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Exploring the Leverage and Profitability Relation in the Norwegian Market

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CHUONG VAN NGUYEN **GIA LUAN THANH VO**

Abstract

The Leverage-Profitability Puzzle has long been one of the most well-known empirical inconsistency in the literature on capital structure. There are few empirical studies that focus solely on the Norwegian market in relation to capital structure. This leaves a gap in knowledge of Norwegian firms' capital structure, and this thesis aims to provide empirical evidence on the relationship between leverage and profitability in the Norwegian market. Dynamic trade-off theory predicts that more profitable firms choose higher levels of leverage when they actively rebalance their capital structure. When firms undertake capital structure rebalancing finaced by debt issues and distribute the proceeds to shareholders, the theory predicts a positive correlation between leverage and profitability. However, we find empirical evidence in the Norwegian market where the correlation between leverage and profitability is negative.

Table of Contents

List of Figures

List of Equations

List of Tables

1. Introduction

In this section of the thesis, we will briefly introduce the research topic of the thesis, as well as state the research question that will be studied in the thesis.

1.1 Research Topic

Trade-off theory suggests that firms adjust their capital structure over time in order to maximize the balance between the costs and benefits of debt and equity (Kraus & Litzenberger, 1973). The theory predicts that more profitable firms ought to issue more debt and have higher leverage. However, the empirical evidence on the trade-off theory has been mixed, with some studies supporting the theory and others finding little to no evidence of a trade-off between debt and firm value (Graham & Leary, 2011). A strong inverse correlation between profitability and financial leverage has been found to be the most convincing evidence against the trade-off theory. Within an industry, the most profitable firms borrow less, and the least profitable borrow more (Myers, 1993).

One of the most notable areas of empirical inconsistency in the trade-off theory is the relation between profitability and leverage. The theory predicts a positive correlation where firms with higher leverage often have higher profitability, even though higher leverage typically increases financial risk and the cost of capital. The empirical evidence, however, rejects the correlation between profitability and leverage. We call this empirical inconsistency between profitability and leverage: *The Leverage-Profitability Puzzle*.

Public industrial firms have long reported a negative empirical relation between leverage and profitability (Frank & Goyal, 2009; Rajan & Zingales, 1995; Titman & Wessels, 1988). Based on the reported relation, the estimation does not take into account periods in which firms actively issue debt to rebalance their leverage. Rebalancing cost refers to the cost associated with debt issuance (Eckbo et al., 2007). When a firm does not rebalance, positive profitability will shock the lower market leverage and cause a negative relation between leverage and profitability. The fixed rebalancing costs discourage firms from maintaining the target leverage ratio on an ongoing basis (Fischer et al., 1989; Goldstein et al., 2001). However, the trade-off theory will predict a positive correlation between leverage and profitability when firms actively rebalance.

In a recent study, Eckbo and Kisser (2021) show that the leverage-profitability correlation is negative even when firms issue debt and distribute the proceeds to shareholders. To achieve this negative leverage-profitability correlation, there has been used theoretically consistent definition of a rebalancing event. This negative correlation contradicts the traditional trade-off theory, where profitability and leverage should be positively correlated cross-sectionally. The result from Eckbo and Kisser (2021) study resurrected the leverage-profitability puzzle.

While much research has been conducted on capital structure, few empirical studies focus only on Norwegian firms. There has been a study analyzing the capital structure of large Norwegian public, and private firms from 1992 to 2005. According to the study, firms were heterogeneous and showed variability in capital structure choices, so leverage increased with size and tangibility, while it decreased with profitability and interest levels (Mjøs, 2007).

In this thesis, we isolate quarters in which Norwegian industrial firms issue debt and distribute proceeds to shareholders to manage a large leverage-increasing capital structure rebalancing. Due to the tax benefits associated with new debt from rebalancing, high-profitable firms are predicted to increase leverage. Eckbo and Kisser (2021) reject this central prediction as the leverage and profitability correlation is typically negative in periods with and without large rebalancings. This results in a resurrection of the leverage-profitability puzzle following the results from Eckbo and Kisser. Our thesis will investigate whether it is possible to reject the trade-off theory and resurrect the leverage-profitability puzzle in the Norwegian market.

1.2 Problem Statement

It should be noted that there are only a small number of empirical studies focusing on capital structure in the Norwegian market. Mjøs (2007) concludes that leverage decreases with profitability but his analysis does not condition on capital structure rebalancing events. In some cross-country studies, Norwegian firms have been included as subsamples when comparing capital structures. Firms' ability to raise external capital through equity or debt is significantly affected by their legal environment (Porta et al., 1997).

There have been empirical studies about capital structure in the Norwegian market; however, there have not been any studies that have examined capital structure in relation to dynamic trade-off theory in the Norwegian market. Based on current research within the field of capital structure in the Norwegian market, we discovered a gap that we argue to be of great relevance to investigate. In accordance with this,

> *What is the relationship between leverage and profitability in the Norwegian market when debt is issued, and proceeds are distributed to shareholders?*

Our objective with the thesis is to investigate whether the dynamic trade-off theory applies to the Norwegian market.

