

Research Article

Debt and the Excess Value of Diversified Firms: Evidence from Nigeria

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Abstract

The purpose of this study was to examine the relationship between debt and the value and excess value of diversified firms in Nigeria. This is against the background that there is no consensus on the factors that distinguish value-creating from value-destroying diversified firms. Data were collected from the annual reports of 62 diversified firms listed on the Nigerian Stock Exchange between 2008 and 2018. The multilevel generalized method of moments technique in the REndo package in the R Statistical Package was used to test the hypotheses. There is a significant positive relationship between debt and diversified firms' value and excess value. The study and its findings are significant in several ways. First, no study has examined the relationship between debt and the value and excess value of diversified firms in the Nigerian context, and the few relevant studies have been in the context of developed countries. Second, it contributes to the literature on the valuation implications of firm diversification by providing some insight into the diversification discount often documented in the literature. These findings suggest that diversified firms' failure to use the debt capacity that diversification creates is one reason some experience valuation discount. Third, the study employs the multilevel GMM analytical technique to control for endogeneity in the absence of valid instrumental variables. This technique has not been used in the diversification literature. The implication of the findings is that diversified firms should use the debt capacity that diversification provides to invest in positive net present value projects. The use of debt also adds a layer of corporate governance required in an environment of increased complexity and opacity associated with diversification. Increased investment in positive NPV projects and improved corporate governance through increased use of debt will enhance firm performance and value. The increased valuation of diversified firms due to debt increases the ability of diversified firms to play their developmental role in society. Investors would also benefit more from investing in diversified firms with higher debt ratios than those with lower debt ratios, all things being equal.

Keywords

Diversification, Diversification Discount, Debt, Excess Value, SIC Code, Multilevel GMM, Nigeria

1. Introduction

This study examines how debt relates to diversified firms' value and excess value. Diversified firms account for significant economic activities worldwide—making the diversification-valuation relationship research relevant [17, 26, 49, 53].

Although the diversification-valuation relationship literature has not reached a consensus, one dominant strand of the literature is the diversification discount strand [20]. This strand of the literature maintains that the market values diversified

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Received: 26 July 2024; **Accepted:** 26 August 2024; **Published:** 6 September 2024



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firms less than what their values would be if their segments operated as focused firms [9, 11, 20, 23, 42].

However, contrary to the diversification discount literature, there is evidence that the valuation effects of diversification vary across institutional contexts, and over time [1, 25, 31, 40, 46, 53, 55]. Some authors have shown that diversification has no significant relationship with firm value [34, 47, 48, 55]. There is also evidence that while some diversified firms trade at a discount relative to focused firms, others trade at a premium [3, 10, 22, 26, 32, 34, 47, 48, 55, 60, 63]. These studies challenge the diversification discount literature and suggest that factors other than diversification explain why some diversified firms trade at a discount and others at a premium relative to focused firms [2, 16, 22, 32, 45, 55, 60].

Some authors have identified various factors that could make a difference in diversified firms' value and excess value. These factors include the approach to implementing diversification [6], the diversification profile of the firm [5], insider ownership [34, 61] and the use of derivatives [45]. Li and Li [44] suggested that some diversified firms trade at a discount because they fail to utilize the debt capacity that diversification creates. In this study, we test Li and Li's [44] proposal by examining the relationship between debt and diversified firms' value and excess value. Some researchers have studied how debt is associated with the performance of diversified firms [18, 48, 52, 54]. Other researchers introduced debt as a control variable in estimating the diversification-valuation relationship [20, 30, 58]. However, the relationship between debt and the excess value of diversified firms has been under-researched [54] and as Duan and Li [21] showed, simply including debt as a control variable does not adequately account for the impact of debt.

We contribute to the diversification-performance literature by examining how debt is related to the value and excess value of diversified firms in Nigeria. Our approach recognizes that diversification could create or destroy value in different situations and deviates from many previous studies [20] that proceeded on the premise that diversification is value-destroying. This study is closest to Ruland and Zhou [54] and Mansi and Reeb [48]. However, whereas these papers focused on US firms, we studied listed firms in Nigeria—an emerging market context with less-developed institutions than the United States and where firm diversification feature prominently [34, 35, 36]. None has conducted such a study in the Nigerian context. Being the most populous country and one of the largest economies in Africa, Nigeria provides a good context for studying the valuation effects of diversification in Africa, where the topic has been under-researched [34]. We also adopt an analytical technique—the multilevel generalized method of moments (GMM)—hitherto not been used in the diversification literature. This technique helps to deal with endogeneity concerns in the absence of valid instrumental variables and improves the robustness of the results [27].

The remainder of the paper is organized into four sections.

The relevant literature is reviewed in Section 2 and the methodology described in Section 3. Section 4 presents the study results and the implications of the results are discussed in Section 5.

2. Literature Review

Lewellen [43] put forward the pure financial rationale hypothesis of diversification, which suggests that firms diversify to reduce cash flow volatility and achieve coinsurance by operating in industries with imperfectly correlated cash flows. Stable cash flows and coinsurance could reduce default risk and increase debt capacity [24, 29, 43]. Consistent with the coinsurance hypothesis, Nußmann [51] showed that the earnings of diversified firms are more predictable than focused firms. The earnings quality of diversified firms with less correlated segment earnings is higher than those with more [51]. There is also evidence that diversification is associated with lower bankruptcy risk, cost of capital, and greater debt [4, 19, 24, 28, 29]. Ibekwe [33] also found that bank credit managers and analysts believe that due to coinsurance, diversified firms would have a lower probability of defaulting on loans.

