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When Does Profitability Translate into Market Capitalization? The Role of Capital Structure and Firm-Level Cyclicality in U.S. Listed Firms.

Keywords:

Profitability, Market Capitalization, Capital Structure, Leverage, Firm-level cyclicality, Return on Equity (ROE), Panel Regression, Moderation Effects.

Abstract:

This thesis examines whether capital structure changes how profitability is reflected in market capitalization, and whether this moderating effect differs with firm-level cyclicality. Using panel data on 934 S&P Composite 1500 firms from 2018 to 2025, the study estimates panel regressions with firm and year fixed effects. Profitability is measured primarily using return on equity, leverage using the debt-to-equity ratio, and firm-level cyclicality as each firm's revenue sensitivity to U.S. GDP growth. The results show that profitability is positively associated with market capitalization. A one-standard-deviation increase in ROE is associated with approximately 13.7% higher market capitalization in the following year. However, this relationship depends on capital structure. The ROE × D/E interaction is negative and statistically significant, showing that higher leverage weakens the extent to which profitability translates into market value. At average leverage, a one-standard-deviation increase in ROE is associated with approximately 17.5% higher market capitalization, but the effect falls to approximately 11.7% when leverage is one standard deviation above the mean. The main contribution of the thesis is the firm-level cyclicality test. The three-way interaction between profitability, leverage, and cyclicality is negative but statistically insignificant, meaning the leverage-related discount on profitability does not differ systematically across firms with different levels of cyclical exposure. This conclusion holds when ROA replaces ROE and when earnings volatility replaces the GDP-beta cyclicality measure. The null result is still informative: it suggests that cyclicality may matter for firms' financing, investment, and refinancing decisions, but not for this specific valuation channel. Overall, leverage matters for how profitability is reflected in market value, while firm-level cyclicality does not appear to change that relationship in this sample.

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1. Introduction:

In 2024, Microsoft Corporation reported a net profit margin of approximately 36%, exceeding Apple Inc.'s margin of around 24% by roughly 12 percentage points. Based on general consensus in the world of corporate finance, one might expect the more profitable firm to have a higher market capitalization. However, during 2024, the two companies showed similar market capitalization levels, with both having approximately 3 trillion USD (Reuters, 2024a, 2024b). One important difference between the firms was leverage: Apple had a debt-to-equity ratio of approximately 1.87 compared to Microsoft Corporation, which had 0.19 (Microsoft, 2024; Apple, 2024). This divergence does not necessarily imply that capital structure explains the difference in equity value alone, as valuation also reflects expectations of long-term growth, among other factors. (Boston Consulting Group, 2024). However, it does raise a central question: under what conditions do increases or decreases in profitability translate into market capitalization, and does capital structure moderate this relationship?

Profitability is widely regarded as an important factor that investors take into account when assessing equity value. Ohlson (1995) explains that market value is closely connected to accounting fundamentals, especially book value and expected abnormal earnings, where abnormal earnings can help explain the divergence between book value and market value. This view is reinforced by Novy-Marx (2013), who shows that profitability conveys important information for pricing a company's equity. Nevertheless, profitability is not the only metric considered in equity valuation. Value is also driven by expected growth, a firm's ability to generate cash flow in the long run, and risk (McKinsey, 2026; PwC, n.d.). Even if profitability is central to market capitalization, investors do not focus solely on accounting profits but rather on whether those profits reflect a competitive advantage, disciplined capital allocation, and the firm's ability to generate long-term cash flows and economic value (Boston Consulting Group, 2026).

The role of capital structure is a topic of interest in this study, as leverage could have a mixed effect on how investors price firms. In corporate finance, leverage is often viewed as a double-edged sword where it, on one hand, could enhance value through mechanisms like tax deductibility of interest, while on the other hand, it could increase the risk profile of a firm and make it more prone to financial distress (Graham, 2000; Opler & Titman, 1994).

Consequently, firms that have similar levels of profitability could still be priced differently by equity markets in scenarios when they differ in capital structure, risk profile, or future expected growth. This highlights the relevance of not only examining how profitability is connected to market capitalization but also how this relationship could partly be contingent on capital structure.

Furthermore, the extent to which capital structure moderates the relationship between profitability and market capitalization may depend on firms' cyclical exposure. Firms with higher cyclical sensitivity are generally more exposed to changes in demand, macroeconomic downturns, and earnings volatility, while firms with lower cyclical sensitivity tend to have more stable demand patterns and cash flows (McKinsey, 2025; Ngene, 2021). This distinction is often discussed at the industry level, but firms within the same industry may still differ in how strongly their revenues move with the business cycle. Therefore, the role of capital structure may be particularly relevant for firms whose revenues and earnings are more exposed to cyclical fluctuations, since higher leverage can increase the consequences of downturns for equity holders (Opler and Titman, 1994; McKinsey, 2025).

In this study, the U.S. equity market is used as the empirical setting for two main reasons. First, the U.S. equity market is the largest in the world, with a total market capitalization of roughly USD 68.94 trillion as of 2025 (World Bank, 2025). Second, the breadth of listed firms provides substantial variation in cyclical exposure across and within industries. This makes the setting suitable for examining whether the extent to which capital structure changes the profitability–market capitalization relationship differs systematically with firm-level cyclicality. By measuring cyclicality through each firm's revenue sensitivity to GDP growth, the thesis allows for a more fine-grained delineation of cyclicality than a broad cyclical-versus-defensive industry classification alone.

1.1 Purpose

Profitability is widely recognized as an important determinant of equity valuation, but it may not translate into market capitalization in the same way for all firms. Investors also consider the financial risk connected to profits and the stability of the environment in which they are generated. This makes firm-level cyclicality important, since firms differ in their exposure to demand fluctuations, macroeconomic conditions, and earnings volatility.

The purpose of this study is to examine whether leverage moderates the relationship between profitability and market capitalization and whether this moderation effect varies with firm-level cyclicality. While the direct relationship between profitability and market capitalization serves as a baseline, the central focus is whether higher leverage weakens the extent to which profitability is reflected in market capitalization more strongly among firms with higher cyclical sensitivity.

By placing cyclicality at the center of the analysis, this thesis examines under what cyclical conditions profitability is more or less strongly reflected in market capitalization when firms differ in leverage.

1.2 Contribution

This thesis builds on relationships that are already well documented in prior research, and these relationships are therefore not treated as novel in themselves. First, prior research has shown that profitability is relevant for equity valuation and stock returns (Ohlson, 1995; Fama and French, 2006, 2015; Novy-Marx, 2013; Ball and Brown, 1968). Second, the role of capital structure in shaping firm value, risk, and investment incentives is well established in corporate finance (Modigliani and Miller, 1958, 1963; Jensen and Meckling, 1976; Graham, 2000; Heider and Ljungqvist, 2015). More recent research also shows that leverage, financing conditions, and investment decisions remain sensitive to changing economic environments, including credit cycles and industry-level business cycles (Gulen et al., 2024; Kumar and Yerramilli, 2025).

The contribution of this thesis is therefore not to show that profitability matters for market capitalization, or simply that leverage matters for valuation. Instead, the contribution lies in examining whether the moderating role of leverage is conditional on the firm's cyclical exposure. More specifically, the thesis tests whether cyclicality affects the strength of the ROE × D/E interaction. In this sense, the thesis treats cyclicality not as a background control, but as a central part of the theoretical framework, measured primarily through firm-level sensitivity to the business cycle.

This cyclicality angle is important because the same profitability signal may not have the same valuation meaning across all firms. For firms with higher cyclical exposure, earnings and cash flows are generally more exposed to changes in demand, macroeconomic

conditions, and industry-specific downturns. As a result, higher leverage may make investors more cautious when valuing current profitability, since debt obligations can make earnings volatility more costly for equity holders. For firms with lower cyclical exposure, where demand and cash flows tend to be more stable, profitability may be interpreted as a more persistent signal of future cash-flow generation.

By foregrounding cyclicality, this thesis contributes to the literature by examining whether the profitability, leverage, and market capitalization relationship is homogeneous across firms or whether it depends on the cyclicality of the firm's operating environment. The thesis also helps assess whether firm-level measures of cyclicality provide a more precise way to capture cyclical exposure than broad industry classifications

2. Literature Review and Theory Background

This section reviews the literature on profitability, capital structure, market capitalization, and cyclicality. The purpose is not to present the profitability–market capitalization relationship as novel, since this relationship is already well established. Instead, the section first treats profitability and capital structure as theoretical background before developing the central contribution of the thesis: whether the moderating role of leverage depends on firms' cyclical exposure.

2.1 Direct relationship between profitability and market capitalization

The relationship between profitability and equity valuation is already well established in corporate finance. For this reason, this thesis treats the direct profitability–market capitalization relationship as a baseline rather than as its main contribution. The theoretical foundation can be traced to valuation models in which firm value reflects expected future earnings and the ability of firms to generate returns above the required return on capital. In the residual income framework, market value is linked to book value and the present value of expected abnormal earnings, meaning that more profitable firms should, all else equal, have higher equity valuations (Ohlson, 1995; Frankel and Lee, 1998). Similarly, Ball and Brown (1968) show that accounting earnings contain value-relevant information that is reflected in stock prices.

More recent asset-pricing research confirms that profitability remains relevant for equity markets but also reinforces that this relationship is already widely documented. Ball et al. (2016) show that cash-based operating profitability is informative for explaining cross-sectional stock returns. Additionally, Hou et al. (2015) examined stock market data from CRSP/Compustat between 1972 and 2011, demonstrating that their q-factor model, which included return on equity as a profitability measure, provides an explanation for the cross-section of average stock returns. These studies support the relevance of profitability for valuation, but they also show that the relationship between profitability and equity valuation is not new.

In this thesis, H1 therefore functions as a necessary baseline. It establishes whether profitability is positively associated with market capitalization in the sample before testing whether leverage changes the strength of this relationship and whether this moderating effect differs with firm-level cyclicality. Therefore, the first hypothesis is:

H1: *Profitability is positively associated with market capitalization*

2.2 Capital Structure and Equity Valuation

Capital structure is relevant for equity valuation because leverage affects both the distribution of cash flows and the risk borne by shareholders. Like the profitability-valuation relationship, the connection between capital structure and firm value is already well established in corporate finance and is therefore treated here as theoretical background rather than as the thesis's main contribution. In the Modigliani and Miller (1958) framework, capital structure is irrelevant under perfect capital markets. However, once real-world frictions such as taxes, financial distress costs, agency conflicts, and asymmetric information are introduced, leverage can affect firm value and the required return on equity.

The trade-off theory captures this tension. On one hand, debt can create value through the tax deductibility of interest payments (Modigliani and Miller, 1963; Graham, 2000). On the other hand, higher leverage increases the probability and expected costs of financial distress, which may reduce equity value (Andrade and Kaplan, 1998; Korteweg, 2010). Leverage can therefore be value-enhancing at moderate levels but value-destroying when debt obligations become too large relative to the firm's cash-flow capacity.

Agency theory provides a second reason why capital structure matters. Debt may discipline managers by reducing free cash flow available for non-value-enhancing investments (Jensen, 1986). However, it may also create conflicts between shareholders and debtholders, including risk shifting and underinvestment incentives (Jensen and Meckling, 1976; Myers, 1977). Recent evidence also emphasizes the role of financial flexibility in capital-structure decisions. Lambrinoudakis, Skiadopoulos, and Gkionis (2019) show that firms reduce leverage when expected future investment shocks increase, suggesting that firms preserve debt capacity when future financing needs become more likely.

Overall, prior literature shows that leverage can affect equity valuation through tax benefits, financial distress risk, agency conflicts, and investment constraints. This thesis builds on these mechanisms by treating capital structure not only as a direct determinant of value but also as a condition that may change how profitability is reflected in market capitalization.

2.3 Capital Structure as a Moderator of the Profitability-Market Capitalization Link

This section builds on established capital-structure mechanisms to motivate the ROE × D/E interaction, which then serves as the basis for examining whether this moderation differs across industry environments. Beyond its direct effect on equity valuation, capital structure may change how strongly profitability translates into market capitalization. A given level of profitability may not be valued in the same way for a low-leverage firm as for a highly leveraged firm. Since shareholders are residual claimants, higher leverage increases the risk borne by equity holders and may raise the required return on equity. Consequently, future cash flows may be discounted at a higher rate when firms are highly levered (Hamada, 1972; Friewald, Nagler, and Wagner, 2022). This suggests that profitability may have a weaker effect on market capitalization when leverage is high.

