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DEBT AND FIRM VALUE, THE NEW APPROACH OF HIERARCHICAL METHOD

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ABSTRACT

This paper examines the impact of debt on firm value. Especially, we investigate the impact of leverage at both the firm level and industry level on the value of the firm in the context of the Vietnamese emerging economy. Besides a single regression econometric model to investigate the impact of firm-level debt ratio on firm value, we build several multilevel models to test the effect of industry-level debt ratio on firm value. Multilevel or hierarchical models are gradually expanded from the null (or empty) model to the random intercept and the random-coefficient model. The effects of firm size, firm profitability, and managerial ownership are also controlled in our tests. Our results reveal that in the Vietnamese market, firm value is negatively and significantly associated with both of the two indicators of leverage employed in the research. Especially, the sensitivity of firm value to firm leverage manifests stronger under the effect of industry-level leverage. The multilevel approach shows its advantages in analyzing the clustering data.

Keywords: *Firm value, Firm debt, Industry-level debt, multilevel model.*

INTRODUCTION

Capital structure is a familiar research topic to scholars, and this topic will never go out of date, as it is related to the financing decisions of any firm in the real world of business. The changing economic environment and the diversified global capital market offer businesses more new choices of capital sources and also more risks to deal with. In general, a firm can generate its capital from three main sources, including internal sources (owner capital, retained profit, and other internal funds), bank loans, and raising capital from the financial market, such as the stock market. A firm must have a mix of these finance sources because each of them has its pros and cons. Internal financing might be easy and quick to access, but at the same time, it can be limited and can be very pressured as the owners or shareholders expect to receive a high rate of dividends paying in return. External finance, such as debt or bank loans, are cheaper sources, but they can be very risky. Baker and Martin (2011) claim that "if debt becomes the least costly form of financing, the influence of growing leverage in using debt financing increases financial risk." So the question is: how much debt should a firm take? Or what is the best mix of finance sources for a firm? For many years, an extensive amount of research has been carried out in order to find the answer to this question. Although some theories on capital structure (Durand,

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1952; Modigliani & Miller, 1963; Kraus & Litzenberger, 1973; Wu *et al.*, 2023) do recognize the existence of the best capital structure, called optimal capital structure, based upon various assumptions, the empirical literature has non-stop challenged these theories by revealing very mixed results. It is an understandable reality, as financing decisions involve a lot of considerations to make a good balance status among risks, costs, and benefits.

The relationship between a firm's capital structure (or firm leverage) and its value has received much attention from finance literature, as the ultimate purpose of navigating a good capital structure is to increase value for shareholders. It is a financial control and management aspect that aims at maximizing the value of a firm. In simple reasoning, more debt employed by a firm lowers its cost of capital thanks to the advantage of debt's tax shield, leading to higher profit and hence, increasing the market value of the firm. So, in brief, we can deduce that a firm should look for as much debt to finance its assets as possible because more debt means a higher value for the firm. However, both academic research and business practices have demonstrated that it would be flawed if we ignore other factors associated with the use of debt, especially high levels of debt. Highly leveraged firms always have to face financial distress and even insolvency. Myers and Majluf (1984) succinctly argue that "Financing decisions have vital consequences for a company as they affect that company's market value and hence shareholder balance, as the capital structure is a direct determinant of the company's overall risk and cost of capital." Most of the theories on capital structure mention the relationship between firm leverage and its market value. However, despite a substantial amount of both theoretical and empirical studies, no agreement has been reached on the degree and direction of this relationship. This is one of our incentives to conduct this paper. Our work continues to contribute to the literature on the pattern of the link between the two factors, especially in the context of the Vietnamese developing economy.

Vietnam is an emerging economy and one of the fastest-growing economies in Southeast Asia. However, in this country, there are still elements of the market economy and the remnants of the centrally-subsidized economy in the past. As a result, inefficient market characteristics due to information asymmetry are still evident in the operation of the whole economy. From the perspectives of researchers on financial markets, this is also a "fertile land" to observe the associations and interactions between factors. One new contribution of this paper to the literature is regarding methodology. Previous studies often approach the debt-firm value relationship by executing one-level regressions such as ordinary least squares (OLS), fixed effects, and random effects models. However, we contend that besides predictors belonging to firm characteristics, firm value can be determined by some industry-related attributes. By adding dummy variables in the model, the traditional fixed effects approach can allow us to estimate the impact of these sector elements on firm value, but it cannot separate the effects of sector-level predictors and the effects of the sector dummies. For this reason, we decide to design another type of test called the multilevel model in addition to single-level regression to better analyze and interpret the effects of hierarchical determinants on firm value.

Our test is designed as follows: After the introduction is the review of some main theories and empirical research on the link between firm leverage and its market value; the third section is about the methodology, which includes details about the construction of both single-level and multilevel regression; the next is the presentation about the data sample of the research,

statistical description, interpretation, and discussion of the results; the last section is a summary about our work.