There are many reasons to expect debt to enhance diversified firms' performance and valuation. Debt increases the capacity of diversified firms to fund positive net present value (NPV) projects [40]. The ability to fund projects is critical in constrained external financial markets, such as during the 2008-2009 financial crises [4, 40]. Due to the tax-deductibility of interest payments on a loan, increased debt capacity could provide tax benefits to firms that utilize debt [43, 64]. Wentland [64] showed that diversified firms' tax liabilities are lower than focused firms, and this is not due to more tax avoidance given Zheng's [65] finding that focused firms engage in more tax avoidance practices than diversified firms.

Debt could also serve as a corporate governance mechanism for curbing agency problems, especially the agency cost of free cash flow [37, 52, 54]. The interest payments reduce the free cash available to managers for discretionary spending, and monitoring by debtholders enhances efficiency in the use of resources [16, 18, 37, 52, 54]. These corporate governance benefits could be significant for diversified firms prone to agency problems [4, 50]. However, debt could impact firm value negatively. The obligatory interest and principal repayments increase default risk and bankruptcy costs [52, 54]. Restrictive bond covenants that bondholders use to protect themselves constrain managers from deploying corporate resources to explore new ideas and markets that could be value-creating [52].

The role of debt in firms may differ between focused and diversified firms. For instance, the relative opacity of diversified firms' operations facilitates opportunistic managerial behavior and increases agency costs [45]. This necessitates the monitoring role of debt in diversified firms than in fo-

cused firms [50]. Although bankruptcy cost increases with debt, Ruland and Zhou [54] pointed out that bankruptcy costs should be lower in diversified firms than in focused firms due to the coinsurance effect arising from imperfectly correlated cash flows from multiple businesses. Given that debt has both bright and dark sides and the role of debt may differ between diversified and focused firms, the extent to which debt contributes to diversified firms' value is an empirical question, and the evidence is mixed [18, 48, 54].

Mansi and Reeb [48] argued that while diversification may reduce shareholder value, it also reduces risk, benefiting bondholders. According to Mansi and Reeb [48], diversification does not destroy firm value but transfers wealth from one provider of capital (shareholders) to another (bondholders). Using a sample of 10,823 focused firm-year and 8075 diversified firm-year observations in the US for the period 1988 to 1999 and employing Berger and Ofek's [9] measure of excess value and instrumental variables method to control for endogeneity, Mansi and Reeb [48] explored the documented diversification discount and its relationship with leverage. Consistent with their argument, they showed that all-equity firms did not experience any diversification discount, and the discount was more pronounced in firms with above-average debt levels. However, Mansi and Reeb did not completely eliminate the effect of debt in their sample of all-equity diversified firms. This is because their definition of all-equity firms included firms with debt, as long as such firms had less than 1% in long-term debt. An ideal all-equity group would be one that excludes all firms with debt (including short-term debt). Mansi and Reeb did not leverage-balance firms as Duan and Li [21] suggested. Mansi and Reeb [48] did not also consider the benefits of debt and how they could enhance shareholder value. These benefits include increased capacity to fund promising projects [40] at lower costs [28], corporate governance and disciplinary roles of debt [18, 37], and the tax benefits of interest payments [64].

Mansi and Reeb's [48] conclusions are inconsistent with the predictions of Li and Li [44] and the findings of Ruland and Zhou [54]. Li and Li [44] developed a model, which predicts, among other things, that a combination of diversification and low debt level should result in poor firm performance and valuation. Therefore, Li and Li [44] suggested that the diversification discount is due to the failure of diversified firms to take full advantage of the additional debt capacity that diversification creates. Based on agency theory [37], Ruland and Zhou [54] argued that debt will reduce the misuse of free cash flows and increase the value of diversified firms. In a sample comprising 11,831 diversified firm-year observations in the United States, Ruland and Zhou [54] found that the value of diversified firms increases with debt.

Whether the findings of Ruland and Zhou [54] will apply to emerging markets is still unclear. Many researchers in the United States context show that diversification is an agency-motivated strategy that destroys shareholder value [9, 20,

30]. Consequently, the monitoring role of debt could help curb the agency problem and increase the value of diversified firms. Many scholars view diversification in emerging markets not as an agency-motivated strategy, but as necessary to address institutional voids and pervasive market failures [25, 38]. Therefore, the governance role that debt may be required to play in diversified firms of developed markets may be unnecessary in emerging markets.

Duan and Li [21] argued that the diversification discount could have resulted from the unbalanced distribution of focused and diversified firms over leverage. Duan and Li [21] replicated Lang and Stulz's [41] and Berger and Ofek's [9] studies using a sample of 1488 diversified and 3052 focused firms from 1985 to 2003 (a total of 23409 firm-year observations) and Tobin's q , Lang and Stulz's [41] industry-adjusted Tobin's q , and Berger and Ofek's [9] excess value as measures of value. Employing multiple regression analysis and controlling for endogeneity through a two-way fixed effect, Heckman's two-step procedure, and instrumental variables methods, they found a diversification discount. However, using a leverage-balanced sample of diversified and focused firms, Duan and Li [21] found no evidence of a diversification discount. They concluded that simply including debt as a control variable does not accurately capture the impact of debt. Duan and Li [21] looked at performance differences between diversified and focused firms but did not test whether debt explained the differences in the valuation of diversified firms.

