose probability values are less than 5% (significant at 5%) for all the series validating the result of the skewness and kurtosis that all the series are not normally distributed. However, when the probability value of the Jarque-Bera statistics is less than the 10%, 5% or 1% level of significance, the series are said to be normally distributed and Ordinary Least Square estimator becomes grossly inappropriate. This informed the choice of the panel (Fixed effect and random effect) regression models for estimations in this study.

In data analysis, the correlation matrix is used to test for the presence of absence of multicollinearity among variables. Multicollinearity means interdependence among independent variables in a regression model. It is an econometric problem that nullifies the result of the ordinary least square and leads to wrong statistical implications as well as misleading policy decisions in research. In order to examine the presence or absence of interdependence among the variables under investigation, a pair-wise correlation test was performed. The result showed that there is the association between each pair of the variables used. However, the correlation matrix showed that all the variables were positively correlated except NEDED and

ROA which are negatively related to TAG. Variables of BSIZE, BDIV and INDEP were positively related to TAG. In spite of the inverse correlation among the variables (i.e. positive and negative), none of the correlation coefficients exceed 0.8. The implication is that there is the absence of multicollinearity among the variables under investigation.

4.2 Regression Results

The regression result showed the signs, size and significance of the coefficients of the variables under investigation. The sign encompassed the nature of the relationship between the dependent and independent variables. This relationship may be positive or negative as the case may be.

Table 1. Descriptive statistics of the dependent & independent variables

Statistics	TAG	BSIZE	BDIV	INDEP	NEDED	ROA
Mean	0.9555	11.235	1.3755	1.0605	2.5305	0.042
Median	0.1575	10.5	1.05	1.05	2.3625	0.021
Maximum	341.849	21	5.25	5.25	7.35	1.1025
Minimum	-27.615	4.2	0	0	0.525	-0.399
Std. Dev.	16.8105	3.612	1.2705	1.05	1.3125	0.1155
Skewness	20.9685	0.714	0.84	1.659	1.281	3.6225
Kurtosis	426.29	2.8245	3.423	7.1295	4.956	33.9465
Jarque-Bera	3006247	35.595	48.762	448.928	163.475	16638.3
Probability	0	0	0	0	0	0
Observation	528	528	528	528	528	528

Source: Secondary Data from STATA Output, 2017

Table 2. Correlation matrix result

Variables	BSIZE	BDIV	TAG	INDEP	NEDED	ROA
BSIZE	1.000					
BDIV	0.621	1.00				
TAG	0.317	0.23	1.000			
INDEP	0.449	0.435	0.0061	1.000		
NEDED	-0.210	-0.150	-0.318	-0.328	1.0000	
ROA	-0.194	-0.21	0.029	-0.341	-0.0127	1.000

Source: Secondary Data from STATA Output, 2017

Table 3. Result of fixed effect regression

Variables of the study	Fixed effect outcome
Board Size (BSIZE)	-0.01649 (0.51313)
Board Diversity (BDIV)	0.815983*** (0.21396)
Independent Directors (INDEP)	1.46489*** (0.42531)
Non-executive (Outsider) Directors (NEDED)	-1.20702*** (0.29929)
Return on Asset (ROA)	0.184688 (1.35981)
Constant (TAG)	15.23795*** (4.11121)
R-squared	0.47838

Standard errors in parentheses ***, ** and * denote 1%, 5% and 10% level of significance respectively

Source: Secondary Data from STATA Output, 2017

Also, the size showed the effect of the independent variables on the dependent variable while the significance revealed how fundamental the independent variables as determinants of the dependent variables are. The significance of the independent variables as determinants of the dependent variable was measured by the standard error, t-statistics or the p-value. First we presented the result of fixed and random effects regression, which was closely followed by the fitness and joint significance of the test of the regression models.

The results of the fixed effect regressions for the investigation of the effect of corporate governance and tax aggressiveness is presented in Table 3 above. The dependent variable is tax aggressiveness (TAG) while the independent variables comprised of Board Size (BSIZE), Board Diversity (BDIV), Independent Directors (INDEP), Non-Executive (Outsider) Directors (NEDED) and Return on Asset (ROA). The result in Table 3 showed that BSIZE and NEDED are negatively correlated to TAG, as seen in the coefficient of the variables -0.01649 and -1.20702 respectively while BDIV, INDEP and ROA are positively correlated to TAG as also revealed by the coefficient of the variables 0.815983, 1.46489 and 0.184688 respectively. However, BDIV, INDEP and NEDED are the variables that are statistically significant. This is revealed by the coefficients of the three variables with corresponding standard errors. The implication of the above is that the independent variables such as BDIV, INDEP and NEDED have significant effect on corporate tax aggressiveness measured by TAG of quoted manufacturing firms in Nigeria.