Literature Review

Theoretical Framework

The trade-off theory was first proposed by Robichek and Myers (1966) by extending the work of Modigliani and Miller (1963) and later developed into two branches, including static trade-off theory (Kraus & Litzenberger, 1973; Bradley *et al.*, 1984) and dynamic trade-off theory (Fischer *et al.*, 1989; Leland, 1994; Goldstein *et al.*, 2001). Similarly, the theory analyzes the connection between a firm's market value and its capital structure by considering the existence and effects of financial distress costs and bankruptcy risks. Robichek and Myers (1966) agree that debt has the benefit of tax saving, and firms should not miss this advantage. However, it does not mean that companies should keep The debt-firm value connection is also a topic of discussion in most of the famous theories on capital structure (for example, the net income approach, Modigliani and Miller's theories (1958, 1963), the trade-off theory, the agency theory, the pecking order theory, and the signaling theory). Durand (1952) and Modigliani and Miller (1958, 1963); Roy *et al.*, (2023) are the first scholars who laid the groundwork for the modern theory of capital structure. However, there exist big differences in their views regarding capital structure and firm value. While Durand (1952) supports and brings forth the relevance of capital structure in the calculation of firm value, Modigliani and Miller (1958) proposed that under an efficient market with the absence of asymmetric information and transactional costs, a firm's market value is independent of the firm leverage. In his research, Durand (1952) first introduced the concepts of weighted average cost of capital (WACC) and optimum capital structure. He reasons that because debt is a cheaper source of finance, a firm's WACC can be lowered when more debt is issued. A judicious financing decision can locate a company's capital structure at the optimal point where the market value of the firm is maximized and the overall WACC of the company is minimized. Later in their research, Modigliani and Miller (1963) also make use of the terms WACC and optimal capital structure. They reconsider their previous conclusion about the irrelevance of capital structure in determining firm value, explaining that leveraged companies' values are higher than unleveraged ones'. Taking on more debt can increase shareholders' wealth thanks to the tax-deductible expense.

Taking on debt is high levels of debt are associated with high costs of financial distress. Therefore, a firm should locate its capital structure at the best (optimal) point of the balance between the advantage of using debt and the possible financial risks. When a firm's capital structure is optimal, the market value also reaches its highest. After this point, if the company continues to issue more debt, the firm's market value will decrease because the costs related to financial distress outweigh the benefit of using debt. In summary, the trade-off theory supports the positive impact of firm leverage on firm value when the amount of debt used is lower than the firm's optimal amount and vice versa.

The other theories, the agency theory, the pecking order theory, and the signaling theory, explain capital structure from different approaches and perspectives but all agree on the positive direction of the relationship between the firm's leverage and the market value. Agency theory discusses the two main conflicts due to the separation between management control and

ownership: conflicts between firm managers and their owners or shareholders and the conflicts between the company's debtholders and the shareholders. And again, using debt is one effective method to resolve problems and is beneficial for a firm's shareholders in many ways. Debt can help to monitor managerial perquisites, reduce free cash flow, and therefore, limit ineffective over-investments and secure ownership (Jensen & Meckling, 1976; Hart & Moore, 1990; Stulz, 1990). The pecking order theory put different types of financing sources in order regarding a firm's preference. At the top is internal funds (etc., retained earnings); then debt finance will be preferred over issuing new equity, which is the last option when a firm wants to raise more capital (Myers, 1984; Myers & Majluf, 1984; Tabassum *et al.*, 2023). This ranking will help a firm to avoid investment inefficiencies (which are due to the asymmetric information between managers and stockholders) and also the mispricing of the market to the firm's stock (which is caused by the asymmetric information between insiders and outsiders). If a firm decides to issue additional shares to afford a new project, outsiders might misinterpret this decision as an overestimation of firm value, causing the share price to fall and therefore, the net loss of the existing shareholders. This view is also supported by the positive signaling theory of capital structure. A firm's market value should be positively associated with the level of debt that the firm uses because outside investors interpret that higher-leveraged firm as having higher firm quality (Brealey *et al.*, 1977; Ross, 1977; Eteng *et al.*, 2023). According to this theory, a decision to choose debt over equity to finance a new investment is a signal from managers to outsiders about the firm's good performance. However, the root cause of this action is not to resolve the information asymmetry or agency conflicts but is driven by the manager's compensation package.

Empirical Studies on the Relationship between Firm Leverage and Firm Value

The existence of different theoretical viewpoints on the connection between capital structure and firm value motivates a considerable number of empirical papers carried out to examine the relationship. And the results are also varied.

Graham and Harvey (2001) test the validity of the trade-off and pecking order theory by surveying nearly 400 Chief Financial Officers (CFOs). The study finds some support for the two theories' viewpoints. Half of the participants confirm that their companies determine the target capital structure for the companies to achieve their possibly best performance. The companies will choose debt over new equity when the internal funds are insufficient because issuing new shares will have a negative effect on the share prices, reducing the market value of their firms. Also, the results of the survey reveal that the tax deduction of debt interest is one factor in deciding the target level of debt used in their companies, but that the CFOs are less concerned about transactional cost, information asymmetry, and personal tax. A positive connection between debt ratio and firm value is also claimed by many authors in their research. Kartikasari *et al.* (2019) investigate listed firms in Indonesia and postulate that one way to create more value for the shareholders is to gear up. Cheng and Tzeng (2014) perform both theoretical and empirical models and come up with the same outcome. They emphasize that the value-leverage relationship manifests much stronger in firms that have high growth opportunities.