O'Brien et al. [52] examined how debt shapes the valuation effects of diversification amongst firms in Japan from 1991 to 2001. O'Brien et al. [52] found a negative relationship between debt and value and explained it by the transaction cost economics hypothesis, which argues that debt limits the managers' flexibility to explore new markets with corporate resources and capabilities. However, O'Brien et al. [52] neither related debt to excess value nor addressed whether debt distinguishes value-creating from value-destroying diversified firms. De la Fuente and Velasco [18] studied a panel of US firms to see whether debt plays a role in curbing value-destroying diversification. They found that debt positively moderated the diversification-firm value relationship and attributed this to the monitoring role of debt, which fosters greater efficiency in capital allocation.

As can be seen from the preceding review of the literature on the relationship between debt and the value of diversified firms, the results have been mixed. According to Duan and Li [21], these mixed results could be attributed to factors such as differences in the way value has been measured across studies and, in some cases, failure to control for the endogeneity of the diversification decision. Duan and Li also suggest that the way debt has been treated across studies is another explanation for the mixed results. They argue that merely including debt as a control variable does not adequately capture the impact of debt. Given the mixed evidence on the subject, the existence of diversification discount and how debt explains it

remains to be determined. Given that some diversified firms experience a diversification premium and others a diversification discount, the factors that make the difference are topics for research [54]. The extent to which debt differentiates diversified firms that are valued at a premium or discount has been under-researched, and the available studies have focused on developed countries [18, 48, 54].

In this study, we address the debt-excess value relationship in the emerging market context of Nigeria. Diversification features prominently among firms listed on the Nigerian Stock Exchange [34]. Given that Nigeria has an underdeveloped capital market [34], firms have limited capacity to fund projects. Therefore, greater debt capacity will give firms an advantage in funding projects. Moreover, as some authors have indicated, the judicial system on which corporate governance in Nigeria depends is inefficient [35]. This inefficiency makes the monitoring role of debtholders value-creating by improving the efficiency with which corporate resources are used [18]. The increased capacity to fund projects and improved resource efficiency will likely increase firm value. Therefore, we hypothesize that:

H1: Debt is significantly related to the value and excess value of diversified firms in Nigeria.

3. Materials and Methods

3.1. Data

The study focused on non-financial diversified firms listed on the Nigerian Stock Exchange between 2008 and 2018. Firms that did not have data to operationalize all the variables in the study were excluded to avoid bias. As a result, there were no missing data issues to deal with in the analysis. Based on the International Standard Industrial Classification (SIC) of all Economic Activities, Rev. 4 [62], we assigned a 2-digit SIC code to each company's products/service. We classified a company as diversified if it operated in more than one 2-digit SIC code industry and used the number of two-digit SIC codes to measure the degree of diversification. This approach is similar to that of Chen and Yu [13] and produced segment classifications that mimic the business units of the Business Information Tracking Series (BITS) that Villalonga [63] used. To ensure the classifications are unbiased, we engaged two industrial economists who used the same International SIC of all Economic Activities, Rev. 4, to classify the firms independently. Their classifications were congruent with ours. The approach mitigated the over or under-reporting of segments and ensured that segments were meaningful rather than merely to fulfill reporting requirements [34]. To be included in the study, we required that the firm had data to operationalize the variables for each year of the sample period. This selection criterion resulted in 62 diversified firms and 682 firm-year observations.

3.2. Variables

The regression model estimated in this study for testing the hypothesis can be expressed as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_z Z_{it} + \varepsilon_{it} \quad (1)$$

Where,

Y_{it} = dependent variable, which is firm value or excess value as the case may be and as described later

X_{it} = independent variable, which is total debt, short-term debt, or long-term debt as the case may be and as described later

Z_{it} = vector of factors other than debt that correlate with firm value and excess value (control variables)

β_0 = the intercept; β_1 = the regression coefficient to be estimated for the independent variable, and β_z = regression coefficient to be estimated for the control variables. Based on our hypothesis, we would expect that if debt impacts diversified firms' value and excess value positively, $\beta_1 > 0$

ε_{it} = the stochastic term

The dependent variables are firm value and excess value. We measured firm value by approximate Q (AQ) that Chung and Pruitt [14] developed to proxy Tobin's Q. AQ is the ratio of the sum of the market value of equity and book value of debt to total assets [34]. The excess value measures the difference between the AQ of a diversified firm and an estimate of its value had its segments traded as focused firms [9, 34, 41]. Since the market values of diversified firms' segments are not observable, an estimate of a segment's value (segment imputed AQ) is the average AQ of standalone firms operating in the same industry as the segment. An estimate of the diversified firm's imputed AQ is the average of the imputed AQs of its segments [41].

In the Lang and Stulz [41] approach, the excess value of a diversified firm is the difference between the firm's AQ and the weighted average of the firm's imputed AQ.

The weight could be the proportion of the firm's total asset, sales, profit (or any other relevant multiple) contributed by each segment of the diversified firm. The problem with the Lang and Stulz [41] approach for computing excess value is that it requires detailed segment asset, sales, and profit data disclosure to facilitate the assignment of weights to segments [34]. Such detailed segment data were unavailable for most of the firms in the sample. Consequently, we could not use Lang and Stulz's [41] and Berger and Ofek's [9] approaches. Moreover, the companies reported segment data based on levels of activity aggregation that differed across companies, and this made inter-company comparisons less valuable [34, 63]. Ibekwe [34] faced these problems but used approaches that mitigated the lack of inter-company comparable segment data—Seo et al. [56] approach.