A second mechanism is related to debt servicing, financial flexibility, and debt overhang. When leverage increases, a larger share of cash flow must be used to meet interest and principal payments. This may reduce the extent to which higher profitability benefits equity holders immediately, especially when firms also need liquidity to absorb shocks or finance new investment. Kalemli-Ozcan, Laeven, and Moreno (2022) show that highly leveraged firms reduced investment more after the European crisis and explicitly account for debt service by measuring interest payments relative to EBITDA. Their evidence supports the

broader idea that debt-service burdens can reduce firms' financial flexibility when conditions weaken.

At higher levels of leverage, this cash flow constraint can also create agency problems between shareholders and debtholders. While moderate leverage may increase value by disciplining managers and reducing overinvestment, especially when firms generate strong free cash flow (Jensen, 1986), excessive leverage can distort investment incentives. In this case, shareholders may be less willing to finance otherwise profitable projects because part of the value created accrues to existing debtholders. This is consistent with Myers (1977) and Hennessy (2004), who show that risky debt can lead to underinvestment. Recent evidence by Blickle and Santos (2024) further shows that debt overhang can reduce firms' investment activity and growth. Taken together, these mechanisms suggest that leverage may weaken the profitability-market capitalization relationship when debt obligations reduce financial flexibility or constrain future value creation.

Before turning to the hypotheses, it is important to address the overlap between the central variables. ROE measures profitability from the shareholder perspective, D/E measures leverage, and market capitalization measures equity market value. These are separate concepts, but they are not fully independent by construction. ROE and D/E both include book equity in the denominator, while market capitalization is also equity-based. This means that some of the observed relationship may reflect shared accounting components rather than only separate economic mechanisms (Kronmal, 1993).

This concern is addressed in several ways. The models include ROE and D/E separately alongside the interaction term, so the interaction is not interpreted without accounting for their direct associations. Section 4.1 reports correlations and VIF values to make the degree of overlap transparent. In addition, the ROA-based robustness model uses a profitability measure that does not share the same denominator with D/E. The ROE × D/E interaction is therefore interpreted carefully: it tests whether equity-based profitability is valued differently when leverage is higher, not whether the underlying constructs are fully independent.

Overall, leverage can moderate the relationship between profitability and market capitalization in two opposing ways. It may weaken the relationship through higher equity risk, financial distress, debt servicing obligations, reduced flexibility, and debt overhang.

However, it may also strengthen the relationship through tax benefits and managerial discipline. This theoretical ambiguity motivates two competing hypotheses:

> ***H2a:*** *Capital structure negatively moderates the relationship between profitability and market capitalization, meaning that the positive association between profitability and market capitalization becomes weaker as leverage increases.*

> ***H2b:*** *Capital structure positively moderates the relationship between profitability and market capitalization, meaning that the positive association between profitability and market capitalization becomes stronger as leverage increases.*

2.4 Cyclicality and the Operating Environment

The contribution of this thesis is developed through the cyclicality dimension of the analysis. Prior research has established both that profitability is reflected in equity valuation and that leverage can affect firm value. However, the moderating role of capital structure is often treated as a general effect rather than as one that may depend on the environment in which firms operate. What remains less clear is whether leverage changes the profitability–market capitalization relationship in the same way for all firms, or whether this effect depends on firms' exposure to cyclical conditions. This section develops the argument that cyclicality may shape how investors interpret profitability when firms differ in leverage.

2.4.1 Cyclicality and profitability as a valuation signal

Firms differ in their exposure to the business cycle. Firms with higher cyclical exposure are generally more sensitive to changes in demand, macroeconomic conditions, and earnings volatility, while firms with lower cyclical exposure tend to have more stable demand and more predictable cash flows. This distinction is often discussed at the sector level, since some sectors are more sensitive to macroeconomic risk than others. Ngene (2021) provides background evidence that volatility patterns differ across U.S. equity sectors and vary with business-cycle conditions. The article is therefore used to support the broader point that risk exposure is not uniform across the market.

The main theoretical point is that the same level of profitability may not carry the same valuation meaning across all firms. For firms with high cyclical exposure, current profitability may be viewed as less persistent because revenues and earnings are more

vulnerable to downturns. For firms with lower cyclical exposure, profitability may instead be interpreted as a more stable signal of future cash-flow generation. Cyclicality may therefore influence how investors interpret profitability, particularly when profitability is combined with high leverage.

Recent value-relevance research offers a useful basis for viewing accounting information as context-dependent in equity valuation. Barth, Li, and McClure (2023) examine the relation between accounting information and share prices from 1962 to 2018 and find that the overall value relevance of accounting information has not declined but has become more nuanced over time. They also include industry indicators, reflecting that accounting items may relate to share prices differently across industries. For this thesis, this is important because profitability should not be viewed only as a general accounting measure but also as a valuation signal whose meaning may depend on the environment in which the firm operates. Although Barth, Li, and McClure (2023) do not examine leverage as a moderator, their findings support the motivation for testing whether the profitability–market capitalization relationship varies with cyclical exposure.

2.4.2 Leverage, downturn exposure, and cash-flow risk

A direct mechanism linking cyclicality to capital structure is the risk created by fixed debt obligations when earnings are unstable. Debt requires firms to meet interest and repayment obligations regardless of whether revenues increase or decline. This makes leverage potentially more costly when firms are exposed to downturns and cash-flow shocks. Opler and Titman (1994) provide direct evidence that highly leveraged firms lose more sales and market value during industry downturns than more conservatively financed firms. This finding is important because it connects leverage to the economic environment in which the firm operates. It suggests that the cost of leverage may not be constant across all firms, but may become more severe when firms are exposed to negative demand shocks.

More recent evidence also indicates that leverage is affected by shocks to the business environment. Tan et al. (2021) show that business shocks explain important changes in corporate leverage and that leverage becomes less stable when firms face larger shocks. They argue that capital structure analysis should take such shocks into account. This supports the logic of the present study, since firms with higher cyclical exposure are more likely to face demand and cash-flow shocks that may affect both debt capacity and investors' interpretation

of profitability. Leverage should therefore not automatically be treated as having the same moderating role across all firms.

This mechanism matters for how profitability is interpreted by equity markets. If a firm with stable demand reports high profitability, investors may be more likely to view that profitability as persistent. In contrast, if a highly levered firm with strong cyclical exposure reports high profitability, investors may discount that profitability more strongly because future earnings are more uncertain and debt obligations increase the consequences of a downturn. Therefore, the same level of profitability may translate less strongly into market capitalization when it is generated by a highly levered firm with greater cyclical exposure. This does not mean that cyclicality alone determines valuation, but it suggests that the valuation impact of profitability may depend on the financial risk attached to it.

This argument is also connected to cash-flow volatility and external financing costs. Minton and Schrand (1999) show that firms with higher cash-flow volatility invest less in capital expenditure and research and development, and that cash-flow volatility is associated with higher costs of debt and equity financing. This supports the broader mechanism that unstable cash flows can reduce investment and make external financing more costly. For firms with higher cyclical exposure, this mechanism is especially relevant because their cash flows are more likely to fluctuate with macroeconomic conditions. If volatile cash flows make external financing more costly and reduce investment, then current profitability may become a weaker signal of future value creation. High leverage may intensify this effect because debt servicing obligations reduce financial flexibility and make it harder for firms to absorb temporary shocks.

2.4.3 Financial flexibility, refinancing risk, and liquidity conditions

Recent evidence on financial flexibility further supports the idea that firms' ability to withstand shocks matters for equity valuation. Fahlenbrach, Rageth, and Stulz (2021) show that firms with greater financial flexibility experienced smaller stock-price declines during the COVID-19 crisis, when many firms faced sudden revenue shortfalls. The COVID-19 crisis is not the same as the cyclicality measure used in this thesis. Nevertheless, the study is relevant because it shows that equity markets value firms' ability to absorb sudden cash-flow shocks. Since highly levered firms generally have less financial flexibility, current

profitability may appear less reliable as a signal of future shareholder value when the firm is more exposed to cyclical downturns.

Refinancing risk provides an additional channel through which capital structure may matter for firms with higher cyclical exposure. Friewald, Nagler, and Wagner (2022) show that debt maturity structure and refinancing risk are reflected in equity returns, suggesting that investors care not only about how much debt a firm has, but also about the risk of maintaining or refinancing that debt. This mechanism is relevant for the cyclicality argument because downturns can lead to weaker earnings, lower valuations, and more difficult financing conditions. In such periods, highly levered firms with greater cyclical exposure may face more pressure when debt needs to be repaid or refinanced. As a result, investors may discount current profitability more strongly when it is generated by highly leveraged firms whose revenues are more sensitive to the business cycle.

Industry conditions are also important in Diamond, Hu, and Rajan (2020), who develop a theory of financing cycles in which creditors' control rights depend on industry liquidity. Their study suggests that firms may take on more debt when industry liquidity and valuations are expected to be favorable, but that high debt can become costly when conditions deteriorate. Although the paper does not test the profitability–market capitalization relationship directly, it is relevant because it links the consequences of debt to industry-level liquidity and valuation conditions. This strengthens the cyclicality argument in this thesis: a given level of profitability may be valued less strongly when it is combined with high leverage in an environment where liquidity and valuations are more likely to fall during downturns.

2.4.4 Business-cycle financing conditions

More recent evidence also supports the importance of business cycles for firms' investment and financing decisions. Kumar and Yerramilli (2025) show that firms' capital investment and net debt issuance are sensitive to industry business cycles. Their findings are relevant because they show that debt and investment decisions depend on the cyclical environment in which firms operate. Therefore, leverage should not be evaluated separately from cyclical exposure, since the valuation relevance of profitability may depend on whether the firm's revenues, cash flows, and financing needs are exposed to cyclical shocks.

Finally, the broader financing environment also varies over the business cycle. Halling, Yu, and Zechner (2016) show that target leverage ratios vary over the business cycle, suggesting that capital structure decisions are linked to macroeconomic conditions rather than being fixed over time. Gulen et al. (2024) further show that credit cycles are connected to corporate investment and debt issuance, suggesting that firms' ability to finance investment depends partly on credit-market conditions. These studies do not directly test the profitability–market capitalization relationship, but they support the broader argument that leverage should be interpreted in relation to the economic and financing environment in which firms operate. In periods when earnings weaken and external financing becomes more difficult, high leverage may make current profitability less valuable to equity investors because debt obligations can limit the firm's ability to finance future investment and withstand shocks.

Much of this literature discusses cyclicality at the industry level. However, firms within the same industry can still differ in how sensitive they are to the business cycle. For this reason, this thesis measures cyclicality at the firm level rather than relying only on a broad industry classification. This is important because the mechanisms discussed in the literature ultimately affect individual firms. For example, firms may lose sales during downturns (Opler and Titman, 1994), face changing debt and liquidity conditions (Diamond, Hu, and Rajan, 2020), or adjust debt issuance over industry business cycles (Kumar and Yerramilli, 2025). A firm-level GDP-beta measure therefore provides a more direct way to capture differences in cyclical exposure than a binary industry classification, while also allowing for variation between firms within the same industry.

Taken together, these mechanisms provide a theoretical bridge between H2 and H3. H2 asks whether leverage changes the strength of the relationship between profitability and market capitalization. H3 extends this by asking whether the moderating effect itself depends on cyclicality. The literature reviewed above does not directly test the exact empirical model used in this thesis. Instead, it motivates the hypothesis by showing that leverage, cash-flow volatility, financial flexibility, refinancing risk, business shocks, liquidity conditions, earnings informativeness, and financing conditions all shape how investors interpret profitability when firms face unstable earnings or adverse business-cycle conditions.

This gives theoretical reason to expect that leverage may weaken the relationship between profitability and market capitalization more strongly for firms with higher cyclical exposure,

where revenues and cash flows are more sensitive to macroeconomic and industry-specific shocks. At the same time, firms with different levels of cyclicality may also differ along other dimensions that could push in the opposite direction. The size and direction of any cyclicality difference is therefore an empirical question rather than a foregone conclusion. H3 is formulated to test this prediction directly rather than to assume it.