Bradley *et al.* (1984) learn about the relationship between firm value and leverage under the effect of financial distress and agency costs. Their finding still supports the trade-off theory but in other directions of the relationship. They conclude that a firm's optimal level of leverage is

negatively associated with financial distress and agency costs of debt, and a firm's market value is inversely correlated to its optimal debt ratio when the cost of financial distress is significant. Graham (1996) discovers that an increase in long-run debt means a higher level of the specific marginal tax rate, leading to earnings loss for the company. Fama and French (1998) use the cross-sectional regression model to investigate the effect of the firm leverage ratio on the firm value. In the studies, they assume that "(i) the market value of an all-equity, no-dividends firm with the same pretax expected net cash flows" and "(ii) the value of the tax effects of the firm's expected dividend and interest payments." His test yields no evidence for the net tax advantage and shows the inversely marginal impact of both debt financing and changes in debt level on the firm market value.

Mixed or contrasting findings can also be found in the same research. Iturriaga and Crisostomo (2010) separate their sample of more than 200 Brazilian listed companies into two groups: low and high levels of growth opportunities, and they received opposite outcomes for these groups. Financial leverage inversely affects market value in firms belonging to the first group but shows a positive impact on the market value in the second one. Lin and Chang (2011) build single-level regression models to examine the firm value and leverage of 200 firms in the Taiwan Stock Exchange from 1993 to 2005. The degree and trend of the relationship depend on the level of gearing in a firm. In low-leveraged firms, the value is positively associated with their debt level. This connection gets weaker as more debt financing is taken by the company, and interestingly, no link is found when debt reaches the ratio of 33.33%, which is called the turning point by the authors.

In Vietnam, Vo and Ellis (2017) design multiple regression tests to investigate the role of debt financing in determining firm market value. They state that only low levels of gearing can add more value for the shareholders, and high levels of leverage can harm firm value. Vietnam is an emerging economy. The legal corridor is still incomplete, especially the law for corporate governance. Many Vietnamese firms are still characterized by weak corporate governance in general and ineffective debt management in particular. Therefore, we argue that the benefit of using debt in a Vietnamese firm can be outweighed by the increase in financial risks that the firm has to deal with. As a result, we predict an inverse relationship between firm leverage and firm value.

H: Debt has a negative effect on firm value.

MATERIALS AND METHODS

In this paper, we design two main types of models to test the hypothesis. The first model is the single-level regression, which is normally used by previous others in the literature. The second type is the hierarchical model, which is the new approach used in this research to observe the multilevel effect of firm leverage on its value.

Single-Level Regression Model

The first model is shown in Eq. (1), which uses firm value and debt as dependent and independent variables, respectively. Prior studies also document some other variables that have influences on firm value, such as the size and profit of the company and the percentage of shares held by the managers in the company (Chang & Dasgupta, 2009; Islam & Khandaker, 2015).

Hence, we employ these factors as the control variables in the research (Sinha, 2017; Vo & Ellis, 2017; Kartikasari *et al.*, 2019).

Model 1:

$$VAL_{it} = \alpha_0 + \alpha_1 DE_{it} + \alpha_2 SIZE_{it} + \alpha_3 ROA_{it} + \alpha_4 MOWN_{it} + \varepsilon_{it} \quad (1)$$

Where i and t represent firm and year, respectively. Firm value is coded as VAL, proxied by Tobin's Q, calculated as the market value of equity plus the book value of debt divided by the book value of total assets. Firm leverage is coded as DE, measured by dividing debt's book value by the book value of equity. SIZE is firm size and is the total firm assets' logarithm. ROA presents profitability, calculated as the net firm profit divided by the total book value of equity. Managerial ownership is coded as MOWN, which is the rate of shares owned by managers, their spouses, and children.

Multilevel Model

Islam and Khandaker (2015) investigate nearly 2,000 Australian listed firms across the span of 13 years and claim that sector type does matter for companies to make their decisions on leverage. For this reason, we argue that besides firm market value's predictors related to firm characteristics, which are widely examined in the literature, some attributes at the sector level may also have critically indirect effects on the company value. One way to allow for group effects is to include dummy variables for groups in a traditional fixed effects model. However, this type of econometric analysis confounds the impacts of group-level determinants and the impacts of the group dummies. This limitation can be addressed by a multilevel or hierarchical approach. Therefore, the multilevel model is the second test in our methodology strategy. Three levels of firm value predictors are developed, including the group of observation units, the between-firm group, and the industry group.

The Empty Model (Model 2)

We first perform the empty model to determine if there is a clue of a data cluster with respect to firm value as the dependent variable.

Empty Model Level 1:

$$VAL_{klm} = \alpha_{0lm} + \varepsilon_{klm} \quad (a_0)$$

Empty Model Level 2:

$$\alpha_{0lm} = \beta_{00m} + \mu_{0lm} \quad (a_1)$$

Empty Model Level 3:

$$\beta_{00m} = \gamma_{000} + r_{00m} \quad (a_2)$$

Where VAL is a firm value, proxied by Tobin's Q calculated as the market value of equity plus the book value of debt divided by the book value of total assets.