Following Ibekwe [34] and using Seo et al. [56] approach, we computed the first variant of a diversified firm's excess value, excess value [Seo et al.'s (2010)] (EXAQ_av). For this purpose, we used data on 54 firms that we classified as fo-

cused firms for the period. A diversified firm's EXAQ_av for each year is the difference between its AQ for that year and the average AQ of all focused firms for the same year. EXAQ_av is close to Smith and Coy's [58] Diversified Q Differential excess value measure. Seo et al. [56] approach does not reflect industry differences that may affect the valuation of firms. To make the excess value reflect industry differences, we followed Ibekwe [34], who used the Servaes [57] approach to compute another variant of excess value we call excess value [Servaes (1996) approach] (EXAQ_serv). EXAQ_serv is the difference between the diversified firms' AQ and its segments' equally-weighted average imputed AQs. Imputed AQs of segments are also equally-weighted. For example, if a company operates in four 2-digit SIC code industries (11, 20, 31, and 42), we assign to each of these segments/industries the average AQ of all focused firms in that industry. The company's imputed AQ becomes the equally-weighted average of the AQs we imputed for the four industries.

The problem with Servaes's [57] approach was that there were not enough focused firms for some segments/industries. To overcome this challenge, we aggregated the observed company segments/industries into groups. Following Ruland and Zhou [54], we assigned every 2-digit SIC code industry with five or more focused firms a distinct group. We grouped segments/industries with less than five focused firms with others in the same 1-digit SIC code industry—yielding 18 groups. Berger and Ofek [9] and Sturm and Nüesch [59] encountered similar challenges and adopted similar aggregations to overcome them.

The independent variable is debt. We measured debt in three ways: total debt (TD), short-term debt (STD), and long-term debt (LTD). TD is the book value of total liabilities to the book value of total assets [13, 30]. STD is the book value of short-term liabilities to total assets, and LTD is the book value of long-term liabilities to total assets [8].

3.3. Control Variables

We controlled for the level of diversification (DIVERS), firm size (FSIZE), insider ownership (INSDOWN), the board size (BSIZE), board independence (BIND), blockholding (BLKH), profitability (EBIT), capital investment (CAPEX), and firm age (FAGE). We chose these control variables because researchers have shown that these variables are related to firm performance and have controlled them in previous studies [11, 30], and we have the data to operationalize them. We measured the level of diversification as the natural logarithm of the number of industries in which a company operates [6, 42]. Firm size is the natural logarithm of total assets [3, 12, 59], and insider ownership is the percentage of company shares owned by the directors [13, 34]. Board size is the natural logarithm of the number of directors in the company [35]. Board independence is the proportion of non-executive directors [34, 35]. We measured blockholding as the proportion of shares held by shareholders

who own 5% or more of the shares [35] and firm age as the natural log of the firm's age from the date of incorporation [35]. Following [30], we measured profitability as the earnings before interest and taxes to sales and capital investment as capital expenditure to sales.

3.4. Data Analysis Technique

We have considered alternative analytical techniques namely the fixed effects and random effects models. Bell and Jones [66] and Bell et al. [67] argue that the random effects model, if well-specified, is better than the fixed effects model for multi-level data sets such as the one we have for this study. By well-specified, they mean specifying the model in a way that deals with the assumption of zero correlation between the level-2 error terms and the level-1 variables made in the random effects model. The random effects model is superior to the fixed effects model because it captures the context, the level-2 variations in the data set, that the fixed effects model controls out [66, 67]. By controlling out the level-2 variations in the data set, the fixed effects model provides simplistic and misleading results [66-68]. One way to address the assumption made in a random effects model is to estimate the model using the hybrid model, which relaxes this assumption and allows for the disentangling of within-firm and between-firm effects of level-1 variables by centering the variables on the group mean and including the group mean in the model [66-68].

Although the hybrid model addresses this assumption in the random effects model and also addresses endogeneity issues due to omitted variables [66-68], it does not address possible simultaneity/reverse causality [68] between the measures of debt and the measures of value and excess value of diversified firms. There are concerns about simultaneity/reverse causality in this study. For example, lenders may lend more to more valuable firms so that firm value drives debt and not the other way around. Therefore, we use the multilevel generalized method of moments (GMM) technique to estimate the regression equation (1). This is to deal with endogeneity issues, especially possible simultaneity/reverse causality problem. Some authors address simultaneity concerns through the Two-Stage Least Squares and Difference and System GMM techniques [30]. However, with these techniques, there is the problem of getting valid instrumental variables [8, 27, 39]. The multilevel GMM technique is suited for multilevel data sets and mitigates the problem of weak instruments associated with the traditional instrument-based techniques such as the two-stage least squares and the Systems GMM techniques [8, 27, 39]. Unlike traditional instrumental variable methods, by exploiting the data's hierarchical structure, the multilevel GMM obtains robust instrumental variable estimators without requiring external instrumental variables that are usually unavailable [8, 27, 39]. The multilevel GMM technique also provides an omitted variable test based on the Hausman test, which compares different estimators. Ankamah-Yeboah et al. [8]

recently employed this technique to study the capital structure-firm performance relationship.

4. Results

4.1. Univariate Analysis

Tables 1 and 2 show the Bootstrap summary statistics of the variables included in the various models. In Table 1, we

classify diversified firms as negative excess value firms and positive excess value firms based on the EXAQ_av excess value measure. In Table 2, we base the classification on the EXAQ_serv measure. These Tables show that negative excess value firms have lower debt ratios in all the debt measures than positive excess value firms. The differences are significant except in the case of LTD for the EXAQ_av measure.

Table 1. Bootstrap Summary Statistics of Variables Included in the Models based on the Exatq_av Measure of Excess Value.