1.3 Thesis Structure

The remainder of this thesis is organized as follows. In Section 2, we review the foundation of capital structure and discuss the existing empirical literature on most relevant theories of capital structure. In Section 3, we take a deep look into the existing tests on the dynamic trade-off theory of capital structure. In Section 4, we explain the methodology applied in our analysis. In Section 5, we present our main empirical findings from the analysis of debt-financed rebalancing events. Section 6 presents a similar regression to Section 5 in order to clarify the differences between rebalancing events finaced by debt and cash. Finally, Section 7 provides our concluding remarks as well as limitations and suggestions for future research.

2. Theoretical Background

This section reviews the foundation of capital structure and the most relevant theories of capital structure. The first part of this section provides an overview of capital structure. The second part of this section discusses the three main views of capital structure, including the trade-off theory, pecking order theory, and market timing theory, along with empirical evidence. At the end of the section, an overview of Norwegian market research on capital structure is presented.

2.1 Capital Structure

A firm's main objective is to maximize its value and create shareholder value. A firm's value can be maximized by making investments to generate cash flows. Firms must decide whether to use debt or equity to fund these investments. The optimal mix of debt and equity can minimize the weighted average cost of capital and increase shareholder value and, consequently, the firm's value (Berk & DeMarzo, 2020). A firm’s capital structure refers to the way it finances their total assets, which is a challenging decision.

The work of Modigliani and Miller in 1958 laid the foundation for understanding firms' capital structure. Under the assumption of perfect capital markets, Modigliani and Miller (1958) show that corporate financing decisions are irrelevant to firm value and cost of capital. While the assumptions of the Modigliani-Miller theorem are not reflective of reality, they provide a useful starting point for understanding the impact of financing decisions on firm value and risk. Moreover, Modigliani and Miller (1963) later relaxed the perfect capital market assumption and show that – in a world with taxes - financing decisions are no longer irrelevant.

After Modigliani and Miller (1958) created the foundation of capital structure in the field of Corporate Finance, there have been several studies creating additional theories regarding capital structure. A few relevant theories of capital structure include the trade-off theory by Kraus and Litzenberger (1973), the pecking order theory by Myers (1984), and the market timing theory by Baker and Wurgler (2002).

2.2 Trade-off Theory

The trade-off theory of capital structure suggests that firms adjust their capital structure over time to optimize the balance between the costs and benefits of the debt and equity (Kraus & Litzenberger, 1973). The benefits of debt financing include the fact that interest payments are tax-deductible, which provides a tax shield and reduces the overall cost of financing (Kraus & Litzenberger, 1973). In other words, debt financing allows a firm to increase its leverage and potentially increase returns for shareholders. On the other hand, the cost of debt financing includes the risk of financial distress or bankruptcy, as excessive debt increases the risk of not being able to meet debt obligations, which could result in a loss of control of the firm to creditors or even bankruptcy.

The trade-off theories fall into two categories: static and dynamic. In both static and dynamic forms, trade-off theory predicts an optimal capital structure that balances the costs, such as financial distress, with the benefits, such as debt interest tax shields (Kraus & Litzenberger, 1973; Strebulaev, 2007). The first theory, known as the static trade-off theory, implies that firms balance the tax benefits of debt with the risks of bankruptcy. Kraus and Litzenberger (1973) were the first to propose the static trade-off theory by using Modigliani and Miller's (1958) theorems, Kraus and Litzenberger (1973) introduced both tax benefit of debt and bankruptcy costs to the model. This trade-off implies the existence of a target leverage that maximizes the firm's value (Kraus & Litzenberger, 1973). Static trade-off theory implies that firms have a target debt ratio and try to move towards this target (Jong et al., 2010).

Static trade-off theory distinguishes itself from dynamic trade-off theory by choosing target leverage such that marginal costs equal marginal benefits without taking time into account. An adjustment cost must be incurred when firms increase or decrease their debt levels In static trade-off theory, the adjustment cost is not the main interest (Myers, 1984). When firms have leverage targets, the dynamic trade-off theory suggests that they only adjust their capital structure when the costs of adjustment can be balanced by the benefits of such adjustments (Fischer et al., 1989). When only one target leverage exists, and adjustment costs are present, firms will optimally be drifted from the target until the benefit of adjusting outweighs the cost of adjusting. There may be a number of things that happen over time, such as changes in the market value of equity that cause leverage to change and the firm deviates from its leverage target.

Under a dynamic capital structure, firms take time into account when making financial decisions. Fischer, Heinkel, and Zechner (1989) were one of the first to place the trade-off theory in a dynamic setting with capital structure rebalancing costs. Their study tested firms' dynamic capital structure through quarterly observations from Compustat-listed firms. Rather than using static leverage as an empirical measure, Fischer, Heinkel, and Zechner (1989) use the observed debt ratio range of a firm. The results from the study find that small rebalancing costs can lead to drastic changes in a firm's capital structure over time. The optimal capital structure is expected to change over time as firms continuously adjust their capital structure (Fischer et al., 1989). Fischer, Heinkel, and Zechner (1989) also find that firms with specific properties of capital structure, such as smaller, riskier, lower-tax, lower-bankruptcy-cost firms, will have more drastic changes in their capital structure over time.