Model 2: Combined empty model:

$$VAL_{klm} = \gamma_{000} + r_{00m} + \mu_{0lm} + \varepsilon_{klm} \quad (2)$$

Random-Intercept Model with Covariates (Model 3)

Random-intercept Model Level 1:

$$VAL_{klm} = \alpha_{0lm} + \alpha_{1lm} DE_{klm} + \varepsilon_{klm} \quad (b_0)$$

Random-intercept Model Level 2:

$$\alpha_{0lm} = \beta_{00m} + \beta_{1lm} FDE_{0lm} + \mu_{0lm} \quad (b_1)$$

Random-intercept Model Level 3:

$$\beta_{00m} = \gamma_{000} + \gamma_{01m} IDE_{00m} + r_{00m} \quad (b_2)$$

Where VAL is firm value, proxied by Tobin's Q. DE is firm leverage, measured by taking the book value of debt divided by the book value of equity. FDE is the firm's leverage level and is the yearly mean of firm leverage. IDE is the industry leverage level, measured by the mean of leverage of all firms in that industry.

Equation (3) is the combination of three models (b_0), (b_1), and (b_2). This model is to figure out whether the intercepts of the three levels are random.

Model 3:

$$VAL_{klm} = \gamma_{000} + \gamma_{01m} IDE_{00m} + \beta_{1lm} FDE_{0lm} + \alpha_{1lm} DE_{klm} + \varepsilon_{klm} + \mu_{0lm} + r_{00m} \quad (3)$$

Random-Coefficient Model with Covariates (Model 4)

Model (4) is obtained by consolidating (c_0), (c_1), (c_2), and (c_3). It is a more complex mixed-effect model that assumes that some observation-level variables' intercepts and slopes are random and influenced by the firm-level and industry-level variables. The performance of this type of model can help to estimate the indirect impact of sector-level characteristics on the value of the company.

Random-coefficient Model Level 1:

$$VAL_{klm} = \alpha_{0lm} + \alpha_{1lm} DE_{klm} + \varepsilon_{klm} \quad (c_0)$$

Random-coefficient Model Level 1:

$$\alpha_{0lm} = \beta_{00m} + \beta_{1lm} FDE_{0lm} + \mu_{0lm} \quad (c_1)$$

Random-coefficient Model Level 1:

$$\beta_{00m} = \gamma_{000} + \gamma_{01m} IDE_{00k} + r_{00m} \quad (c_2)$$

$$\alpha_{1lm} = \gamma_{100} + \gamma_{110} IDE_{00m} + r_{1lm} \quad (c_3)$$

Where VAL is firm value, proxied by Tobin's Q. DE is firm leverage, measured by dividing the debt's book value by the book value of equity. FDE is the firm's leverage level and is the yearly mean of firm leverage. IDE is the industry leverage level, measured by the mean of leverage of all firms in that industry.

Model 4:

$$VAL_{klm} = \gamma_{000} + \gamma_{01m} IDE_{00m} + \beta_{1lm} FDE_{0lm} + \delta_{100} DE_{klm} + \gamma_{110} IDE_{00m} * DE_{klm} + + r_{1lm} DE_{klm} + \varepsilon_{klm} + \mu_{0lm} + r_{00m} \quad (4)$$

Random-Coefficient Model with Covariates and Control Variables (Model 5)

Model 5 is an extension of model 4, by adding some control variables at the observation level as determinants, including firm size, profitability, managerial ownership, and a dummy variable representing the year of observation.

Model 5:

$$VAL_{klm} = \gamma_{000} + \gamma_{01m} IDE_{00m} + \beta_{1lm} FDE_{0lm} + \delta_{100} DE_{klm} + \gamma_{110} IDE_{00m} * DE_{klm} + r_{2lm} DE_{klm} + \delta_{200} YEAR_{klm} + \delta_{300} SIZE_{klm} + \delta_{400} ROA_{klm} + \delta_{500} MOWN_{klm} + \varepsilon_{klm} + \mu_{0lm} + r_{00m} \quad (5)$$

Where VAL is firm value, proxied by Tobin's Q. DE is firm leverage, measured by dividing the debt's book value by the book value of equity. FDE is the firm's leverage level and is the yearly mean of firm leverage. IDE is the industry leverage level, measured by the mean of leverage of all firms in that industry. SIZE is firm size and is the total firm assets' logarithm. ROA presents profitability, calculated as the net firm profit divided by the total book value of equity. MOWN is managerial ownership which is the rate of shares owned by managers, their spouses, and children. YEAR is the year of the observation (Ashurko, *et al.*, 2021; García, 2021; Yudhawati & Yuniawati, 2021).