Variable	Negative EV firms			Positive EV firms			Difference
	N	Mean	SD	N	Mean	SD	
AQ	482	.97	.26	200	2.38	.80	-1.41***
EXAQ_av	482	-.53	.26	200	.86	.75	-1.39***
TD	482	.59	.21	200	.70	.37	-.11***
STD	482	.43	.21	200	.50	.30	-.07***
LTD	482	.17	.15	200	.20	.31	-.03
INSDOWN	482	.20	.23	200	.12	.24	.08***
DIVERS	482	1.20	.53	200	1.11	.43	.09**
BIND	482	.73	.13	200	.71	.14	.02
BLKH	482	.50	.23	200	.58	.23	-.08***
FSIZE	482	23.30	1.80	200	23.11	1.80	.19
BSIZE	482	2.09	.25	200	2.06	.26	.03
EBIT	482	.03	.59	200	.01	.70	.02
CAPEX	482	.13	.33	200	.10	.18	.04*
FAGE	482	3.59	.57	200	3.82	.39	-.23***

Note. AQ = approximate Q; EXAQ_av = excess value [Seo et al.'s (2010) approach]; TD = total debt; STD = short-term debt, LTD = long-term debt; INSDOWN = insider ownership; DIVERS = level of diversification; BIND = board independence; BLKH = blockholding; FSIZE = firm size; BSIZE = board size; EBIT = profitability; CAPEX = capital investment; FAGE = firm age.

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

Table 2. Bootstrap Summary Statistics of Variables Included in the Models based on EXAQ_serv Measure of Excess Value.

Variable	Negative EV firms			Positive EV firms			Difference
	N	Mean	SD	N	Mean	SD	
AQ	424	.94	.27	258	2.09	.87	-1.14***
EXAQ_serv	424	-.49	.38	258	.78	.71	-1.26***
TD	424	.57	.22	258	.68	.34	-.09***
STD	424	.43	.21	258	.48	.28	-.05**

Variable	Negative EV firms			Positive EV firms			Difference
	N	Mean	SD	N	Mean	SD	
LTD	424	.16	.14	258	.20	.28	-.04*
INSDOWN	424	.20	.23	258	.15	.24	.05***
DIVERS	424	1.22	.55	258	1.09	.42	.13***
BIND	424	.72	.12	258	.72	.14	.00
BLKH	424	.48	.23	258	.59	.23	-.11***
FSIZE	424	23.30	1.53	258	23.14	1.79	.16
BSIZE	424	2.09	.25	258	2.07	.25	.02
EBIT	424	.02	.62	258	.02	.63	.002
CAPEX	424	.12	.30	258	.13	.29	-.01
FAGE	424	3.61	.58	258	3.73	.38	-.12***

Note. AQ = approximate Q; EXAQ_serv = excess value [Servaes' (1996) approach]; TD = total debt; STD = short-term debt, LTD = long-term debt; INSDOWN = insider ownership; DIVERS = level of diversification; BIND = board independence; BLKH = blockholding; FSIZE = firm size; BSIZE = board size; EBIT = profitability; CAPEX = capital investment; FAGE = firm age.

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

4.2. Multivariate Analysis

4.2.1. Correlation Analysis

Table 3 reports the bootstrap correlation matrix to ascertain multicollinearity problems. The Table shows that the variables that pose multicollinearity problems are AQ, EX-

AQ_av, and EXAQ_serv. However, no two of these variables entered the same models. TD and STD also show a high correlation coefficient (.70). These two debt measures did not enter the same models. All other coefficients are within ranges that indicate the absence of multicollinearity problems.

Table 3. Bootstrap Correlation Matrix of the Variables Included in the Models.

No Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 AQ	1														
2 EXAQ_av	.88***	1													
3 EXAQ_serv	.97***	.90***	1												
4 TD	.17***	.19***	.19***	1											
5 STD	.14***	.14***	.14***	.70***	1										
6 LTD	.06	.08*	.07*	.47***	-.30***	1									
7 INSDOWN	-.15***	-.18***	-.15***	-.09**	-.05	-.05	1								
8 DIVERS	-.10**	-.13***	-.11**	.05	.03	.03	-.04	1							
9 BIND	-.11***	-.03	-.07*	-.04	-.11***	.08*	-.10**	-.19***	1						
10 BLKH	.18***	.25***	.21***	.05	-.06	.13***	.09**	-.06	.03	1					
11 FSIZE	-.01	.06	.01	.18***	.11**	.11**	-.27***	.30***	-.11***	.11***	1				
12 BSIZE	-.08*	-.10**	-.09**	-.12***	-.15***	.02	-.17***	.20***	.17***	-.03	.40***	1			
13 EBIT	.07	.10**	.05	-.16***	-.07*	-.13***	-.07*	-.02	.03	.11***	.11***	.11***	1		

No Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
14 CAPEX	-.04	-.05	-.09***	-.14***	-.20***	.06	-.00	.05	-.04	-.09**	.07*	.04	.03	1	
15 FAGE	.22***	.16***	.26***	.23***	.23***	.02	-.26***	.14***	-.19***	.08*	.01	-.03	-.00	-.23***	1

Note. AQ = approximate Q; EXAQ_av = excess value [Seo et al.'s (2010) approach]; EXAQ_serv = excess value [Servaes' (1996) approach]; TD = total debt; STD = short-term debt; LTD = long-term debt; INSDOWN = insider ownership; DIVERS = level of diversification; BIND = board independence; BLKH = blockholding; FSIZE = firm size; BSIZE = board size; EBIT = profitability; CAPEX = capital investment; FAGE = firm age.