Building on H1 and the competing predictions in H2a/H2b, the following hypothesis is proposed:

> ***H3***: *The moderating effect of capital structure on the relationship between profitability and market capitalization differs systematically with firm-level cyclicality, such that the negative moderating effect is stronger for firms with higher cyclical sensitivity and weaker for firms with lower cyclical sensitivity.*

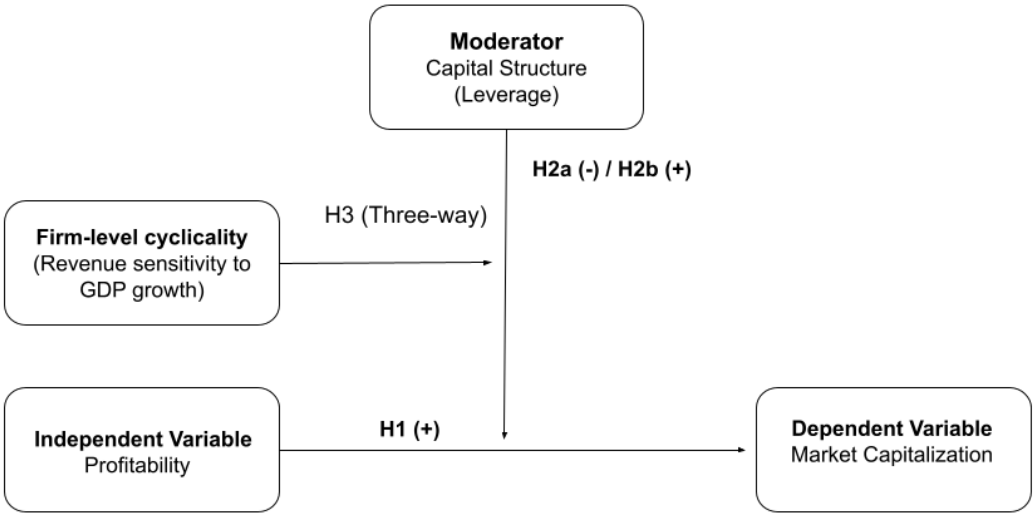
2.5 Conceptual Framework

Figure 1 presents the conceptual framework of the thesis and summarizes the hypotheses developed in the literature review. H1 represents the baseline relationship, where profitability is expected to be positively associated with market capitalization.

H2a and H2b introduce capital structure as a moderator of this relationship. A negative moderating effect would imply that higher leverage weakens the extent to which profitability is reflected in market capitalization, while a positive moderating effect would imply that leverage strengthens this relationship.

H3 extends the framework by introducing firm-level cyclicality as a moderator of the moderation effect. Therefore, H3 is not a separate direct relationship between cyclicality and market capitalization. Instead, it represents a three-way interaction in which firm-level cyclicality affects the strength of the ROE × D/E interaction. In empirical terms, the thesis tests whether the moderating effect of leverage differs across firms with different levels of cyclical sensitivity.

Figure 1. Conceptual framework and Hypotheses



3. Method and Data

This section describes the method and data used to examine how profitability relates to market capitalization among U.S. firms, and whether this relationship changes with capital structure. The main focus is whether the moderating effect of leverage differs with firms' cyclical exposure. The section first describes the data and sample selection, including how the exclusion of firms with incomplete data may affect which firms enter the final sample. It then defines the main variables and discusses the overlap between ROE, D/E, and market capitalization. After that, the regression models are presented, including the control variables and the three-way interaction used to test H3. The section ends by explaining the identification strategy, estimation approach, and measurement of cyclicality.

3.1 Data Collection and Sample Construction

The sample is based on the S&P Composite 1500 index, which includes firms from the S&P 500, S&P 400, and S&P 600. This gives broad coverage of large-, mid-, and small-cap firms in the U.S. equity market, while excluding many of the least liquid and most thinly traded firms.

Annual financial data were collected from S&P Global's Capital IQ platform for fiscal years 2018 to 2025. The collected variables include market capitalization, ROE, ROA, the debt-to-equity ratio, and several control variables. The control variables are annual revenue growth, total assets, capital expenditure, cash and short-term investments, research and development expense, and dividends paid.

The final regression sample consists of 7,464 firm-year observations across 934 firms for the period 2018 to 2025. The reduction from the raw data to the final sample comes from the filtering steps needed to create a clean lagged panel with complete data for all regression variables. The sample-size progression is summarized in the table below.

Table 1. Sample-size progression

Stage	Firm-year observations
Initial Capital IQ download	8,415
After applying the one-year lag (drops the earliest year per firm)	7,464
After dropping non-positive market capitalisation	7,464
After dropping missing values on any regression variable	7,464
Final regression sample	**7,464 (934 firms, 2018–2025)**

Note. The table reports the number of firm-year observations remaining after each stage of sample construction. The final regression sample comprises 7,464 firm-year observations across 934 firms over the period 2018–2025.

3.1.1 Data screening procedure and sample selection

The data screening procedure needs to be described carefully. The Capital IQ Company Screening function uses a strict filter. A firm is included in the screened dataset only if it has non-missing data for every requested variable in every requested year. This means that a firm is excluded if just one accounting variable is missing in one year.

For this reason, the 934 firms in the final sample should not be seen as a random sample of the S&P Composite 1500. Instead, they represent the firms with complete data for all required variables across the full sample period. The possible implications of this screening

procedure are examined in Section 3.1.2, where the 934 included firms are compared with the 343 firms that did not meet the complete-data requirement.

3.1.2 Test for selection bias

To examine the extent of the resulting selection bias, an unfiltered Capital IQ extract of the same S&P Composite 1500 set of firms was collected. This extract included only firm names and annual market capitalization, since market capitalization was the only variable with reliable coverage for all firms. The unfiltered dataset contains 1,277 firms.Of these, 934 firms, or 73.1%, are included in the analysis sample, while 343 firms, or 26.9%, are excluded by the complete data requirement.

The excluded firms are not mainly missing because of survival, IPO timing, or delisting. In fact, 99.7% of the excluded firms have complete market-capitalization data across all nine sample years. This suggests that the exclusion is driven by missing accounting variables, such as ROE, D/E, and R&D expenditure, rather than by missing market-value data. The selection issue is therefore mainly related to accounting data completeness, not survivorship.

A comparison of market capitalization between included and excluded firms shows a clear size difference. The pooled median market capitalization is USD 6,637 million for included firms and USD 3,931 million for excluded firms, meaning that included firms are about 1.69 times larger at the median. This difference is statistically significant across all tests used: the Welch t-test on log market capitalization ($t = 14.51$, $p < 0.001$), the Mann-Whitney U-test ($p < 0.001$), and the Kolmogorov-Smirnov test ($D = 0.148$, $p < 0.001$). The size difference is also present in every year of the sample period, with median ratios ranging from 1.54 to 1.78 (Appendix A)

3.1.3 Reflection on what is systematically included and excluded

This selection process means that the analysis sample is tilted toward larger firms with more complete accounting disclosure. Smaller firms with missing values for specific accounting variables, such as R&D expenditure, capital expenditure, or dividend payments, are more likely to be excluded.

Two features of the empirical design reduce, but do not remove, this concern. First, firm size is included as a control variable in all main models through the logarithm of total assets. This

helps account for observable size differences within the analysis sample. Second, firm fixed effects remove time-invariant firm characteristics, meaning that the estimates are based on changes within the same firm over time.

Even so, the results should mainly be interpreted as applying to larger U.S. listed firms with consistent accounting disclosure. The moderation effect may differ among smaller firms with less complete reporting, which is discussed as a limitation in Section 5.6. This comparison therefore helps show that the sample selection is related to firm size. However, it cannot rule out that firms with incomplete data also differ in other ways that are not directly observed, and that these differences may be related to the moderation effect.

3.2 Descriptive statistics

Table 2 reports summary statistics for all regression variables in their original units. The statistics are shown after winsorization at the 1st and 99th percentiles, but before z-score standardization. These procedures are explained in Section 3.3.3. Panels B and C split the sample using the firm-level GDP-beta cyclicality measure described in Section 3.3.2 (Appendix B). Firms with above-median GDP beta are classified as high-cyclicality firms, while firms with below or at-median GDP beta are classified as low-cyclicality firms. This firm-level measure is the primary cyclicality measure used in the main analysis

The dependent variable, ln(Market Cap), has a mean of 9.06 and a standard deviation of 1.52 across the full sample of 7,464 firm-year observations. This corresponds to an implied market capitalization of approximately USD 8.6 billion. Low-cyclicality firms are larger than high-cyclicality firms on average, with implied market capitalization of approximately USD 10.4 billion compared with USD 7.2 billion. This suggests that firms with revenues that are less sensitive to macroeconomic conditions tend to be larger and more established.

ROE ranges from −49.0% to 105.1% after winsorization, with a median of 12.3% in the full sample. Median ROE is very similar across the two cyclicality groups: 12.1% for high-cyclicality firms and 12.4% for low-cyclicality firms. This indicates that the GDP-beta classification mainly separates firms by revenue sensitivity to the macroeconomic cycle, rather than by profitability levels.

The D/E ratio remains strongly right-skewed even after winsorization, with a median of 77.2% and a 99th percentile bound of 869.4%. High-cyclicality firms have slightly higher median leverage than low-cyclicality firms, at 78.6% compared with 76.2%, but the difference is modest. This differs from what may be expected under a broad GICS-based classification, where some defensive sectors, such as utilities, often have high leverage. The small leverage difference under the GDP-beta classification suggests that firm-level revenue cyclicality and capital structure are not strongly aligned in the sample.

In the sample, revenue growth is the most unevenly distributed variable. In the full sample, it has a standard deviation of 118.4 percentage points and a maximum value of 8,290%. This is likely caused by a small number of firms that experienced large increases in revenue during the sample period. To reduce the influence of these extreme observations, revenue growth is log-transformed in the models as $\ln(1 + \text{Revenue Growth}_{i,t-1} / 100)$. This reduces skewness and makes the variable more comparable with the other regressors. Revenue growth is included as a control variable because growth may independently affect market capitalization.

In addition to the variables shown in Table 2, the regression models also include five firm-level control variables to address omitted-variable concerns: the natural logarithm of total assets, capital expenditure intensity, cash holdings, R&D intensity, and the dividend ratio. Descriptive statistics for these additional controls are reported in Appendix B.

Table 2 Descriptive Statistics (Panel A: Full Sample)

Variable	N	Mean	SD	Min	P25	Median	P75	Max
ln(Market Cap)	7,464	9.063	1.517	4.526	7.950	8.894	10.035	15.327
ROE (lagged)	7,464	0.152	0.201	-0.490	0.061	0.123	0.215	1.051
D/E (lagged)	7,464	113.930	130.308	1.746	41.175	77.200	135.750	869.399
ROE × D/E (lagged)	7,464	22.393	82.708	-425.745	2.352	7.607	18.929	913.512
ROA (lagged)	7,464	0.052	0.053	-1.204	0.025	0.046	0.073	0.574
ln(1 + Revenue Growth, lagged)	7,464	0.071	0.226	-1.826	-0.005	0.063	0.141	4.430
ln_TotalAssets_lag	7,464	8.992	1.516	3.325	7.886	8.877	9.945	14.332
Capex_Intensity_lag	7,464	0.032	0.032	0.000	0.009	0.022	0.044	0.160
Cash_Ratio_lag	7,464	0.080	0.083	0.000	0.020	0.053	0.113	0.422
RD_Intensity_lag	7,464	0.015	0.034	0.000	0.000	0.000	0.010	0.184
Dividend_Ratio_lag	7,464	0.001	0.004	0.000	0.000	0.000	0.000	0.032

Notes: The table reports summary statistics for the full sample (N = 7,464 firm-year observations). All explanatory variables are lagged one period. Continuous variables are winsorised at the 1st and 99th percentiles.

To show the gap between profitability and market capitalization, Table 3 reports how firms are distributed across ROE and market-capitalization quintiles. Each firm is first ranked by its average ROE and then separately ranked by its average market capitalization over the sample period. The table shows, within each ROE quintile, how firms are distributed across the market-capitalization quintiles. If profitability and market capitalization were closely aligned, most firms would appear along the diagonal, where the two rankings match.

The table shows a positive relationship, but not a perfect one. Firms in the lowest ROE quintile are more often found in the lower market-capitalization quintiles, while firms in the highest ROE quintile are more often found in the upper market-capitalization quintiles. However, the relationship is far from one-to-one. Among firms in the highest ROE quintile, 38.0% are also in the highest market-capitalization quintile. This means that 62.0% of the most profitable firms are not among the most valuable firms, and 37.4% are found in the bottom three market-capitalization quintiles. Across the full table, the diagonal cells average only 27.2%, meaning that roughly three out of four firms have different ROE and market-capitalization rankings.

This provides descriptive evidence that profitability is positively related to market capitalization, but only moderately so. ROE helps explain differences in market value, but it does not fully determine them. This motivates the main analysis of whether capital structure and firm-level cyclicality help explain when profitability is more or less strongly reflected in market capitalization.