RESULTS AND DISCUSSION

Data Collection

Performing hierarchical linear models is one of the primary strategies in our research. We observe three levels of firm value predictors, which are the observation unit group (the level-one group), the between-firm group (the level-two group), and the industry group (the level-three group). Regarding the software package and estimation algorithm, the important question when executing the multilevel approach is the power of the statistical test. Snijders (2005) wrote, "Sample size determination in multilevel designs requires attention to the fact that statistical power depends on the total sample sizes for each level." The size of a group or level is defined as the unit number of that level. The major restriction is often at the higher groups, especially at the top level of the multilevel hierarchy. The accuracy of the model estimate results may be impacted by an inadequate data sample. As a result, having as many units at the top of the hierarchy as feasible is typically preferred (Snijders, 2005). A level-two sample size of 50 or less is regarded as a small sample size and may result in skewed estimates of the second-level standard errors (Maas and Hox, 2005). We are able to avoid this problem in our article.

Table 1 describes the types of data that need to be collected for the research. We gather this financial data for all listed companies from Hochiminh City Stock Exchange in Vietnam. The research period is five years (2017-2021). We exclude 1) all the financial companies (banks, securities, and insurance companies) due to the unique nature of their businesses, which are often associated with high debt-to-equity ratios; 2) firms that are delisted in the period; or 3) firms that have been newly listed for less than 3 years. We apply the sector classification of the Global Industry Classification Standard (GICS). Finally, the research sample has 362 listed

enterprises with 1,541 observations coming from 10 GISC industries apart from financials.

Table 1. Data Collection Illustration

Name	Items collected to estimate variables
Firm value	Total outstanding share number, closing share price at the end of the year, the book value of debt, and owners equity
Firm leverage	Book value of debt and owners' equity
Firm size	Total book value of assets
Profitability (ROA)	Profit before income tax, total assets
Managerial ownership	Number of shares owned by managers, the total number of shares issued
Firm leverage level	Grand mean of firm's leverage in 5 years
Industry leverage level	Grand mean of leverage of all selected firms in one industry

Statistical Description

Table 2 describes the statistics for the research data sample. The current Vietnamese law restricts the amount of debt used in listed companies. This law has come into effect in 2016 and states that the debt-to-equity ratio of listed companies must be less than five times. This explains why the max value of the variable DE in the sample is 4.96.

Table 2. Statistic Description

	Range	Minimum	Maximum	Mean	Std. Deviation
VAL	8.95	0.09	9.04	1.52	0.75
DE	4.95	0.01	4.96	1.27	1.02
MOWN	71.75	0.00	71.75	8.78	7.62
ROA	1.61	-0.79	0.82	0.10	0.10
SIZE	4.01	11.79	15.80	12.17	0.56
FDE	4.83	0.03	4.86	1.27	1.00
IDE	4.66	0.05	4.71	1.27	0.89

No. of observations: 1,541. VAL is firm value, proxied by Tobin's Q. DE is firm leverage, measured by dividing the debt's book value by the book value of equity. FDE is the firm's leverage level and is the yearly mean of firm leverage. IDE is the industry leverage level, measured by the mean of leverage of all firms in that industry. SIZE is firm size and is the total firm assets' logarithm. ROA presents profitability, calculated as the net firm profit divided by the total book value of equity. MOWN is managerial ownership, which is the rate of shares owned by managers, their spouses, and children.

Table 3 shows the results of the correlation between each pair of the research variables. We can notice that there is only one pair of variables (firm leverage (DE) and firm size (SIZE)) showing the sign of heavy multicolinearity, as their correlation coefficient's absolute value is larger than 0.5 (0.638). However, the VIF indexes check denies this suspicion.

Table 3. Correlations Between Variables

	VAL	DE	MOWN	ROA	SIZE	VIF
VAL	1					
DE	-0.102*	1				1.854

MOWN	-0.051	0.067	1			1.007
ROA	0.597**	-.306**	-0.026	1		1.115
SIZE	0.101*	-.638**	-0.048	-.128**	1	1.703

* Significant at the 5% level (1-tailed).
** Significant at the 1% level (2-tailed).

VAL is firm value, proxied by Tobin's Q. DE is firm leverage, measured by dividing the debt's book value by the book value of equity. SIZE is firm size and is the total firm assets' logarithm. ROA presents profitability, calculated as the net firm profit divided by the total book value of equity. MOWN is managerial ownership, which is the rate of shares owned by managers, their spouses, and children.

Results

Linear Regression Model

Table 4 presents the result for the one-level regression. Firm value is found to be inversely correlated to financial leverage (DE) and the proportion of shares owned by the managers (MOWN) but positively associated with firm profitability (ROA) and firm size (SIZE). However, the impact of management ownership (MOWN) on a company's market value is insignificant. This outcome supports our hypothesis and prediction on the negative effect of the debt-to-equity ratio on the firm value. Debt is relevant in determining the value of a firm. Clearly, the benefits of using debt are undeniable. Nevertheless, it is also "a double-edged sword." More debt means a higher level of risks related to financial distress and bankruptcy, which can harm shareholders' value. Especially in Vietnamese firms with weak risk control and management systems, the overuse of debt can lead to serious consequences, making firms collapse and even badly affecting the whole economy.