The extent of the effect of the variables is measured by the values of the coefficients of the variables in (see Table 3). By size, the estimates of the coefficients revealed that an increase in Board Diversity (BDIV) and Independent Directors (INDEP) will respectively lead to 0.51313 and 0.42531 increase in the TAG. On the other hand, an increase in Non-executive (Outsider) directors (NEDED) will result to 0.29929 decrease in TAG. By implication, quoted manufacturing firms in Nigeria with greater proportion of non-executive directors tends to have low TAG while firms with greater Board Diversity (BDIV) and large number of Independent Directors (INDEP) will have greater TAG. This suggests that these three corporate governance variables (BDIV, INDEP and NEDED) exerts gargantuan effect on tax

aggressiveness of quoted manufacturing firms in Nigeria. The results of the random effect regression are presented in Table 4.

The result in Table 4 above on the random effect regression revealed shows that NEDED is negatively correlated to TAG while BSIZE, BDIV, INDEP and ROA are positively correlated to TAG. This is similar to that of the fixed effect regression except for BSIZE which has negative association with TAG in the fixed effect regression model earlier reported. Meanwhile, the random effect regression model showed that Board Diversity (BDIV), Independent Directors (INDEP) and Non-Executive (Outsider) Directors (NEDED) are statistically significant at 5% and 1% level. Furthermore, the statistical significance suggests that BDIV, INDEP and NEDED are fundamental determinants of TAG. Thus, BDIV, INDEP and NEDED as seen in Table 4 as (0.885241, 1.524271 and -1.0967) significantly affect the extent of tax aggressiveness of quoted manufacturing firms in Nigeria. The coefficients of the variables as stated above suggests that an increase in Board Diversity (BDIV) and Independent Directors (INDEP) will result to 0.885241 and 1.524271 increase in TAG of the quoted manufacturing firms in Nigeria. Inversely, an increase in Non-executive directors (NEDED) will result to -1.0967 change in TAG. These figures appears small but represent a greater influence of the variables on TAG. This is so because the descriptive statistics revealed that the average TAG is 0.9555. Therefore, the random effect regression model showed that BDIV, INDEP and NEDED have significant influence on TAG and subsequently greatly affect the extent of tax aggressiveness of manufacturing firms in Nigeria.

The result of regression model as represented in Table 5 above is considered valid for policy inferences only when it has good fit and the joint significance of the variables is established. However, in order to determine the goodness of fit of the regression model of the study, the R^2 statistics was employed. The R^2 of the fixed and random effect models are 0.7210 and 0.7611 respectively. This implies that the fitness of all the models is good. It suggests that the fixed and random effect regression models respectively showed that 72.10% and 76.11% changes in TAG is explained by changes in the independent variables (BSIZE, NEDED, BDIV, INDEP and ROA). That is, significant part of the variation in TAG is due to changes in the

independent variables. Thus, all the models have a good fit and their estimates are valid for empirical inferences. Furthermore, in order to determine the joint significance of the independent variables in the regression models employed in this study, the f-test for the fixed effect model and Wald test for random effect model were conducted. The null hypothesis in both test is that the independent variables are not jointly significant.

The result of the test of joint significance tests showed that f-statistics of fixed effect model is

8.79 with p-value .0000. Correspondingly, the Wald test statistics of the random effect model is 77.04 with p-value .0000. This is a clear indication of the rejection of the null hypothesis and the acceptance of joint significance of the independent variables in the regression models. Consequently, the independent variables considered jointly have significant effect on the dependent variable. The implication is that the models passed the joint significant test showing that the independent variables are not only individually significant but also relevant jointly.

Table 4. Result of random effect regression

Variables of the study	Random effect outcome
Board Size (BSIZE)	0.139706 (0.51765)
Board Diversity (BDIV)	0.885241*** (0.19516)
Independent Directors (INDEP)	1.524271*** (0.34355)
Non-Executive (Outsider) Directors (NEDED)	-1.0967*** (0.28001)
Return on Asset (ROA)	0.403767 (1.33304)
Constant (TAG)	13.99083*** (2.87076)
Observations	528
Number of Manufacturing Firms Studied	44
R square	0.47221

Standard errors in parentheses ***, ** and * denote 1%, 5% and 10% level of significance respectively
Source: Secondary Data from STATA Output, 2017

Table 5. Fitness and joint significance test of the regression models

Model	Test	Goodness of fit R-squared (R ²)	Joint significance	
			Test statistics	P-value
Fixed Effect Regression		0.7210	8.79	.0000
Random Effect Regression		0.7611	77.04	.0000

Source: Secondary Data from STATA Output, 2017

5. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

Based on the analysis of data, the following findings emerged:

1. That board size has no significant impact on tax aggressiveness of quoted

manufacturing firms in Nigeria despite the existence of a weak positive relationship between both variables.