Table 3. Distribution of Firms by ROE Quintile and Market Capitalisation Quintile

	MC Q1 (lowest)	**MC Q2**	**MC Q3**	**MC Q4**	**MC Q5 (highest)**
ROE Q1 (lowest)	**60 (32.1%)**	57 (30.5%)	28 (15.0%)	22 (11.8%)	20 (10.7%)
ROE Q2	39 (21.0%)	**40 (21.5%)**	40 (21.5%)	43 (23.1%)	24 (12.9%)
ROE Q3	49 (26.2%)	32 (17.1%)	**41 (21.9%)**	33 (17.6%)	32 (17.1%)
ROE Q4	27 (14.5%)	34 (18.3%)	43 (23.1%)	**42 (22.6%)**	40 (21.5%)
ROE Q5 (highest)	12 (6.4%)	23 (12.3%)	35 (18.7%)	46 (24.6%)	**71 (38.0%)**

Note. Cell entries are firm counts with row percentages in parentheses. N = 934 firms, computed at the firm level (the firm-level collapse of the 7,464 firm-year sample). Diagonal cells (matching ROE and market-capitalisation quintiles) are in bold and average 27%, indicating that roughly three in four firms occupy different ROE and market-capitalisation rankings.

3.3 Variable construction

The dependent variable is the natural logarithm of market capitalization, ln(Market Cap), measured in USD millions. The log transformation reduces the influence of very large firms and makes the distribution of market capitalization less skewed. Since the explanatory variables are later standardized, the regression coefficients can be interpreted approximately as percentage changes in market capitalization for a one-standard-deviation increase in the relevant explanatory variable. Market capitalization is calculated as the share price multiplied by the number of shares outstanding and represents the market value of a firm's equity (Boston Consulting Group, 2023). In contrast to accounting-based measures of equity, market capitalization is partly forward-looking because it reflects both the firm's current position and investors' expectations about future cash flows and discount rates (Ohlson, 1995; Chen, Da, and Zhao, 2013).

The main independent variables are return on equity (ROE), the debt-to-equity ratio (D/E), and their interaction term, ROE × D/E. ROE is used as the main profitability measure and is calculated as net income divided by book equity. It captures the return generated on shareholders' equity. When a firm's expected ROE exceeds its cost of equity, it should trade at a premium to book value, while firms with expected ROE below the cost of equity should trade at a discount (Penman, 1996). From a shareholder perspective, ROE is therefore an important signal of value creation. However, ROE can also be affected by leverage, meaning that a higher ROE may reflect capital structure choices rather than improved operating performance, consistent with the DuPont framework (Soliman, 2008).

Alongside ROE, the study uses return on assets (ROA) as an alternative profitability measure. Nissim and Penman (2003) argue that financial statement analysis should separate the effects of leverage from the effects of operating performance. ROA complements the analysis because it measures profitability relative to the firm's asset base and is less directly influenced by capital structure choices. This separation is also supported by Penman, Richardson, and Tuna (2007), who show that valuation can reflect both operating performance and financing risk. Including ROA therefore helps assess whether the results are specific to ROE or whether similar patterns appear for profitability measured at the asset level.

Debt-to-equity is used as the measure of leverage. D/E measures the extent to which a firm uses debt relative to its equity base. It is suitable for this study because the analysis focuses on equity valuation and market capitalization, making the balance between debt and equity financing central to the research question (Corporate Finance Institute, n.d.; Penman, Richardson, and Tuna, 2007).

The interaction term ROE × D/E captures whether capital structure moderates the relationship between profitability and market capitalization. This interaction is the main coefficient of interest in the two-way moderation model. In the main H3 model, this interaction is extended into a three-way interaction with firm-level cyclicality.

Table 4 summarizes the key variables used in the analysis:

Key Variables	**Definition**
$\ln(\text{Market Cap}_{it})$	The natural logarithm of firm i's market capitalization in year t
$ROE_{i,t-1}$	Return on equity for firm i in year t-1
$(D/E)_{i,t-1}$	The debt-to-equity ratio for firm i in year t-1
$ROE_{i,t-1} \times (D/E)_{i,t-1}$	The interaction term between return on equity and debt-to-equity for firm i in year t-1
$ROA_{i,t-1} \times (D/E)_{i,t-1}$	The interaction term between return on assets and debt-to-equity for firm i in year t-1
$ROE_{i,t-1} \times Cyc_{it}$	Interaction between return on equity and cyclicality
$(D/E)_{i,t-1} \times Cyc_{it}$	Interaction between debt-to-equity and cyclicality
$ROE_{i,t-1} \times (D/E)_{i,t-1} \times Cyc_{it}$	Three-way interaction between return on equity, debt-to-equity, and cyclicality
$\gamma' X_{i,t-1}$	Vector of lagged control variables for firm (i) in year (t-1), including firm size, revenue growth, capital expenditure intensity, cash ratio, R&D intensity, and dividend ratio.
$\ln(\text{Total Assets})_{i,t-1}$	The natural logarithm of firm i's total assets in year t-1; controls for firm siz
$\ln(1 + (\text{Revenue Growth}_{i,t-1}/100))$	Log-transformed lagged revenue growth, based on the yearly percentage change in revenue and included as a control variable.

Capex Intensity$_{i,t-1}$	Capital expenditure divided by total assets for firm i in year t-1; control variable
Cash Ratio$_{i,t-1}$	Cash and cash equivalents divided by total assets for firm i in year t-1; control variable
R&D Intensity$_{i,t-1}$	Research and development expenditure divided by total assets for firm i in year t-1; control variable
Dividend Ratio$_{i,t-1}$	Dividends paid divided by net income for firm i in year t-1; control variable
α_i	Firm fixed effects, controlling for persistent firm-specific heterogeneity
λ_t	Year fixed effects, controlling for time-specific changes that affect all firms
ε_{it}	Error term for firm i in year t

3.3.1 Construct overlap and variable interpretation

A potential concern in this study is that several of the main variables are related by construction. ROE is calculated as net income divided by book equity, while the D/E ratio is calculated as total debt divided by book equity. Both variables therefore share book equity in the denominator. Since the interaction term is created by multiplying ROE and D/E, the shared denominator may partly affect the interaction term as well.

This means that the ROE × D/E variable may partly reflect mechanical overlap between the two ratios, rather than only an economic moderation effect. This concern is important because ratios with a common component can become mechanically correlated even when the underlying economic relationship is weaker (Kronmal, 1993).

At the same time, the variables are not identical in economic meaning. ROE is a backward-looking accounting measure of shareholder profitability, based on reported earnings from the previous fiscal year. D/E captures the firm's capital structure and the balance between debt and equity financing. Market capitalization, in contrast, reflects the market's valuation of the firm and is forward-looking in the sense that investors price expected future cash flows, growth opportunities, and risk. The thesis, therefore, does not assume that these variables are independent but treats them as related measures that capture different parts of the profitability–valuation relationship.

The overlap between ROE and leverage is also visible through the DuPont framework, where ROE is affected by both operating performance and financial leverage. Prior accounting research similarly separates operating performance from financing effects when analyzing profitability and valuation (Nissim and Penman, 2003; Penman, Richardson, and Tuna, 2007). For this reason, the thesis includes an ROA-based robustness model. ROA is measured relative to total assets rather than book equity and is therefore less directly tied to the D/E ratio. If the ROE × D/E result were mainly driven by the shared book-equity denominator or by leverage being embedded in ROE, the interaction should weaken or change when ROA replaces ROE.

The empirical design also helps address the concern. ROE and D/E are included separately together with their interaction, so the interaction is interpreted after accounting for their direct effects. Correlations and VIF values are reported in Section 4.1 to assess multicollinearity. Firm fixed effects remove stable firm-level differences, meaning that the estimates are based on changes within the same firm over time. Winsorization and standardization further reduce the influence of extreme values and scaling differences.

Overall, the variables are related by construction, and this limitation is acknowledged. However, they capture different economic concepts: backward-looking equity profitability, capital structure, and forward-looking market valuation. The results should therefore be interpreted carefully as associations between these related constructs, rather than as purely mechanical relationships between financial ratios.

3.3.2 Measuring cyclicality

In our study, cyclicality is measured at the firm level as each firm's revenue sensitivity to the U.S. business cycle, allowing for a more fine-grained delineation of the cyclicality of firms than a broad industry classification. For each firm, the cyclicality measure is estimated from a separate OLS regression of annual revenue growth on contemporaneous U.S. nominal GDP growth over the period 2018–2025.

$$\text{Revenue Growth}_{it} = \alpha_i + \beta_i \cdot \text{GDP Growth}_t + \varepsilon_{it}$$

The coefficient β_i captures how strongly a firm's revenue growth moves with GDP growth. U.S. nominal GDP growth is obtained from the Federal Reserve's FRED database (Federal

Reserve Bank of St. Louis, 2026a). This approach is adapted from Jones and Tuzel (2013), who use the slope from a regression of industry sales growth on GDP growth to capture cyclicality. In this thesis, the same logic is applied at the firm level by estimating each firm's revenue sensitivity to U.S. GDP growth. A higher β_i indicates that a firm's revenues are more sensitive to the macroeconomic cycle and that the firm is therefore more cyclical. A low or negative β_i indicates that the firm's revenues are less sensitive to macroeconomic conditions and can therefore be viewed as more defensive.

A firm must have at least four years of non-missing revenue-growth observations to receive a beta estimate. The estimated beta values are winsorized at the 1st and 99th percentiles and then standardized as z-scores before they enter the three-way interaction models.

This firm-level measure is used because it captures differences in cyclical exposure that a broad sector classification may miss. Firms within the same GICS sector can still differ substantially in how sensitive their revenues are to the business cycle. For example, an industrial firm with long-term defense contracts may be less cyclical than an industrial firm exposed to commercial construction, even though both firms belong to the same sector. Similarly, within Consumer Discretionary, a discount retailer and a luxury goods firm may respond very differently to changes in economic conditions. By estimating cyclicality from each firm's own revenue-GDP relationship, the measure captures firm-specific macroeconomic exposure rather than relying only on the average cyclicality of the firm's industry.

3.3.3 Winsorization and standardization

ROE and D/E are winsorized at the 1st and 99th percentiles to reduce the influence of extreme observations prior to standardization and model estimation. Extreme values are common in empirical finance and accounting data and may affect coefficient estimates and statistical inference. Because outlier treatment choices can influence empirical results, the winsorization procedure is reported transparently and robustness checks are used to assess whether the findings are sensitive to variable construction (Adams et al., 2019).

All independent variables are standardized using z-scores to make coefficient magnitudes more comparable across variables measured on different scales. Interaction terms are then

constructed using the standardized variables, which also makes the interpretation of marginal effects more transparent in the moderation models. The interpretation of interaction effects follows standard econometric guidance for models with interaction terms (Balli and Sørensen, 2013). Variance inflation factors are reported in Section 4.1 to assess whether multicollinearity is likely to affect the stability of the coefficient estimates.

3.4 Model specifications

This study uses panel regression to examine whether the profitability–market capitalization relationship depends on capital structure, with the central focus placed on whether this moderating role of leverage differs with firm-level cyclicality. The dependent variable is the natural logarithm of market capitalization, ln(Market Cap). This reduces the right-skewed distribution of market capitalization, which reflects the presence of a number of very large firms. The models are built step by step. The analysis first estimates a baseline specification, then adds leverage and the profitability–leverage interaction, and finally examines whether this interaction varies with firm-level cyclicality.

Firm fixed effects are included to account for time-invariant firm-specific characteristics that may affect both capital structure and market capitalization. Year fixed effects are included to control for shocks that affect all firms in a given year. This fixed-effects approach helps reduce omitted-variable bias by controlling for unobserved firm characteristics that are constant over time. This is consistent with Gormley and Matsa (2014), who argue that the fixed-effects estimator "controls directly for the unobserved heterogeneity" and is therefore appropriate when unobserved firm-level factors may otherwise bias the estimates.

Throughout, $X_{i,t-1}$ represents the vector of lagged firm-level controls, which are the following: ln(total assets), log-transformed revenue growth, capex intensity, cash ratio, R&D intensity, and the dividend ratio. Including these control variables helps make sure that the results are not mainly driven by omitted firm characteristics. Firm fixed effects also control for differences between firms that do not change over time, such as business model, industry position, and other stable firm-specific factors.