Table 4. Results for the Single-Level Regression (Model 1)

Model	R-square 0.229		F Test 44.903 (0.000)		
	Unstandardized Coef.		Standardized Coef.	t	Sig.
	B	Std. Error			
(Constant)	-1.383	0.477		-3.001	0.004
DE	-0.007	0.006	-0.034	-0.625	0.054
MOWN	-0.004	0.003	-0.027	-1.073	0.279
ROA	4.597	0.269	0.590	14.308	0.000
SIZE	0.168	0.041	0.300	3.157	0.000

VAL is firm value and a dependent variable, proxied by Tobin's Q. DE is firm leverage, measured by dividing the debt's book value by the book value of equity. SIZE is firm size and is the total firm assets' logarithm. ROA presents profitability, calculated as the net firm profit divided by the total book value of equity. MOWN is managerial ownership, which is the rate of shares owned by managers, their spouses, and children.

Multilevel Model

Estimates for the parameters of covariances in multilevel models are presented in **Table 5**. We develop three levels of predictor financial leverage, including leverage at the observation unit level, at the firm level, and at the sector level. From this, hierarchical models are extended gradually from Model 2 to Model 5. Model 2 (see Equation 2) is the empty or null model, which contains only one fixed intercept and one variance at each level of the hierarchy. This test is to determine if the intercept of the dependent variable (firm value) is significantly affected by predictors at higher levels (levels two and three). If the null hypothesis is accepted, then a

hierarchical approach may not be needed and can be replaced by some normal forms of single-level modeling. Model 3 (see Equation 3) facilitates random intercepts, and Model 4 (see Equation 4) allows both intercepts and coefficients to be random. And Model 5 (see Equation 5) is an extension of Model 4 with the inclusion of some more explanatory variables documented in previous research to have an impact on the firm value.

Positive and significant variations are seen at all three levels of the hierarchy, and these are regarded as important pieces of evidence for data categorization. One may argue that the company level, which is nested within the industry level, has the data for the observation unit level. To further understand how each amount of leverage affects the fluctuation of firm value, we may compute the intraclass correlation coefficient (ICC) (Table 5) using the estimations for variation values. According to Peugh (2010), "the ICC is conceptually comparable to the eta-squared effect size from ANOVA and the R-square effect size from regression." Additionally, 5% is frequently regarded as a "rough cutoff" of evidence of significant clustering, according to Heck *et al.* (2014). In particular, level two, firm-level, of the three data clustering groups is the most crucial in assessing a firm's worth since it exhibits the greatest ICC across all models (from around 59% to 75%). These numbers can be viewed as showing that changes in fundamental firm features are a major factor in changes in company value. With ICCs ranging from 5.42% to 8.27%, the clustering is therefore not insignificant at the industry level. This finding confirms that characteristics specific to a certain sector are important in assessing the market value of a company operating in that industry and validates that multilevel modeling fits data better than alternative single-level models.

Table 5. The Covariance Decomposition

	Model 2	Model 3	Model 4	Model 5
Covariance Parameter				
Obs. Level	0.112736 (0.000)	0.112919 (0.000)	0.112020 (0.000)	0.110778 (0.000)
Firm Level	0.420878 (0.000)	0.425649 (0.000)	0.307155 (0.000)	0.198457 (0.000)
Industry Level	0.030570 (0.0026)	0.033061 (0.0052)	0.052011 (0.00830)	0.027869 (0.0040)
Covariance Decomposition (%)				
Obs. level	19.98%	19.75%	23.77%	32.86%
Firm Level	74.60%	74.46%	65.19%	58.87%
Industry Level	5.42%	5.78%	11.04%	8.27%

(P-value is in parenthesis)

As the fit of the multilevel approach is verified, we continue to look at the estimates for the fixed effects. **Table 6** shows the estimates for parameters of all variables in four models 2,3,4, and 5. The estimated intercept for Model 2 is 1.53 which can be understood as the grand mean of the intercepts on firm value across all industries. In effect, it is the expected firm value for any random firm at a random year sampled in the research. Covariates are gradually added in Models 3, 4, and 5. In the random intercept model (see Model 3), firm value (VAL) is inversely and significantly associated with all three levels of leverage (DE, FDE, and IDE). These outcomes

still hold after considering random coefficients (see Model 4) and including some more level-one value predictors in Model 4 (see Model 5).

Table 6. Estimates for the Fixed Effects

Fixed Effects Parameters	Model 2	Model 3	Model 4	Model 5
Intercept	1.53035 (0.000)	1.546239 (0.000)	1.511453 (0.000)	1.688028 (0.088)
Year fixed effect		No	No	Yes
DE		-0.006 (0.022)	-0.007 (0.021)	-0.006 (0.038)
FDE		-0.017 (0.048)	-0.017 (0.053)	-0.029 (0.057)
IDE		-0.191 (0.072)	-0.204 (0.074)	-0.156 (0.081)
DE*IDE			-0.399 (0.081)	-0.401 (0.086)
ROA				2.160 (0.000)
SIZE				0.230 (0.005)
MOWN				0.001 (0.746)

(P-value is in parenthesis)

VAL is firm value, proxied by Tobin's Q. DE is firm leverage, measured by dividing the debt's book value by the book value of equity. FDE is the firm's leverage level and is the yearly mean of firm leverage. IDE is the industry leverage level, measured by the mean of leverage of all firms in that industry. SIZE is firm size and is the total firm assets' logarithm. ROA presents profitability, calculated as the net firm profit divided by the total book value of equity. MOWN is managerial ownership, which is the rate of shares owned by managers, their spouses, and children.