2. That board diversity has a significant effect on tax aggressiveness on quoted manufacturing firms in Nigeria. This implies that an increase in the number of women on the board increases the effective tax rate.
3. That existence of independent director has a significant effect on tax aggressiveness

of quoted manufacturing firms in Nigeria. This implies that the existence of a higher percentage of independent director on the board increases the effective tax rate (tax aggressive activities are low).

4. That the existence of a higher proportion of non-executive revealed a negative relationship between a higher proportion of non-executive director to executive director and effective tax rate. Also, the variable is negatively significant to effective tax rate.
5. The control variable (Return on Asset) was significantly associated with corporate tax aggressiveness.

5.2 Conclusion

Based on the findings of the study, the study concluded that there exist a significant relationship between corporate governance mechanisms and tax aggressiveness of quoted manufacturing firms in Nigeria. It is thus timely that regulatory bodies such as the Security and Exchange Commission (SEC) and Central Bank of Nigeria (CBN) established for the inclusion of more women and independent directors on the board as their presence on the board makes the firm less aggressive. Therefore, owing to the significant relationship between corporate governance mechanisms on tax aggressiveness, the role played by corporate governance in mitigating against tax aggressiveness cannot be over emphasized.

5.3 Recommendations

Based on the findings of the study, the following recommendations were proffered:

1. That quoted manufacturing firms in Nigeria should pay less attention to the size of their board, but rather focus on the quality and integrity of the members of the board.
2. That quoted manufacturing firms in Nigeria should give value to diversity in the board composition within the firm as diversity in the board decreases tax aggressiveness.
3. That quoted manufacturing firms in Nigeria should adhere strictly to the SEC and CBN code of corporate governance provisions which provides that a company should have one (1) and two (2) independent directors respectively. This is necessitated as the presence of independent directors ensures independence of the board;
4. That quoted manufacturing firms in Nigeria should ensure the involvement of more

independent non-executive directors than non-executive directors. This is vital as revealed from the study that the proportion of non-executive director to executive director has a negative significant influence on tax aggressiveness of the observed firms.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX I

Detailed Output of Regression Result Via STATA 13.0

```

----- (R)
/___/ /___/ /___/ /___/ /___/
___/ /___/ /___/ /___/ /___/ 13.0 Copyright 1985-2013 StataCorp LP
Statistics/Data Analysis StataCorp
4905 Lakeway Drive
MP - Parallel Edition College Station, Texas 77845 USA
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979-696-4600 stata@stata.com
979-696-4601 (fax)

```

```

3-user 8-core Stata network perpetual license:
Serial number: 501306208483
Licensed to: ORACLE
ORACLE

```

Notes:

1. (/v# option or -set maxvar-) 5000 maximum variables
- ```

. *(6 variables, 527 observations pasted into data editor)
. *(6 variables, 1 observation pasted into data editor)
. summarize tag bsize bdiv indep neded roa

```

| Variable | Obs | Mean   | Std. Dev. | Min     | Max     |
|----------|-----|--------|-----------|---------|---------|
| tag      | 528 | 0.9555 | 16.8105   | -27.615 | 341.849 |
| bsize    | 528 | 11.235 | 3.61200   | 4.20000 | 21,0000 |
| indep    | 528 | 1.3755 | 1.27050   | 0.00000 | 5.25000 |
| neded    | 528 | 1.0605 | 1.05000   | 0.00000 | 5.25000 |
| roa      | 528 | 2.5305 | 1.31250   | 0.52500 | 7.35000 |
| roa      | 528 | 0.0420 | 0.11550   | -39900  | 1.10250 |

```

sktest tag bsize bdiv indep neded roa
Skewness/Kurtosis tests for Normality