3.4.1 Model 1: The baseline model

Model 1 estimates the baseline relationship between lagged profitability and market capitalization. It includes firm- and year-fixed effects as well as control variables

$$\ln(\text{Market Cap}_{it}) = \beta_0 + \beta_1 \text{ROE}_{i,t-1} + \gamma' X_{i,t-1} + \alpha_i + \lambda_t + \varepsilon_{it}$$

3.4.2 Model 2: Adding capital structure

To examine the effect of profitability after accounting for differences in leverage, Model 2 adds the lagged debt-to-equity ratio:

$$\ln(\text{Market Cap}_{it}) = \beta_0 + \beta_1 \text{ROE}_{i,t-1} + \beta_2 (\text{D/E})_{i,t-1} + \gamma' X_{i,t-1} + \alpha_i + \lambda_t + \varepsilon_{it}$$

3.4.3 Model 3: Two-way moderation model

To assess whether capital structure moderates the profitability–valuation relationship, Model 3 adds the lagged ROE × D/E interaction. This is the test of H2a/H2b:

$$\ln(\text{Market Cap}_{it}) = \beta_0 + \beta_1 \text{ROE}_{i,t-1} + \beta_2 (\text{D/E})_{i,t-1} + \beta_3 (\text{ROE}_{i,t-1} \times (\text{D/E})_{i,t-1}) + \gamma' X_{i,t-1} + \alpha_i + \lambda_t + \varepsilon_{it}$$

3.4.4 Model 4: Three-way moderation model (main model, H3)

Model 4 is the main model for the study's contribution. It tests whether the way leverage moderates the profitability–market capitalization relationship depends on how cyclical a firm is. The coefficient of interest is β_6, on the three-way term ROE × D/E × Cyc. A significant negative (\beta_6) would mean that the negative moderating effect of leverage becomes stronger as firm-level cyclicality increases. A non-significant β_6 means that no such difference is found. Estimating one combined model in this way gives a direct test of H3, rather than relying on separate subsample comparisons. Cyc has no separate main-effect term because it is time-invariant within firms and is absorbed by the firm fixed effects, but the interaction terms remain estimable.

$$\ln(\text{Market Cap}_{it}) = \beta_0 + \beta_1 \text{ROE}_{i,t-1} + \beta_2 (\text{D/E})_{i,t-1} + \beta_3 (\text{ROE} \times \text{D/E})_{i,t-1}) + \beta_4 (\text{ROE} \times \text{Cyc})_{i,t-1} + \beta_5 (\text{D/E} \times \text{Cyc})_{i,t-1} + \beta_6 (\text{ROE} \times \text{D/E} \times \text{Cyc})_{i,t-1} + + \alpha_i + \lambda_t + \varepsilon_{it}$$

3.4.5 Model 5: ROA-based moderation model (Robustness check of H3)

Model 5 repeats the three-way test using ROA instead of ROE as a robustness check on H3. The aim is to see whether the result depends on the profitability measure. This matters because ROE is built on book equity, the same denominator as D/E, whereas ROA is scaled by total assets and is therefore less mechanically linked to leverage. The coefficient of interest is again β_6, on the three-way term ROA × D/E × Cyc, which is compared with the β_6 from the ROE model. If the two point in the same direction, the finding is not specific to equity-based profitability. If they differ, the result should be read as more specific to ROE than to profitability in general. As before, Cyc has no separate main-effect term because it is time-invariant within firms and absorbed by the firm fixed effects.

$$\ln(\text{Market Cap}_{it}) = \beta_0 + \beta_1 \text{ROa}_{i,t-1} + \beta_2 (\text{D/E})_{i,t-1} + \beta_3 (\text{ROa} \times \text{D/E})_{i,t-1}) + \beta_4 (\text{ROA} \times \text{Cyc})_{i,t-1} + \beta_5 (\text{D/E} \times \text{Cyc})_{i,t-1} + \beta_6 (\text{ROA} \times \text{D/E} \times \text{Cyc})_{i,t-1} + \gamma' \text{Xi,t-1} + \alpha_i + \lambda_t + \varepsilon_{it}$$

3.5 Identification and Endogeneity

In this study, the most relevant endogeneity concern is reverse causality, meaning firms with higher market valuations may have greater access to equity financing, making them less reliant on debt financing to finance operations, and may sustain higher profitability through lower costs of capital. Firm fixed effects are included in the models to reduce omitted-variable bias from time-invariant firm characteristics that may affect both capital structure and valuation. Year fixed effects are included to control for broader shocks in each year that may affect all firms in the sample. This approach helps address unobserved heterogeneity that is constant within firms over time, although it does not remove all potential endogeneity concerns (Gormley and Matsa, 2014)

To further address reverse causality, the independent variables, ROE, D/E, and ROE * D/E, are lagged by one fiscal year relative to the dependent variable so that year_{t-1} variables are used to explain year_t market capitalization. To clarify the timing direction, the analysis lags the independent variables because profitability and leverage are measured before market capitalization. This reduces concerns about reverse causality. Lagging the independent variables can help to clarify the timing of the relationship, but it does not fully address potential endogeneity concerns (Reed, 2015).

3.6 Estimation and inference

The main models are estimated using panel OLS and include both firm and year fixed effects. Considering that the same firms are observed over several years, the observations within a firm could be related over time. Therefore, standard errors are clustered at the firm level to account for this correlation. This approach accounts for within-firm correlation better than heteroskedasticity-robust standard errors. This is a commonly used approach in panel studies with repeated observations per unit (Petersen, 2009). Statistical significance is assessed at the 1%, 5%, and 10% levels.

Variance inflation factors (VIFs) are reported for all regressors in Section 4.1 to assess whether multicollinearity is likely to affect the stability of the coefficient estimates. VIF values close to 10 are viewed as potential indications of multicollinearity rather than fixed cutoffs (Gujarati and Porter, 2009). Furthermore, a pairwise correlation matrix is reported in Section 4.1 before the regression analysis, showing how the key independent variables are correlated with the dependent variable, the logarithm of market capitalization.

3.7 Usage of AI in the analysis

AI tools, including ChatGPT by OpenAI, and Claude by Anthropic, were used as support during the thesis process. They were mainly used to improve language, structure parts of the text, and clarify methodological explanations.

The empirical analysis was carried out by the authors using Python. This included creating variables, winsorizing data, calculating descriptive statistics, running regressions, visualizing tables, and producing descriptive evidence on the magnitude of the disparity between ROE and market capitalization. For example, Claude was used to help us understand what specific parts of the code did, why certain errors occurred, and whether the code for lagged variables, interaction terms, and regression models matched the intended analysis. The suggested explanations were used as guidance, not as final answers. All data, statistical results, interpretations, references, and conclusions were reviewed and verified by the authors.

4. Findings

This section presents the empirical results. First, pairwise correlations and variance inflation factors are reported to assess the relationships between the main variables and potential multicollinearity. Second, the main regression models are presented. Third, the moderating effect of capital structure on the relationship between profitability and market capitalization is interpreted. The section then examines whether this moderation differs with firm-level cyclicality through the three-way interaction used to test H3. Finally, robustness checks and diagnostic tests are used to assess the reliability of the results.

4.1 Pairwise Correlations and Variance Inflation Factors

Table 5 reports the pairwise correlations between the dependent variable and the key predictors, alongside the remaining controls and each variable's variance inflation factor.

Table 5. Pairwise correlations and variance inflation factors

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	VIF
(1) ln(Market cap)	1.00											-
(2) ROE	0.28	1.00										4.14
(3) D/E	0.03	0.19	1.00									1.50
(4) ROE × D/E	0.13	0.69	0.51	1.00								3.01
(5) ROA	0.21	0.67	-0.06	0.24	1.00							2.27
(6) ln(Revenue growth)	0.01	0.15	-0.02	0.06	0.14	1.00						1.04
(7) ln(Total assets)	0.80	0.08	0.14	0.06	-0.04	-0.05	1.00					1.13
(8) Capex intensity	0.03	0.05	0.05	0.03	0.09	0.01	0.01	1.00				1.03
(9) Cash ratio	-0.03	0.06	-0.10	-0.01	0.09	0.05	-0.27	-0.07	1.00			1.26
(10) R&D intensity	0.12	0.00	-0.10	-0.03	-0.02	0.06	-0.13	-0.04	0.38	1.00		1.18
(11) Dividend ratio	0.06	-0.02	0.03	0.02	-0.05	-0.02	0.09	-0.07	-0.07	-0.05	1.00	1.02

Note. Pairwise Pearson correlations between standardized lagged variables (N = 7,464). Variable (1), ln(Market cap), is the dependent variable.. VIFs for the remaining variables are reported in the final column; all are below five, indicating that multicollinearity does not threaten coefficient stability. The high correlation between ROE (2) and ROE × D/E (4) is mechanical, since the interaction is constructed as the product of ROE and D/E.

ln(Market Cap) is positively but only moderately correlated with profitability (ROE: 0.28) and effectively uncorrelated with leverage on its own (D/E: 0.03). The ROE × D/E interaction correlates 0.13 with firm value, while the alternative profitability measure, ROA, correlates 0.21 with firm value. Firm size, proxied by ln(Total Assets), has the strongest correlation with market capitalization (0.80). This reflects the close connection between firm scale and market value rather than multicollinearity among the regressors, since ln(Total Assets) correlates only weakly with the key explanatory variables and has a low VIF of 1.13. The remaining control variables, which are revenue growth, capex intensity, cash holdings, R&D intensity, and the dividend ratio, are all weakly correlated with market capitalization.

The matrix also helps assess the concern that the core variables may be mechanically related, since ROE and D/E share book equity in the denominator while market capitalization is an equity-based valuation measure. In the sample, ROE and D/E are only weakly correlated (0.19). The interaction term ROE × D/E is more strongly correlated with ROE (0.69), which is expected because the interaction is constructed from ROE and D/E. However, the variance inflation factors remain below conventional warning thresholds (ROE 4.14, D/E 1.50, ROE × D/E 3.01, ROA 2.27). These results do not eliminate the construct-overlap concern, but they suggest that the shared denominator does not create severe multicollinearity in the estimated models. The results are therefore interpreted cautiously as associations between equity-based profitability, leverage, and market capitalization rather than as evidence that the variables are fully independent constructs.

4.2 Main regression results

The main regression results are reported in Table 6. Models 1, 2, and 3 add the variables sequentially: profitability measured by ROE in Model 1, the debt-to-equity ratio as the leverage measure in Model 2, and the two-way interaction term ROE × D/E in Model 3. Model 4, the main model of this study, extends Model 3 by adding the interaction terms between the cyclicality measure and the variables of interest, producing the three-way

interaction structure ROE × D/E × Cyclicality. Cyclicality is measured at the firm-level using the GDP-beta measure described in Section 3.3.2. The corresponding ROA-based three-way specification is introduced in Section 4.5. All four models contain both firm and year fixed effects, so the estimates reflect within-firm variation over time while accounting for year-specific shocks affecting all firms simultaneously. All models include the same set of control variables: lagged log-transformed revenue growth, firm size, capex intensity, cash holdings, R&D intensity, and the dividend ratio.

Table 6. Sequential model build and three-way moderation (H3)

	Model 1	Model 2	Model 3	Model 4 (Main, H3)
ROE (lagged)	0.1281***	0.1258***	0.1609***	0.1533***
	(0.0107)	(0.0102)	(0.0148)	(0.0176)
D/E (lagged)	-	-0.0748***	-0.0536***	-0.0570**
		(0.0132)	(0.0144)	(0.0182)
ROE × D/E (lagged)	-	-	-0.0500***	-0.0421**
			(0.0124)	(0.0153)
ROE × Cyc (lagged)	-	-	-	0.0138
				(0.0181)
D/E × Cyc (lagged)	-	-	-	0.0047
				(0.0140)
ROE × D/E × Cyc (β_6)	-	-	-	-0.0122
				(0.0127)
Revenue Growth	0.0081	0.0089	0.0063	0.0047
	(0.0063)	(0.0064)	(0.0065)	(0.0065)
ln(Total Assets)	0.6808***	0.6791***	0.6785***	0.6795***
	(0.0569)	(0.0559)	(0.0559)	(0.0560)
Capex / Assets	0.0047	0.0011	0.0019	0.0015
	(0.0160)	(0.0160)	(0.0161)	(0.0161)
Cash / Assets	0.0514***	0.0495***	0.0486***	0.0489***
	(0.0128)	(0.0125)	(0.0124)	(0.0124)
R&D / Assets	0.0768*	0.0781*	0.0798*	0.0801*
	(0.0319)	(0.0313)	(0.0317)	(0.0316)
Dividends / Assets	-0.0091	-0.0094	-0.0092	-0.0092
	(0.0116)	(0.0118)	(0.0116)	(0.0116)
Entity + Time FE	Yes	Yes	Yes	Yes
R^2 (within)	0.2312	0.2340	0.2388	0.2391
N	7,464	7,464	7,464	7,464

Note. The dependent variable is ln(Market Cap). Models 1–3 build the specification sequentially; Model 4 is the main model and adds the three-way interaction term that tests H3 (β_6 : ROE × D/E × Cyc), where Cyc is the firm-level cyclicality

measure. All explanatory variables are lagged by one year and standardised. Firm-clustered standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Model 1 contains lagged ROE as the variable of interest, alongside the control variables. The lagged ROE coefficient is positive and highly significant ($\beta = 0.1281$, $p < 0.001$), indicating that a one-standard-deviation increase in profitability is associated with approximately a 13.7% increase in market capitalization the following year (e^0.1281 − 1 ≈ 13.7%). The dependent variable is in log form, so the coefficient can be interpreted as a proportional rather than absolute change in market capitalization. This is consistent with prior research showing that profitability is positively related to equity valuation.