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

4.2.2. Relationship Between Debt and Firm Value and Excess Value

We employ the multilevel GMM technique to deal with possible simultaneity/reverse causality problems between debt, firm value, and excess value. We implemented it through the multilevelIV estimator of the REndo package in R [27]. Durbin-Wu-Hausman Test indicated that all the explanatory variables (except firm age) are endogenous. This result is consistent with Hoechle et al. [30], who treated as

endogenous all their explanatory variables, similar to those we employ in this study. To examine the relationship between debt and excess value of diversified firms, we estimate various multilevel GMM models relating the three measures of debt (TD, STD, and LTD) to the measures of firm value (AQ) and excess value (EXAQ_av, and EXAQ_serv). We base the decision on which of the outputs of the multilevel GMM estimators to report on the omitted variables test in Table 4.

Table 4. Hausman Omitted Variables Test for the Random Effects, Fixed Effects, and GMM Estimators.

Dependent variable	Measure of debt	1	2	3	4
		FE_L2 vs REF	GMM_L2 vs REF	FE_L2 vs GMM_L2	Decision
AQ	TD	25.84 (.01)	24.23 (.004)	23.52 (<.0001)	GMM_L2
	STD	25.65 (.01)	22.91 (.01)	23.07 (<.0001)	GMM_L2
	LTD	23.50 (.02)	24.32 (.004)	21.58 (<.0001)	GMM_L2
EXAQ_av	TD	6.77 (.82)	21.00 (.01)	5.01 (.08)	GMM_L2
	STD	7.07 (.79)	15.58 (.05)	5.39 (.07)	REF
	LTD	6.36 (.85)	16.73 (.05)	5.25 (.07)	REF
EXAQ_serv	TD	5.00 (.93)	18.33 (.03)	3.26 (.20)	GMM_L2
	STD	4.71 (.94)	13.13 (.16)	3.19 (.20)	REF
	LTD	4.58 (.95)	12.96 (.17)	3.48 (.18)	REF

Note. FE = fixed effects model; REF = random effects model; AQ = approximate Q; EXAQ_av = excess value [Seo et al.'s (2010) approach]; EXAQ_serv = excess value [Servaes' (1996) approach]; TD = total debt; STD = short-term debt; LTD = long-term debt

Chi-square p-values are in parenthesis

Tables 5, 6, and 7, report results for the TD, STD, and LTD, respectively, as the explanatory variables. Models 1, 2, and 3 of each Table show the results with AQ, EXAQ_av, and EXAQ_serv, respectively, as the outcome variables.

Table 5. Relationship between Total Debt, and AQ and Excess Value.

Variables	Model 1 (DV = AQ)	Model 2 (DV = EXAQ_av)	Model 3 (DV = EXAQ_serv)
TD	.97*** (.12)	1.00*** (.11)	1.01*** (.12)
INSDOWN	.20 (.24)	.28 (.22)	.37 (.23)
DIVERS	-.10 (.18)	-.10 (.17)	-.16 (.18)
BIND	-1.14*** (.30)	-.61** (.28)	-.60** (.30)
BLKH	.57** (.26)	.56** (.25)	.39 (.26)
FSIZE	-.46*** (.06)	-.23*** (.06)	-.19*** (.06)
BSIZE	-.16 (.16)	-.25* (.15)	-.19 (.15)
EBIT	.05 (.04)	.03 (.04)	.004 (.04)
CAPEX	.15** (.07)	.05 (.07)	.11 (.07)
FAGE	-.10 (.14)	.23* (.12)	.13 (.13)
Constant	12.82*** (1.34)	4.49*** (1.24)	4.10*** (1.30)
N(Level 2)	62	62	62
N(Level 1)	682	682	682

Note. DV = dependent variable; AQ = approximate Q; EXAQ_av = excess value [Seo et al.'s (2010) approach]; EXAQ_serv = excess value [Servaes' (1996) approach]; TD = total debt; INSDOWN = insider ownership; DIVERS = level of diversification; BIND = board independence; BLKH = blockholding; FSIZE = firm size; BSIZE = board size; EBIT = profitability; CAPEX = capital investment; FAGE = firm age.

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

Table 6. Relationship between Short-term debt, and AQ and Excess Value.

Variables	Model 1 (GMM_L2) (DV = AQ)	Model 2 (REF) (DV = EXAQ_av)	Model 3 (REF) (DV = EXAQ_serv)
STD	.66*** (.15)	.68*** (.13)	.81*** (.14)
INSDOWN	.21 (.25)	-.07 (.19)	.01 (.20)
DIVERS	-.23 (.19)	-.22* (.12)	-.32** (.13)
BIND	-1.02*** (.32)	-.49* (.27)	-.49* (.28)
BLKH	.56** (.28)	.62*** (.21)	.54** (.22)
FSIZE	-.48*** (.06)	-.07* (.04)	-.04 (.04)
BSIZE	-.16 (.17)	-.10 (.14)	-.08 (.15)
EBIT	-.003 (.04)	-.03 (.04)	-.04 (.04)
CAPEX	.11 (.07)	.01 (.07)	.06 (.07)
FAGE	.03 (.13)	.19* (.11)	.08 (.13)
Constant	13.15*** (1.41)	.87 (.90)	.81 (.97)
N(Level 2)	62	62	62
N(Level 1)	682	682	682

Note. DV = dependent variable; AQ = approximate Q; EXAQ_av = excess value [Seo et al.'s (2010) approach]; EXAQ_serv = excess value [Servaes' (1996) approach]; STD = short-term debt; INSDOWN = insider ownership; DIVERS = level of diversification; BIND = board independence; BLKH = blockholding; FSIZE = firm size; BSIZE = board size; EBIT = profitability; CAPEX = capital investment; FAGE = firm age.

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

Table 7. Relationship between Long-term Debt, and Firm Value and Excess Value.