Level-one and -two firm leverage (DE and FDE) negatively affect firm market value (VAL), suggesting that a higher amount of debt used in a firm can harm its market value. Level-three leverage (IDE) inversely impacts firm value (VAL), meaning that an industry with a higher debt-to-equity ratio tends to be predicted to demonstrate a lower average market value of firms and vice versa. One special variable in the multilevel models is the interaction between the observation unit level and industry level of financial leverage (DE*IDE) (see Models 4 and 5). This interaction also shows negative and significant figures, indicating that a higher level of sector-level leverage can significantly strengthen the negative effect of leverage on firm value. Similar to the single-level model, profitability and firm size reveal a positive and significant influence on firm value, while managerial presents a positive but insignificant impact.

CONCLUSION

This paper aims to observe the effect of leverage at both the firm level and industry level on firm value. Literature often uses dummy variables in the fixed effect model as the traditional approach to gauge the effect of predictors at the industry level. This method is simple to perform, but it cannot separate the effects of observable and unobservable predictors. To overcome this limit, our paper employs the new method of hierarchical modeling to investigate the relationship between financial leverage and firm value. This model can better handle clustering data and distinguish between the effects of group dummies and the effects of group-level indicators. We found that not only firm-level debt but also sector-level debt is relevant in determining the value of a firm. In detail, both of them show their inverse impacts on firm value. A high level of debt-to-equity ratio employed by a firm may increase the financial risks and harm its market value.

In addition, a highly leveraged firm operating in the highly leveraged industry may worsen its market value.

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References

Ashurko, I., Esayan, A., Magdalyanova, M., & Tarasenko, S. (2021). Current concepts of surgical methods to increase mucosal thickness during dental implantation. *Journal of Advanced Pharmacy Education and Research, 11*(3), 37-41.

Baker, H. K., & Martin, G. S. (2011). *Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice*. John Wiley & Sons. doi:10.1002/9781118266250

Bradley, M., Jarrell, G. A., & Kim, E. H. (1984). On the existence of an optimal capital structure: Theory and evidence. *The Journal of Finance, 39*(3), 857-878. doi:10.1111/j.1540-6261.1984.tb03680.x

Brealey, R., Leland, H. E., & Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. *The Journal of Finance, 32*(2), 371-387. doi:10.1111/j.1540-6261.2009.01479.x

Chang, X., & Dasgupta, S. (2009). Target Behaviour and Financing: How conclusive is the evidence? *The Journal of Finance, 64*(4), 1767-1796. doi:10.1111/j.1540-6261.1977.tb03277.x

Cheng, M. C., & Tzeng, Z. C. (2014). Effect of Leverage on Firm Market Value and How Contextual Variables Influence This Relationship. *Review of Pacific Basin Financial Markets and Policies, 17*(1), 1-63. doi:10.1142/s0219091514500040

Durand, D. (1952). Cost of Debt and Equity funds for Business Trends and Problems of Measurement. *Conference on Research in Business Finance, National Bureau of Economic Research, Inc*., Cambridge, 215-262.

Eteng, O. E., Bassey, N., Eteng, E. I., Okwe, E. P., Ekpo, G., Ekam, V., & Ubana, E. (2023). Effect of vanillic acid and Morin on bisphenol S and diethyl phthalate induce-nephrotoxicity in male rats. *Bulletin of Pioneering Researches of Medical and Clinical Science, 2*(1), 25-34. doi:10.51847/JipHmYy6fi

Fama, F. F., & French, R. K. (1998). Taxes, Financing Decisions, and Firm Value. *The Journal of Finance, 53*(3), 819. doi:10.1111/0022-1082.00036

Fischer, E. O., Heinkel, R., & Zechner, J. (1989). Dynamic capital structure choice: Theory and tests. *The*

Journal of Finance, 44(1), 19-40. doi:10.1111/j.1540-6261.1989.tb02402.x

García, E. M. C. (2021). Management decisions through the neuro management in the universities of zone 3 of Ecuador. *Journal of Advanced Pharmacy Education and Research, 11*(3), 88-94.

Goldstein, R., Ju, N., & Leland, H. (2001). An EBIT-based model of dynamic capital structure. *The Journal of Business, 74*(4), 483-512. doi:10.1086/322893

Graham, J. R. (1996). Proxies for the corporate marginal tax rate. *Journal of Financial Economics, 42*(2), 187-221. doi:10.1016/0304-405x(96)00879-3

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics*, *60*(2-3), 187-243. doi:10.1016/s0304-405x(01)00044-7

Hart, O., & Moore, J. (1990). Property Rights and the Nature of the Firm. *Journal of Political Economy*, *98*(6), 1119-1158. doi:10.1086/261729

Heck, R. H., Thomas, S. L., & Tabata, L. N. (2014). Multilevel and longitudinal modeling with IBM SPSS (2nd ed). Routledge: New York. doi:10.4324/9780367824273-1