Model 2 adds the debt-to-equity ratio. The D/E coefficient is negative and significant ($\beta = -0.0748$, $p < 0.001$), indicating that higher leverage is associated with lower market capitalization after controlling for profitability and the other firm-level controls. The ROE coefficient remains positive and highly significant ($\beta = 0.1258$, $p < 0.001$).

Model 3 introduces the two-way interaction term ROE × D/E to test Hypothesis 2. The interaction coefficient is negative and significant ($\beta = -0.0500$, $p < 0.001$), showing that leverage weakens the positive relationship between profitability and market capitalization. The two-way moderation result and its quantitative interpretation are discussed in Section 4.3.

Model 4 is the main model of the study and provides the formal test of Hypothesis 3. The model adds three interaction terms to Model 3: ROE × Cyclicality, D/E × Cyclicality, and the central three-way interaction ROE × D/E × Cyclicality. The coefficient on the three-way interaction is negative but statistically insignificant ($\beta_6 = -0.0122$, $p = 0.336$). Hypothesis 3 is therefore not supported by the data. The weakening effect of leverage found in Model 3 does not appear to differ significantly with firm-level cyclicality.

Although the coefficient is negative and therefore points in the expected direction, it is not statistically significant. This means that the results do not provide enough evidence to conclude that the moderating effect of leverage is stronger in more cyclical firms.

The remaining results in Model 4 are similar to the earlier models. ROE is still positively related to market capitalization at the average level of cyclicality ($\beta = 0.1533$, $p < 0.001$),

while D/E remains negatively related to market capitalization (β = −0.0570, p = 0.002). The ROE × D/E interaction is also negative and significant (β = −0.0421, p = 0.006). Because cyclicality is standardized, this interaction shows the moderating effect of leverage at average cyclicality. Overall, Model 4 confirms that the main two-way moderation result from Model 3 remains present in the three-way specification. The interactions ROE × Cyclicality and D/E × Cyclicality are both small and statistically insignificant. Since cyclicality is time-invariant at the firm level, its main effect is absorbed by the firm fixed effects. These interaction terms therefore test whether the ROE and D/E coefficients differ across firms with different levels of cyclicality.

All four models include lagged log-transformed revenue growth as a control variable. Its coefficient is small and statistically insignificant in every specification, ranging from about 0.005 to 0.009, with all p-values above 0.10. This suggests that prior-year revenue growth does not add much explanatory power once firm size and the other firm-level controls are included. This is consistent with its role as a control variable rather than a main variable of interest.

4.3 The moderation effect: interpreting the interaction term

The negative ROE × D/E coefficient in Model 3 means that the positive relationship between profitability and market capitalization becomes weaker as leverage increases. Since ROE and D/E are standardized before the interaction term is constructed, the coefficients can be interpreted in terms of one-standard-deviation changes.

In Model 3, the ROE coefficient is 0.1609 and the ROE × D/E coefficient is −0.0500. This means that at average leverage, a one-standard-deviation increase in ROE is associated with approximately a 17.5% increase in market capitalization (e^0.1609 − 1 ≈ 17.5%). When leverage is one standard deviation above the average, the same increase in ROE is associated with an increase of approximately 11.7% (e^(0.1609 − 0.0500) − 1 ≈ 11.7%). The difference shows that higher leverage reduces the profitability premium by roughly one-third.

This result supports H2a rather than H2b. The evidence suggests that capital structure negatively moderates the profitability–market capitalization relationship. In other words, profitability is still positively valued by the market, but the valuation benefit attached to profitability is smaller when leverage is higher.

4.4 Three-way moderation: Does cyclicality strengthen leverage's moderating effect?

Hypothesis 3 predicts that the weakening effect of leverage on the profitability–valuation relationship is stronger for more cyclical firms. This is tested in Model 4 using the three-way interaction ROE × D/E × Cyclicality. Cyclicality is measured at the firm level as the sensitivity of each firm's annual revenue growth to US nominal GDP growth. This firm-level GDP beta provides a more detailed measure of macroeconomic sensitivity than the earlier binary GICS industry classification (MSCI, 2022) The three-way interaction coefficient, ROE × D/E × Cyclicality, is negative but statistically insignificant ($\beta = -0.0122$, $p = 0.336$) (Appendix C). H3 is therefore not supported. In other words, the results do not show that the negative moderating effect of leverage differs significantly with firm-level cyclicality.

4.5 Robustness checks

To test whether the null result for Hypothesis 3 is sensitive to methodological choices, two more three-way interaction models are estimated. Each robustness check follows the same structure as Model 4, but changes one aspect of the specification at a time. In all models, the key coefficient is the three-way interaction term, which tests whether the moderating effect of leverage differs with firm cyclicality. Table 7 reports the results of these robustness checks.

Table 7. Three-way moderation: H3 robustness checks

	Model 5 (ROA)	Model 6 (Earnings Volatility)
Profitability (lagged)	0.1743***	0.1725***
	(0.0265)	(0.0241)
D/E (lagged)	-0.0937***	-0.0945***
	(0.0244)	(0.0264)
Profitability × D/E (lagged)	0.0423*	-0.0463*
	(0.0226)	(0.0250)
Profitability × Cyc (lagged)	-0.0551**	-0.0104**
	(0.0227)	(0.0268)
D/E × Cyc (lagged)	0.0122	0.0436
	(0.0151)	(0.0245)
Profitability × D/E × Cyc (β_6)	-0.0149	-0.0064
	(0.0155)	(0.0224)
Revenue Growth (lagged)	0.0059	0.0061
	(0.0072)	(0.0066)
ln(Total Assets)	0.6765***	0.6822***
	(0.0568)	(0.0558)
Capex / Assets	-0.0047	0.0033
	(0.0161)	(0.0162)
Cash / Assets	0.0432***	0.0491***
	(0.0126)	(0.0126)
R&D / Assets	0.0914**	0.0811**
	(0.0326)	(0.0319)
Dividends / Assets	-0.0115	-0.0092
	(0.0123)	(0.0115)
Entity + Time FE	Yes	Yes
R^2 (within)	0.2437	0.2399

N	7,464	7,464

Note. The dependent variable is ln(Market Cap). The table reports robustness checks for the three-way moderation result in the main model (Model 4, reported separately). Model 5 replaces ROE with ROA as the profitability measure; Model 6 uses an earnings-volatility-based cyclicality measure. The coefficient of interest is β_6 on the three-way term (Profitability × D/E × Cyc), which is statistically insignificant in both specifications, consistent with the main model. All explanatory variables are lagged by one year and standardised. Firm-clustered standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

Model 5 checks whether the H3 result depends on using ROE as the profitability measure. In this model, ROA replaces ROE throughout the specification, including in the ROA × D/E interaction and the three-way interaction with cyclicality. If the insignificant result in Model 4 were driven by the choice of profitability measure, the ROA model would be expected to give a different conclusion. This is not the case. The ROA × D/E × Cyclicality coefficient is also negative and statistically insignificant ($\beta = -0.0149$, $p = 0.3354$). This suggests that the lack of support for H3 is not driven by the use of ROE.

Model 6 uses earnings volatility as an alternative measure of cyclicality, measured as each firm's standard deviation of ROA. This provides a different view of cyclical exposure than the main GDP-beta measure. While the main measure captures how strongly a firm's revenue growth moves with GDP growth, the ROA-volatility measure captures how unstable the firm's profitability is over time. For each firm, the standard deviation is calculated using all available ROA observations, with at least four non-missing yearly observations required. The resulting firm-level measure is then winsorized and standardized before being included in the three-way interaction. The coefficient remains negative and statistically insignificant ($\beta = -0.0064$, $p = 0.774$), which supports the conclusion that H3 is not supported.

ROA volatility is used instead of ROE volatility for two reasons. First, ROE is directly affected by leverage through the DuPont relationship. This means that a firm with stable operating performance but changing leverage could still show volatile ROE. Using ROE volatility would therefore risk mixing the cyclicality measure with the D/E variable already included in the model. Second, ROA is less directly affected by capital structure and gives a cleaner measure of variation in profitability relative to the firm's asset base. For this reason, ROA volatility is better suited for capturing instability in underlying firm performance.

The three-way interaction between ROE, D/E, and earnings volatility is also statistically insignificant. This suggests that firms with more volatile profitability do not show a significantly different leverage-related moderation effect than firms with more stable profitability. Together with Model 5, this supports the conclusion that the lack of support for H3 is not driven by the choice of profitability measure or by the main GDP-beta measure of cyclicality.

Across the two robustness checks, the three-way interaction remains statistically insignificant. This is the case when ROA is used instead of ROE in Model 5, and when firm-level earnings volatility is used instead of the GDP-beta cyclicality measure in Model 6. The coefficient is negative in all specifications, but it is never statistically significant. Overall, the results support the conclusion from Model 4: the data do not show that leverage moderates the profitability–valuation relationship differently across firms with different levels of cyclicality. The lack of support for H3 therefore does not appear to depend on the main model's specific measurement choices.

4.6 Diagnostic test and model fit

Model 4 is the main regression model and provides the formal test of H3. At the average level of cyclicality, lagged ROE is positive and highly significant ($\beta = 0.1533$, $p < 0.001$), while lagged D/E is negative and significant ($\beta = -0.0570$, $p = 0.002$). The ROE × D/E interaction is also negative and significant ($\beta = -0.0421$, $p = 0.006$). Since cyclicality is standardized, this coefficient shows the leverage moderation effect when cyclicality is at its average level. This means that the negative moderation effect found in Model 3 remains present in the three-way model.The main coefficient for H3 is the three-way interaction between ROE, D/E, and cyclicality. This coefficient is negative but statistically insignificant ($\beta = -0.0122$, $p = 0.336$). The result therefore does not show that the moderating effect of leverage differs significantly with firm-level cyclicality. H3 is therefore not supported.

The firm-level control variables mostly behave as expected. Firm size, measured by ln(Total Assets), is the strongest control variable and is positive and statistically significant ($\beta = 0.6795$, $p < 0.001$). This shows that increases in firm size are strongly associated with higher market capitalization within firms over time. Cash holdings are also positive and significant ($\beta = 0.0489$, $p < 0.001$), suggesting that firms with larger liquidity buffers tend to be valued more highly. R&D intensity is positive and significant as well ($\beta = 0.0801$, $p = 0.012$), which

is consistent with the idea that equity markets place value on investment in future growth and intangible assets. In contrast, capex intensity ($\beta = 0.0015$, $p = 0.926$), the dividend ratio ($\beta = -0.0092$, $p = 0.428$), and lagged revenue growth ($\beta = 0.0047$, $p = 0.468$) are not statistically significant. This means that, once firm size, cash holdings, R&D intensity, firm fixed effects, and year fixed effects are included, these variables do not add much independent explanatory power in the model. Overall, the controls help reduce omitted-variable concerns, but they do not change the main conclusion that leverage weakens the profitability–valuation relationship while H3 is not supported.

The robustness checks support the conclusion that H3 is not supported. The three-way interaction remains negative and statistically insignificant when ROA is used instead of ROE ($\beta = -0.0149$, $p = 0.3354$), and when earnings volatility is used as the alternative cyclicality measure ($\beta = -0.0064$, $p = 0.774$). Although the coefficient is negative in both specifications, neither estimate is statistically significant. This suggests that the weakening effect of leverage on the profitability–valuation relationship does not differ systematically with firm-level cyclicality, regardless of whether profitability or cyclicality is measured differently.

The within-R^2 of the main model is 23.9% (Appendix D). In a two-way fixed-effects panel model, this should be interpreted differently from the R^2 in a standard regression. Firm and year fixed effects already account for stable differences between firms and common shocks across years. The within-R^2 therefore shows how much of the remaining within-firm variation in market capitalization is explained by the lagged independent variables after these fixed effects have been removed.