Variables	Model 1 (GMM_L2) (DV = AQ)	Model 2 (REF) (DV = EXAQ_av)	Model 3 (REF) (DV = EXAQ_serv)
LTD	.88*** (.17)	.78*** (.15)	.67*** (.16)
INSDOWN	-.08 (.25)	-.24 (.19)	-.21 (.20)
DIVERS	-.03 (.19)	-.15 (.12)	-.24* (.13)
BIND	-.95*** (.32)	-.49* (.27)	-.45 (.29)
BLKH	.55** (.27)	.55*** (.21)	.47** (.23)
FSIZE	-.50*** (.06)	-.08** (.04)	-.05 (.04)
BSIZE	-.18 (.17)	-.15 (.14)	-.13 (.15)
EBIT	.01 (.04)	-.02 (.04)	-.04 (.04)
CAPEX	.12 (.07)	.01 (.07)	.05 (.07)
FAGE	.01 (.14)	.21* (.11)	.12 (.13)
Constant	13.53*** (1.39)	1.39 (.91)	1.27 (.98)
N(Level 2)	62	62	62
N(Level 1)	682	682	682

Note. DV = dependent variable; AQ = approximate Q; EXAQ_av = excess value [Seo et al.'s (2010) approach]; EXAQ_serv = excess value [Servaes' (1996) approach]; LTD = long-term debt; INSDOWN = insider ownership; DIVERS = level of diversification; BIND = board independence; BLKH = blockholding; FSIZE = firm size; BSIZE = board size; EBIT = profitability; CAPEX = capital investment; FAGE = firm age.

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

The three debt measures in Model 1 of Tables 5, 6, and 7 show a significantly positive relationship with AQ. In the case of TD (Table 5), $b = .97$, $p < .01$. For STD (Table 6), $b = .66$, $p < .05$, and LTD (Table 7), $b = .88$, $p < .01$. However, these results do not suggest that debt is either associated with diversified firms' excess values or explains the diversification discount in some studies.

To examine whether debt can explain the diversification discount, we relate the debt measures to the two measures of excess value. Models 2 and 3 of Tables 5, 6, and 7 show that the three debt measures are significant and positively related with the two measures of excess value. For instance, in the case of TD and EXAQ_av, $b = 1.00$, $p < .01$ and $b = 1.01$, $p < .01$ in the case of EXAQ_serv (Model 2 and 3, respectively of Table 5). This result indicates that, on average, a 1-unit increase in debt is associated with a 1.00 to 1.01 units increase in excess value (depending on the measure of excess value used). This result shows that debt significantly determines whether a diversified firm will trade at a discount (negative excess value firms) or a premium (positive excess value firms) relative to focused firms.

To see if it makes a difference whether debt is short-term or long-term, we disaggregate TD into short-term debt (STD) and long-term debt (LTD). Models 2 and 3 of Table 6 show that STD exhibits a significant positive relationship with EXAQ_av ($b = .68$) and EXAQ_serv ($b = .81$), at the 1% level. In the case of LTD (Models 2 and 3 of Table 7), the rela-

tionships are significantly positive at the 1% level— $b = .78$ (for EXAQ_av) and $b = .67$ (for EXAQ_serv). These results show that whether debt is short-term or long-term does not make a difference in the debt-excess value relationship.

In Tables 5, 6, and 7, board independence, blockholding, and firm size are the control variables that consistently show a significant relationship with AQ. The board independence and firm size coefficients are negative, but blockholding is positive. In the case of the EXAQ_av excess value measure, board independence, blockholding, and firm size also show significant relationships in all the Tables and in the same directions as in their relationships with AQ. In their relationship with the EXAQ_serv, board independence is significantly negative when TD and LTD are the independent variables (Tables 5 and 6); blockholding is significantly positive in Tables 6 and 7, where STD and LTD are the independent variables. Firm size shows a significant relationship with EXAQ_serv in Table 5 (where TD is the independent variable).

4.3. Robustness Check

Duan and Li [21] show that the diversification discount results from the unbalanced distribution of focused and diversified firms over debt. Suppose low debt is the reason some diversified firms trade at a discount, we expect no significant difference in AQ between positive excess value

firms and focused firms with similar debt levels. To verify this, we debt-balance diversified firms and focused firms. To do this, we classify focused firm years as positive excess debt firms or negative excess debt firms. We define a positive excess debt firm as a focused firm with total debt equal to or greater than the average total debt of positive excess value firms and a negative excess debt firm as a focused firm with total debt below the average of positive excess value firms. Comparing the AQ of positive excess value firms and positive excess debt firms using the estimated marginal means procedure, there is no significant difference in the mean AQs. In the case of EXAQ_serv, $b = .04$; 95% CI $[-.31;.39]$, is nonsignificant, $t(99.16) = .23$, $p = .82$. In the case of EXAQ_av, $b = -.25$, 95% CI $[-.95;.10]$ is nonsignificant, $t(80.17) = -1.42$, $p = .16$.

Our finding about the role of debt in the valuation of diversified firms will also lead to the expectation that negative excess debt firms will be valued more than negative excess value firms. Consistent with this expectation, we find—using the EXAQ_serv measure—that on average, negative excess debt firms have mean AQ ($M = 1.08$; $SE = .07$) greater than the mean AQ of negative excess value firms ($M = .86$, $SE = .06$). The difference, $b = .22$, 95% CI $[.08;.37]$ was significant, $t(218.69) = 3.01$, $p < .01$. However, in the case of EXAQ_av measure, the mean AQ of negative excess debt firms ($M = 1.01$, $SE = .06$) is greater than that of negative excess value firms ($M = .92$, $SE = .05$) but the difference, $b = .09$, 95% CI $[-.04;.22]$ is nonsignificant, $t(263.46) = 1.40$, $p = .16$.