Islam, S. Z., & Khandaker, S. (2015). Firm leverage decisions: Does industry matter? *North American Journal of Economics and Finance, 31*, 94-107. doi:10.1016/j.najef.2014.10.005

Iturriaga, F. J. L., & Crisostomo, V. L. (2010). Do Leverage, Dividend Payout, and Ownership Concentration Influence Firms' Value Creation? An Analysis of Brazilian Firms. *Emerging Markets Finance and Trade, 46*(3), 80-94. doi:10.2753/ree1540-496x460306

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics*, *3*(4), 305-360. doi:10.1016/0304-405x(76)90026-x

Kartikasari, E. D., Hermantono, A., & Mahmudah, A. (2019). Good Corporate Governance, Dividend, Leverage, and Firm Value. *International Research Journal of Business Studies*, *12*(3), 301-311. doi:10.21632/irjbs.12.3.301-311

Kraus, A., & Litzenberger, R. H. (1973). A State-Preference Model of Optimal Financial Leverage. *Journal of Finance, 28,* 911-922. doi:10.1111/j.1540-6261.1973.tb01415.x

Leland, H. E. (1994). Corporate debt value, bond covenants, and optimal capital structure. *The Journal of Finance, 49*(4), 1213-1252. doi:10.1111/j.1540-6261.1994.tb02452.x

Lin, F. L., & Chang, T. (2011). Does Debt Affect Firm Value in Taiwan? A Panel Threshold Regression Analysis. *Applied Economics, 43*(1-3), 117-128. doi:10.1080/00036840802360310

Maas, C. J. M., & Hox, J. J. (2005). Sufficient Sample Sizes for Multilevel Modelling. *Methodology, 1*(3), 85-91. doi:10.1027/1614-2241.1.3.85

Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: a correction. *The American Economic Review, 53*(3), 433-443.

Modigliani, F., & Myers, M. H. (1958). The Cost of Capital, Corporate Finance and the Theory of Investment. *American Economic Review*, *49*, 261-297.

Myers, S. C. (1984). The Capital Structure Puzzle. *Journal of Finance*, *39*(3), 575-592. doi:10.2307/2327916

Myers, S. C., & Majluf, N. S. (1984). Corporate Financing and Investments Decisions When Firms Have Information That Investors Do Not Have. *Journal of Financial Economics*, *13*, 187-221. doi:10.1016/0304-405x(84)90023-0

Peugh, J. L. (2010). A practical guide to multilevel modeling. *Journal of School Psychology*, *48*(1), 85-112. doi:10.1016/j.jsp.2009.09.002

Robichek, A. A., & Myers, S. C. (1966). Conceptual problems in the use of risk-adjusted discount rates. *The Journal of Finance*, *21*(4), 727-730. doi:10.1111/j.1540-6261.1966.tb00277.x

Ross, S. A. (1977). The determination of financial structure: the incentive-signaling approach. *The Bell Journal of Economics*, 23-40. doi:10.2307/3003485

Roy, P. K., Lalchuangkima, F., Gupta, B., Zonuntluangi, Z., Laldinchhana, L., Lalhlenmawia, H., & Sawant, S. D. (2023). Green synthesis of silver nanoparticles with picrasma javanica extract shows enhanced wound healing in Wistar rats. *Bulletin of Pioneering Researches of Medical and Clinical Science*, *2*(1), 35-48. doi:10.51847/6wXPZcGzxu

Sinha, A. (2017). An inquiry into the effect of capital structure on firm value: A study of power sector companies in India. *Parikalpana: KIIT Journal of Management*, *13*(2), 107-117. doi:10.23862/kiit-parikalpana/2017/v13/i2/164525

Snijders, T. A. B. (2005). Power and Sample Size in Multilevel Linear Models. *Encyclopedia of Statistics in Behavioral Science*, *3*, 1570-1573. doi:10.1002/0470013192.bsa492

Stulz, R. (1990). Managerial discretion and optimal financing policies. *Journal of Financial Economics*, *26*(1), 3-27. doi:10.1016/0304-405x(90)90011-n

Tabassum, M., Ayub, F., Tanveer, K., Ramzan, M., Bukhsh, A., Mohammed, Z. M., & Khan, T. M. (2023). Quality-of-life assessment in musculoskeletal disorder patients, Lahore, Pakistan. *Bulletin of Pioneering Researches of Medical and Clinical Science*, *2*(1), 17-24. doi:10.51847/QVOwcxjCwX

Vo, X. V., & Ellis, C. (2017). An empirical investigation of capital structure and firm value in Vietnam. *Finance Research Letters*, *22*, 90-94. doi:10.1016/j.frl.2016.10.014

Wu, C., Cheng, S., Wu, J., Zhang, Y., Lin, Y., Li, L., Du, J., Zhang, Y., & Lang, H. (2023). Factors influencing job satisfaction and work of male nurses. *Journal of Integrative Nursing and Palliative Care*, *4*, 38-45. doi:10.51847/nAoDCI4Lq1

Yudhawati, R., & Yuniawati, E. (2021). Correlation of serum interleukin-6 level and pneumonia severity index score in patient with community-acquired pneumonia. *Journal of Advanced Pharmacy Education and Research*, *11*(3), 58-62.