A within-R^2 of 23.9% is relatively high for a two-way fixed-effects panel model. A large part of this explanatory power appears to come from firm size, measured by ln(Total Assets), which has the largest coefficient among the control variables ($\beta = 0.68$, $p < 0.001$). This suggests that growth in book assets within a firm is strongly associated with growth in its market value. The part of market capitalization that the model does not explain is likely related to investor expectations, market news, and firm-specific events that are not fully captured by accounting variables.

Since the model focuses on changes within the same firm over time, the negative and significant ROE × D/E interaction remains an important finding. At the same time, the main H3 coefficient, ROE × D/E × Cyclicality, remains small and statistically insignificant. Since

this result is similar when profitability and cyclicality are measured in alternative ways, the lack of support for H3 does not appear to depend on one specific model choice. Instead, it reflects the pattern found in the data.

4.7 Summary of results

Before discussing each finding in detail, Table 8 provides a summary of how the findings relate to the hypotheses developed in the literature review:

Table 8. Summary of Hypotheses and Results:

Hypothesis	**Prediction**	**Conclusion**
H1	Profitability is positively associated with market capitalization.	Supported
H2a	Capital structure negatively moderates the relationship between profitability and market capitalization.	Supported
H2b	Capital structure positively moderates the relationship between profitability and market capitalization.	Not supported
H3	The negative moderating effect of capital structure is stronger for firms with higher firm-level cyclicality and weaker for firms with lower firm-level cyclicality.	Not Supported

5. Discussion

This section interprets the findings in relation to the literature reviewed in Section 2. Rather than restating results, it focuses on what the pattern of supported and unsupported findings adds to existing research. The greatest weight falls on the cyclicality test, which is the main contribution of the thesis even though the formal result does not support H3.

5.1 Profitability and Market Capitalization in a recent U.S. sample

The positive association between profitability and market capitalization in Model 1 ($\beta = 0.1281$, $p < 0.001$) is consistent with earlier accounting and finance research (Ball and Brown, 1968; Ohlson, 1995; Fama and French, 2015; Hou et al., 2015; Ball et al., 2016). The

purpose of this baseline result is therefore not to claim that the profitability–valuation relationship is new. Instead, it shows that the relationship remains present in a recent U.S. sample covering an unusual macroeconomic period, including the COVID-19 demand and supply shock (del Rio-Chanona et al., 2020) and the later shift from near-zero interest rates to a higher-rate environment (Federal Reserve Bank of St. Louis, 2026b).

A one-standard-deviation increase in ROE is associated with roughly 13.7% higher market capitalization in the following year. This association remains after controlling for firm size, capital intensity, cash holdings, R&D, and dividend policy. The contribution of this result is therefore mainly confirmatory: profitability continues to be reflected in market value even in a period that differs from the earlier samples used in much of the profitability literature.

5.2 How leverage weakens the profitability premium

The negative ROE × D/E interaction in Model 3 ($\beta = -0.0500$, $p < 0.001$) is consistent with the equity-risk channel in Hamada (1972) and with recent evidence that refinancing risk is priced in equity markets (Friewald, Nagler, and Wagner, 2022). In itself, the negative direction is not unexpected. The more important point is the size of the effect. At average leverage, the profitability premium is approximately 17.5%. When leverage is one standard deviation above the average, this falls to about 11.7%, which means that the valuation benefit of profitability is reduced by roughly one-third.

This puts a concrete valuation estimate on recent arguments about financial flexibility. Kalemli-Ozcan, Laeven, and Moreno (2022) show that debt burdens can limit firms' financial flexibility, while DeAngelo, Gonçalves, and Stulz (2018) show that firms often reduce leverage after periods of high debt. The result here helps explain why this matters for equity valuation. Even when profitability is high, the market appears to attach less value to that profitability when the firm is more highly leveraged.

This also connects two areas of research that are often discussed separately. The capital-structure literature focuses on leverage, refinancing risk and financial flexibility, while the profitability-factor literature focuses on the value relevance of profitability. The evidence in this thesis suggests that these two perspectives should be considered together. Profitability

remains positively valued by the market, but the value attached to it depends partly on the firm's capital structure.

5.3 Does cyclicality change how leverage is priced?

The three-way test of whether cyclicality changes the leverage–profitability interaction is the main point where this thesis moves beyond prior work. Section 2.4 brought together several arguments that suggest such an effect should exist. Opler and Titman (1994) show that highly leveraged firms are more exposed during industry downturns, while more recent studies develop the industry-based view of leverage further. Diamond, Hu, and Rajan (2020) link the cost of debt to industry liquidity; Kumar and Yerramilli (2025) show that debt issuance varies with industry business cycles; and Tan et al. (2021) show that business shocks can make leverage less stable. Together, these studies suggest that the market consequences of leverage should be stronger for firms that are more exposed to cyclical conditions.

Model 4 tests this implication directly through the three-way interaction between profitability, leverage, and cyclicality. The coefficient is negative, which is in the expected direction, but it is not statistically significant ($\beta = -0.0122$, $p = 0.336$). This means that the results do not support the claim that cyclicality significantly strengthens the leverage-related weakening of the profitability–valuation relationship.

The null result for H3 is informative rather than simply an absence of a finding. Much of the prior literature suggests that cyclical exposure should matter for how investors value earnings, meaning that profitability may be rewarded differently in more cyclical firms than in less cyclical firms. This thesis tests that idea directly using 7,464 firm-year observations across 934 firms and a firm-level cyclicality measure adapted from Jones and Tuzel (2013). The results do not show that cyclicality changes the profitability–valuation relationship or the way leverage moderates that relationship.

The contribution is therefore about scope. The findings suggest that cyclicality may matter for firms' financing, investment, and refinancing decisions, but it does not appear to be a central channel through which leveraged profitability is priced in this sample. The negative ROE × D/E interaction found in H2a holds regardless of where firms sit on the cyclicality

spectrum. This redirects the interpretation of the results: differences in how profitability is valued appear to be more closely connected to firms' own leverage positions than to their cyclical exposure.

The two robustness checks strengthen this interpretation by showing that the null result is not tied to one specific measurement choice. Each check changes one part of the three-way interaction. When ROA is used instead of ROE, the three-way term remains insignificant (Model 5: $\beta = -0.0149$, $p = 0.3354$), suggesting that the result is not driven by the profitability measure. When firm-level earnings volatility is used instead of the GDP-beta cyclicality measure, the three-way term is also insignificant (Model 6: $\beta = -0.0064$, $p = 0.774$), suggesting that the result is not driven by the cyclicality measure either. The conclusion therefore remains the same when either profitability or cyclicality is measured differently.

This is relevant for recent evidence that the value relevance of accounting information varies across industries (Barth, Li and McClure, 2023). The results in this thesis do not challenge the broader idea that industries differ in valuation-relevant ways. Instead, they clarify one channel through which this industry heterogeneity does not appear to operate. Differences in cyclical exposure may affect valuation through other mechanisms, but the results in this thesis do not show that they significantly change how leverage moderates the profitability–valuation relationship. In this sense, the thesis separates a specific pricing channel from the broader claim that cyclical and defensive firms differ in how the market values them.

5.4 Managerial implications

The findings have three implications for managerial decision-making. First, the negative moderation of profitability by leverage suggests that managers of highly leveraged firms should not assume that improvements in ROE will be valued by the market in the same way as for less leveraged firms. The cost of debt may therefore extend beyond interest payments. In this sample, when leverage is one standard deviation above the average, the valuation premium attached to profitability is roughly one-third lower. This is a valuation effect that standard after-tax cost of capital calculations may not fully capture. It also supports recent arguments that financial flexibility is valued by the market (Fahlenbrach, Rageth, and Stulz,

2021; Lambrinoudakis, Skiadopoulos, and Gkionis, 2019). The market appears not only to value the ability to preserve financial flexibility, but also to discount profitability when it is accompanied by higher leverage.

Second, the ROA comparison suggests that managers should distinguish between operating profitability and profitability created through financial leverage. Improvements in margins, asset use, and operating efficiency may still be valued positively, while ROE gains that mainly reflect leverage amplification appear less strongly rewarded. This gives managers a market-based reason to prioritize operational improvements over financial sources of profitability, especially when leverage is already high relative to peers.

Third, the insignificant three-way interaction suggests that this leverage-related valuation effect does not differ systematically with firm cyclicality. Managers of more cyclical firms should therefore not assume that the leverage discount is uniquely severe for them, while managers of more stable firms should not assume that they are protected from it. The effect appears to operate more broadly across firms, which points to the importance of leverage management across the sample rather than only within firms classified as cyclical.

5.5 Investor implications

For investors, the findings have three implications. First, the negative ROE × D/E interaction suggests that ROE should not be interpreted separately from leverage. The same reported ROE may have different valuation implications depending on how much debt the firm carries. Investors using profitability-based signals, as in Hou et al. (2015) or Ball et al. (2016), should therefore consider whether profitability is generated under low or high leverage, especially given the size of the effect found in this thesis.

Second, the ROA comparison suggests that ROA may be a cleaner profitability measure when comparing firms with very different capital structures. Since ROA is measured relative to total assets rather than book equity, it is less mechanically linked to leverage than ROE. This makes ROA useful for investors who want to compare operating profitability across firms without giving too much weight to differences in financing structure.

Third, and most importantly for the main contribution of the thesis, the insignificant three-way interaction suggests that a firm's cyclical sensitivity does not explain differences in how leverage affects the valuation of profitability. This matters because the cyclical-versus-defensive classification is widely used in sector rotation and risk budgeting, often on the implicit assumption that cyclical firms are priced differently. The evidence here suggests that investors should be cautious about that assumption. For the specific pricing channel tested, a firm's own leverage position appears more important than its cyclical profile in explaining how profitability is reflected in market value.

5.6 Limitations and implications for future research

These contributions should be interpreted within the limits of the sample. The analysis is based on S&P Composite 1500 firms, which are generally large, well-covered, and consistently reporting. As shown in Sections 3.1.2 and 3.1.3, the complete data screening narrows the sample further, since 343 firms (26.9% of the S&P Composite 1500 universe) were excluded for missing accounting variables, and these excluded firms are systematically smaller than the firms that remain. The sample is therefore tilted toward larger firms with more complete disclosure, even within an already large-firm index. Firm size is controlled for and firm fixed effects absorb stable differences between firms, but this does not fully remove the selection on firm size, and unobserved characteristics linked to both data completeness and the moderation effect cannot be ruled out. It is therefore unclear whether the insignificant three-way result would also hold for smaller U.S. firms, less-covered firms, or firms outside the U.S. market. This matters because smaller firms may be more financially constrained and more exposed to the costs of debt. For these firms, leverage could make cyclical downturns more important for how profitability is valued by the market. Future research could therefore test whether the moderating role of leverage differs more clearly with cyclicality in samples that include smaller firms or firms with less stable reporting.

The cyclicality measures used in this thesis, firm-level GDP beta and firm-level earnings volatility, are based on historical revenue and profitability data. They therefore capture realized cyclical exposure rather than investors' expectations about future cyclicality. This is a limitation, because equity markets are forward-looking and may price expected changes in demand, risk, and financing conditions before they appear in accounting data. Future research could use more forward-looking measures of cyclicality, such as analyst forecast dispersion,

option-implied volatility, sector-specific demand indicators, or macroeconomic sentiment measures. These could better capture how investors expect firms to be affected by future business-cycle conditions and may reveal differences in the moderation effect that historical measures do not capture.

The contribution of this thesis is therefore to clarify where the cyclicality argument applies, and where it does not. In the firm-level moderation framework used here, the results do not show that the leverage moderation of the profitability–valuation relationship varies systematically with firm-level cyclicality. In other words, more cyclical firms do not appear to face a significantly stronger leverage-related discount on profitability than less cyclical firms. Future research may find different results in other samples, markets, or with more forward-looking measures of cyclicality. However, the evidence in this thesis suggests that cyclicality may matter more through other channels, such as capital allocation, investment decisions, refinancing risk, and financial flexibility, than through the specific profitability–leverage valuation channel tested here.

6. Conclusion

This thesis examines whether firm-level cyclicality changes how capital structure affects the market pricing of profitability. Its contribution is not to show that profitability or leverage matter on their own, but to test whether the leverage–profitability relationship depends on firms' cyclical exposure.

The results first confirm that profitability is positively associated with market capitalization in a recent U.S. sample of S&P Composite 1500 firms. A one-standard-deviation increase in ROE is associated with about 13.7% higher market capitalization in the following year, after controlling for firm characteristics. This confirms that the profitability–valuation relationship remains present in a period covering both the COVID-19 shock and the shift to a higher-rate environment.