Further, we compare the AQ of positive excess value firms and negative excess debt firms, expecting that positive excess value firms—which typically have higher debt than negative excess value firms—will have a significantly greater AQ than negative excess debt firms. Indeed, this is what we found. Using EXAQ_av as an excess value measure, the mean AQ of positive excess value firms ($M = 1.78$, $SE = .10$) is greater than that of negative excess debt firms ($M = 1.28$, $SE = .10$). The difference is significant, $b = .50$, 95% CI $[.27;.73]$, $t(205.76) = 4.33$, $p < .01$. In the case of EXAQ_serv, the mean AQ of positive excess value firms ($M = 1.52$, $SE = .10$) is greater than that of negative excess debt firms ($M = 1.31$, $SE = .10$), and the difference $b = .21$, 95% CI $[.011;.42]$, $t(280.48) = 1.87$, is significant at the 10% level, $p = .06$.

Based on these analyses, we accept the hypothesis in Section 2 and conclude that debt is a significant determinant of diversified firms' value. Debt also differentiates diversified firms that trade at a premium from those that trade at a discount relative to focused firms. The greater the debt level of diversified firms, the more likely they will trade at a premium [44].

5. Discussion

We examined how debt relates to diversified firms' value and excess value to see if debt explains the diversification discount. This is against the background of the evidence that

the diversification discount does not characterize all diversified firms. Whereas the market values some diversified firms at a premium relative to focused firms, it values others at a discount. What differentiates diversified firms that trade at a premium from those that trade at a discount requires investigation to improve corporate strategy and investment decisions. Li and Li [44] suggested that debt is one such factor.

Using the multilevel GMM statistical technique to control endogeneity, we find that debt is positively and significantly associated with diversified firms' value and excess value. These findings are consistent with two streams of the literature on the role of debt in companies: the more money and the corporate governance roles [18, 34, 37, 40, 43, 44, 54]. The more money view is that diversification enhances the debt capacity of firms, which increases their capacity to fund net present value projects [40, 43]. There is evidence that investors place a premium on debt capacity of firms [7]. The use of the increased debt capacity also provides tax benefits, which lowers tax liability of firms [43, 64]. There is also evidence that the market values interest tax benefits of debt positively [15]. The monitoring role of bondholders would be more necessary in diversified firms due to the relative opacity of their operations, which facilitates opportunistic behavior by managers and leads to higher agency costs [45, 50, 52].

The findings are inconsistent with O'Brien [52] who find a negative debt-firm value relationship, and Mansi and Reeb [48], who show that the diversification discount was more pronounced in firms with above-average debt levels. This inconsistency may be due to the fact that the expected negative effects of higher leverage, such as an increased likelihood of bankruptcy and the associated costs, do not seem to materialize in the case of diversified firms, or at least are outweighed by the positive effects. As [54] pointed out, diversified firms have a lower probability of default and bankruptcy than focused firms due to the co-insurance that comes from diverse and unrelated cash flow streams.

The findings have implications for the diversification literature. It calls to question the diversification discount literature [9, 11, 20]. Various researchers show that while diversification sometimes destroys shareholder value, it creates value in others [32, 34, 47, 55]. Therefore, what is essential is to seek those factors associated with the positive valuation of diversified firms. This study shows that consistent with Li and Li [44], one factor to consider is the debt level of the diversified firm. The results are also consistent with agency theory which proposes that debt plays critical corporate governance roles of monitoring and subjecting management of corporations to the discipline of the debt market.

The implication of the findings is that diversified firms should use the debt capacity that diversification provides to invest in positive net present value projects. The use of debt also adds a layer of corporate governance required in an environment of increased complexity and opacity associated with diversification. Increased investment in positive NPV

projects and improved corporate governance through increased use of debt will enhance firm performance and value. The increased valuation of diversified firms due to debt increases the ability of diversified firms to play their developmental role in society. Investors would also benefit more from investing in diversified firms with higher debt ratios than those with lower debt ratios, all things being equal.

One limitation of this study is that due to the lack of detailed segment data, it measured diversification by the number of 2-Digit SIC code industries in which firms operate. Whereas this measure captures the full extent of a firm's activities, it does not reflect the contribution of each activity to the firm's total output [34]. Future researchers should capture the weight of each activity/industry in the firm's measure of total output.

6. Conclusions

In this study, we find that debt is positively and significantly associated with diversified firms' value and excess value. The findings have implications for corporate strategy and for the investing public. It suggests that some diversified firms experience a valuation discount because they fail to exploit the debt capacity that diversification creates. Therefore, diversified firms should increase their debt levels to fund more positive net present value projects and improve monitoring, given the opacity and greater tendency of agency problems in diversified firms. For the investing public, the results suggest that investing in diversified firms with greater debt will be more rewarding than investing in lower-debt diversified firms.

Abbreviations

AQ	Approximate Tobin's q
BITS	Business Information Tracking System
EV	Excess Value
GMM	Generalized Method of Moments
LTD	Long-Term Debt
NPV	Net Present Value
STD	Short-Term Debt
SIC	Standard Industrial Classification
TD	Total Debt

Author Contributions

Ibeawuchi Ibekwe: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

Pedkuna Queenta Siliya: Data curation, Funding acquisition, Investigation, Methodology, Resources, Validation, Writing – review & editing

Funding

This work is not supported by any external funding.

Data Availability Statement

The data supporting the outcome of this research work has been reported in this manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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