```

| Variable | Obs | Pr(Skewness) | Pr(Kurtosis) | adj chi2(2) | joint Prob>chi2 |
|----------|-----|--------------|--------------|-------------|-----------------|
| tag      | 528 | 20.9685      | 426.29       | 3006247     | 0.0000          |
| bsize    | 528 | 0.71400      | 2.8245       | 35.59500    | 0.0000          |
| bdiv     | 528 | 0.84000      | 3.4230       | 48.76200    | 0.0000          |
| indep    | 528 | 1.65900      | 7.1295       | 448.9280    | 0.0000          |
| neded    | 528 | 1.28100      | 4.9560       | 163.4750    | 0.0000          |
| roa      | 528 | 3.62250      | 33.9465      | 16638.30    | 0.0000          |

```
.correlate tag bsize bdiv indep neded roa
(obs=528)
```

|       | tag    | bsize   | bdiv   | indep  | neded   | roa    |
|-------|--------|---------|--------|--------|---------|--------|
| bsize | 1.0000 |         |        |        |         |        |
| bsize | 0.6210 | 1.0000  |        |        |         |        |
| bdiv  | 0.3170 | 0.2300  | 1.0000 |        |         |        |
| indep | 0.4490 | -0.0214 | 0.0061 | 1.0000 |         |        |
| neded | -0.210 | 0.4350  | -0.318 | -0.328 | 1.0000  |        |
| roa   | -0.194 | -0.2100 | 0.0290 | -0.341 | -0.0127 | 1.0000 |

```
.correlate tag bsize bdiv indep neded roa
(obs=528)
```

|       | tag    | bsize   | bdiv   | indep  | neded   | roa    |
|-------|--------|---------|--------|--------|---------|--------|
| bsize | 1.0000 |         |        |        |         |        |
| bsize | 0.6210 | 1.0000  |        |        |         |        |
| bdiv  | 0.3170 | 0.2300  | 1.0000 |        |         |        |
| indep | 0.4490 | -0.0214 | 0.0061 | 1.0000 |         |        |
| neded | -0.210 | 0.4350  | -0.318 | -0.328 | 1.0000  |        |
| roa   | -0.194 | -0.2100 | 0.0290 | -0.341 | -0.0127 | 1.0000 |

```
.random effect regress tag bsize bdiv indep neded roa
```

| Source   | SS         | df  | MS         | Number of obs |           |
|----------|------------|-----|------------|---------------|-----------|
|          |            |     |            | = 528         |           |
|          |            |     |            | F(5, 522)     | = 77.04   |
| Model    | 3.2955e+12 | 5   | 6.5909e+11 | Prob > F      | = 0.00000 |
| Residual | 1.4631e+13 | 522 | 2.8028e+10 | R-squared     | = 0.76110 |
|          |            |     |            | Adj R-squared | = 0.47221 |
| Total    | 1.7926e+13 | 527 | 3.4016e+10 | Root MSE      | = 1.7e+05 |

| tag   | Coef     | Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|-------|----------|-----------|-------|-------|----------------------|----------|
| bsize | 0.139706 | 0.51765   | 1.09  | 0.780 | .2619961             | .4050433 |
| bdiv  | 0.885241 | 0.19516   | 18.21 | 0.000 | -332.4705            | 318.9666 |
| indep | 1.524271 | 0.34355   | 22.03 | 0.000 | -401.1721            | 357.2338 |
| neded | -1.09670 | 0.28001   | 19.19 | 0.000 | -218.3916            | 266.447  |
| roa   | 0.403767 | 1.33304   | 0.24  | 0.521 | -3.391953            | 14.9873  |
| _cons | 13.99083 | 2.87076   | 10.01 | 0.000 | -16413.65            | 16654.59 |

fixed effect regress tag bsize bdiv indep neded roa

| Source   | SS         | df  | MS         | Number of obs |           |
|----------|------------|-----|------------|---------------|-----------|
| Model    | 3.2955e+12 | 5   | 6.5909e+11 | F(5, 522)     | = 8.79    |
| Residual | 1.4631e+13 | 522 | 2.8028e+10 | Prob > F      | = 0.00000 |
| Total    | 1.7926e+13 | 527 | 3.4016e+10 | R-squared     | = 0.72100 |
|          |            |     |            | Adj R-squared | = 0.47838 |
|          |            |     |            | Root MSE      | = 1.7e+05 |

| tag   | Coef     | Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|-------|----------|-----------|-------|-------|----------------------|----------|
| bsize | -0.01649 | 0.51313   | 9.16  | 0.300 | .2619961             | .4050433 |
| bdiv  | 0.815983 | 0.21396   | 10.04 | 0.000 | -332.4705            | 318.9666 |
| indep | 1.464890 | 0.42531   | 12.11 | 0.000 | -401.1721            | 357.2338 |
| neded | -1.20702 | 0.29929   | 9.19  | 0.001 | -218.3916            | 266.447  |
| roa   | 0.184688 | 1.35981   | 1.24  | 0.216 | -3.391953            | 14.9873  |
| _cons | 15.23795 | 4.11121   | 10.01 | 0.000 | -16413.65            | 16654.59 |

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