Second, leverage weakens this profitability effect. At average leverage, a one-standard-deviation increase in ROE is associated with about 17.5% higher market capitalization. When leverage is one standard deviation above the mean, the effect falls to

about 11.7%. This shows that the market does not value profitability in isolation, but also considers the financial risk attached to it.

Third, the leverage discount does not appear to differ with firm-level cyclicality. The three-way interaction between profitability, leverage, and cyclicality is statistically insignificant, and the same conclusion holds when ROA and earnings volatility are used as alternative measures. This suggests that more cyclical firms do not face a significantly stronger leverage-related discount on profitability than less cyclical firms.

The practical implication is that a firm's own leverage position appears more important than its cyclical profile in explaining how profitability is reflected in market value. The results should still be interpreted within the limits of the study, since the sample consists of large U.S. firms and cyclicality is measured using historical data. Overall, the thesis suggests that cyclicality may matter more through financing, investment, refinancing, and financial-flexibility channels than through the specific pricing channel tested here.

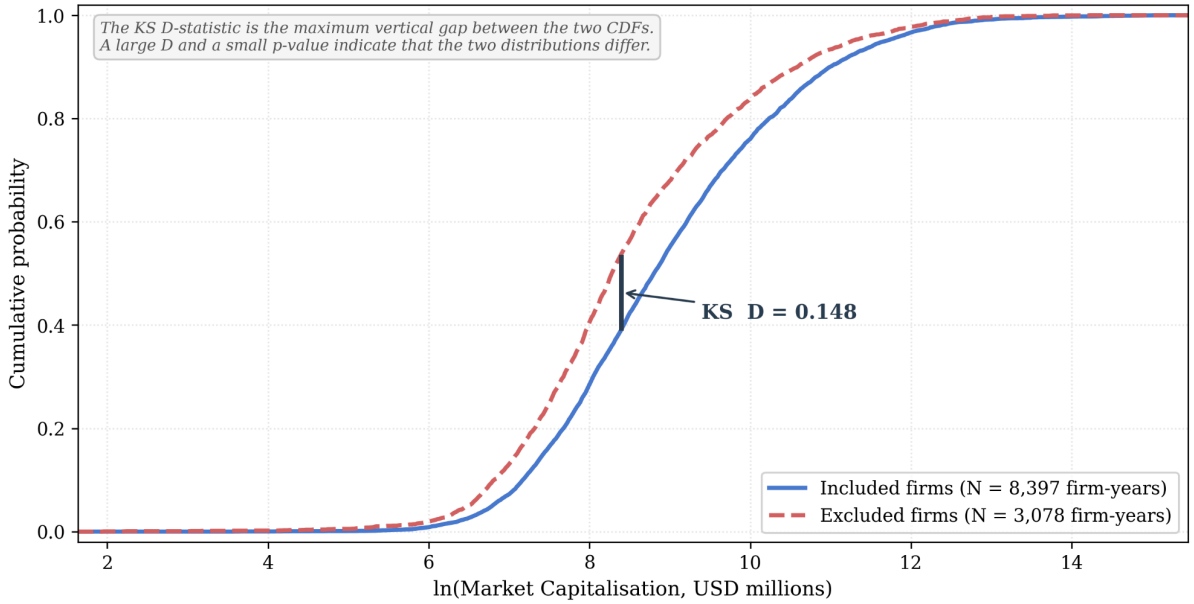
AI disclosure:

In this thesis, artificial intelligence (ChatGPT by OpenAI) was used in certain parts of this thesis to improve language flow, grammar, and sentence structure. The AI was not used to generate or change the content itself, but only to refine clarity and readability. For example, a typical prompt used was "Check this paragraph for grammar, spelling, and flow, but do not change the meaning or content." Moreover, Claude by Anthropic was used to support parts of the Python coding process for the data analysis. These tools were used only as assistance and not as substitutes for our own academic judgment. We remained fully responsible for the design of the study, the interpretation of the data, the arguments made, and the content of the full report. All final decisions regarding analysis, structure, wording, and conclusions were made by the authors. We are fully aware that AI tools cannot be fully relied upon.

Appendices

Appendix A - Selection bias diagnostic

Panel A — Empirical CDFs of ln(Market Cap): Included vs Excluded firms



Panel B — Statistical tests of distributional differences

Test	Test statistic	p-value	Significance
Welch's t-test (on ln Market Cap) *Tests whether mean ln(Market Cap) differs between groups.*	**t-statistic: 14.51**	**7.16e-47**	***
Mann-Whitney U test *Non-parametric test of distributional location.*	**U-statistic: 15.24M**	**2.87e-49**	***
Kolmogorov-Smirnov test *Tests whether the two CDFs differ at any point (see Panel A).*	**D-statistic: 0.148**	**3.27e-43**	***

Significance levels: *** p < 0.001 ** p < 0.01 * p < 0.05 † p < 0.10

All three tests reject the null of distributional equality at the 0.1% level.

Appendix B: Descriptive Statistics (Panel B: High-Cyclicality Firms)

Variable	**N**	**Mean**	**SD**	**Min**	**P25**	**Median**	**P75**	**Max**
ln(Market Cap)	3,728	8.879	1.420	4.526	7.855	8.719	9.753	14.218
ROE (lagged)	3,728	0.140	0.204	-0.490	0.054	0.121	0.209	1.051
D/E (lagged)	3,728	116.868	132.488	1.746	42.200	78.550	141.600	869.399
ROE × D/E (lagged)	3,728	19.246	79.393	-425.745	1.981	7.508	18.929	913.512
ROA (lagged)	3,728	0.051	0.059	-1.204	0.026	0.047	0.074	0.509
ln(1 + Revenue Growth, lagged)	3,728	0.070	0.271	-1.826	-0.023	0.062	0.160	4.430
ln_TotalAssets_lag	3,728	8.832	1.429	3.325	7.821	8.780	9.756	13.959
Capex_Intensity_lag	3,728	0.037	0.034	0.000	0.013	0.026	0.051	0.160
Cash_Ratio_lag	3,728	0.085	0.085	0.000	0.022	0.058	0.120	0.422
RD_Intensity_lag	3,728	0.012	0.031	0.000	0.000	0.000	0.008	0.184
Dividend_Ratio_lag	3,728	0.001	0.004	0.000	0.000	0.000	0.000	0.032

Notes: The table reports summary statistics for the cyclical-firm subsample (N = 3,728 firm-year observations). All explanatory variables are lagged one period. Continuous variables are winsorised at the 1st and 99th percentiles.

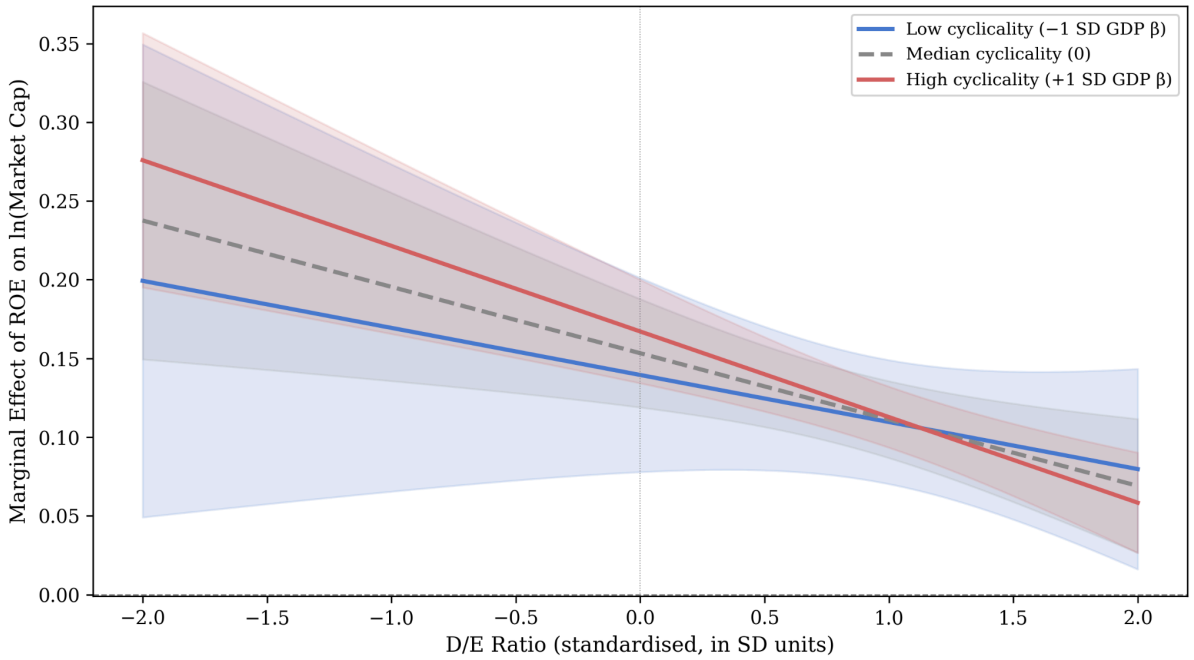
Descriptive Statistics (Panel C: Low-Cyclicality Firms)

Variable	N	Mean	SD	Min	P25	Median	P75	Max
ln(Market Cap)	3,736	9.246	1.587	5.491	8.045	9.090	10.293	15.327
ROE (lagged)	3,736	0.164	0.198	-0.490	0.066	0.124	0.222	1.051
D/E (lagged)	3,736	110.999	128.046	1.746	40.200	76.200	130.400	869.399
ROE × D/E (lagged)	3,736	25.533	85.785	-425.745	2.615	7.740	18.920	913.512
ROA (lagged)	3,736	0.053	0.045	-0.309	0.025	0.045	0.072	0.574

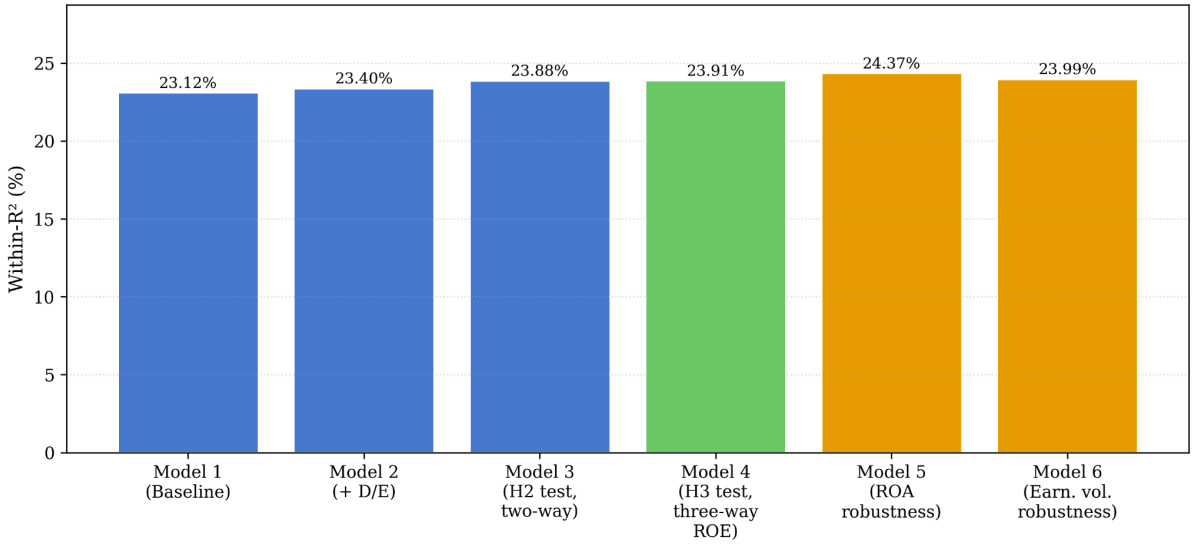
ln(1 + Revenue Growth, lagged)	3,736	0.073	0.170	-1.386	0.009	0.063	0.128	3.350
ln_TotalAssets_lag	3,736	9.151	1.582	4.000	7.949	8.988	10.181	14.332
Capex_Intensity_lag	3,736	0.026	0.028	0.000	0.006	0.017	0.037	0.160
Cash_Ratio_lag	3,736	0.075	0.080	0.000	0.018	0.049	0.107	0.422
RD_Intensity_lag	3,736	0.017	0.037	0.000	0.000	0.000	0.013	0.184
Dividend_Ratio_lag	3,736	0.001	0.004	0.000	0.000	0.000	0.000	0.032

Notes: The table reports summary statistics for the defensive-firm subsample (N = 3,736 firm-year observations). All explanatory variables are lagged one period. Continuous variables are winsorised at the 1st and 99th percentiles.

Appendix C - Marginal effect plot for the three-way interaction



Appendix D - Model fit and within-R²



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