As well as Fischer, Heinkel, and Zechner (1989) model, Goldstein, Ju, and Leland (2001) later proposed a model of dynamic capital structure. According to the model, debt levels and credit spreads are more in line with what is observed in practice when firms can increase their debt levels. Risk-neutral drift is the risk free rate for an asset with no dividends, cost of carry or any other payouts. In traditional framework, the risk-neutral drift is set as the difference between risk-free rate and payout rate. The empirical findings of Goldstein, Ju, and Leland (2001) indicate that their model implies a significantly lower risk-neutral drift than the traditional framework, predicting a higher probability of bankruptcy, resulting in a lower optimal leverage ratio. As a result, models based on the traditional framework are required to assume unrealistically high bankruptcy costs. However, the model is only able produce yield spreads consistent with empirical evidence when bankruptcy costs estimates are set unrealistically high (Goldstein et al., 2001).

Strebulaev (2007) tested the different theories on capital structure in a unique method. Instead of using datasets with historical data (such as Compustat), Strebulaev (2007) constructed a model to generate dynamic paths of leverage. Thus, cross-sectional data are generated that are similar to those used in empirical research into capital structure. This allows Strebulaev (2007) to replicate tests commonly used in such studies and ask to what extent the results are similar. According to his findings, only the trade-off theory's arguments can produce quantitative predictions about leverage ratios in dynamics. As the generated data are more consistent with dynamic trade-off theory than other theories, using a trade-off model is more appropriate.

Several empirical studies have demonstrated that the trade-off theory is not always valid. A central argument of the trade-off theory predicts a positive relationship between leverage and profitability. The first empirical evidence of a negative correlation was reported by Titman and Wessels (1988), Rajan and Zingales (1995), and Frank and Goyal (2009). The empirical negative relation was found in US public industrial firms. In a dynamic setting with rebalancing costs that characterize the debt issuance (Eckbo et al., 2007), the empirical estimations from Frank and Goyal (2009), Rajan and Zingales (1995), and Titman & Wessels (1988) do not consider periods when firms actively rebalance leverage, resulting an unconditional relation between leverage and profitability. Eckbo and Kisser (2020) show that firms that frequently issue debt, so-called high-frequency net debt issuers, do not seem to follow the trade-off theory. According to the trade-off theory, leverage and profitability are positively correlated, including when firms issue debt and distribute the proceeds to shareholders. Eckbo and Kisser (2021), on the other hand, reject the prediction of the theory and resurrect the Leverage-Profitability Puzzle in this case.

2.3 Pecking Order Theory

The pecking order theory of capital structure arises from the concept of asymmetric information. Asymmetric information occurs when one party possesses more or better information than another party. The pecking order theory postulates that information asymmetry affects the choice between internal and external financing (Myers, 1984). The theory suggests that firms should prioritize their source of financing from internal financing to debt to equity financing (Myers, 1984). Another key argument of the pecking order theory is that it predicts firms will finance when investments are needed; the firm will issue because it needs funds to invest.

It has been noted that Myers (1984) argues that internal financing, such as retained earnings, is a better source of financing than debt and equity. Retained earnings are profits a firm has earned and kept rather than distributed to shareholders as dividends. In a given period, it has no transaction costs or interest expenses, making them the most preferred source of financing due to its low costs and minimized information asymmetry. It is important to note that the balance sheet contains retained earnings since inception. This balance sheet item informs about the magnitude of internal equity, but it does not mean that these retained earnings are invested in cash accounts with low transaction costs. Equity financing is considered a last resort. According to Myers (1984), equity financing is generally more expensive than debt financing due to the fact that it is more risky and, hence, to a larger degree affected by information asymmetry. Equity investors expect a higher return on their investment to compensate for the increased risk from equity financing.

Several empirical studies have been conducted on the pecking order theory. It has been found that the pecking order hierarchy depends on the size and development level of the firm (Berger & Udell, 1998). This is due to the fact that there is a particular level of information asymmetry and financial need for each phase of the firm development. It is also noted that average smaller firms use more equity (Berger & Udell, 1998). When a small firm is in its early stages of development, it may have fewer equity holders and a lower risk of information asymmetry. With the growth and maturity of the firm, the risk of information asymmetry increases.

Shyam-Sunder and Myers (1999) conducted one of the first empirical studies to test the static trade-off theory against the pecking order theory. In their study, they found that the pecking order influences mature US firms' financial decisions. In contrast to Shyam-Sunder and Myers (1999), some empirical studies do not support the pecking order theory, and the theory itself does not describe a firm’s financing decisions. Frank and Goyal (2003) tested the pecking order theory on a broad cross-section of publicly traded American firms from 1971 to 1998, and conclude the opposite of Shyam-Sunder and Myers (1999). According to Frank and Goyal (2003), American firms heavily rely on external financing. However, debt financing does not dominate equity financing in magnitude. Pecking order is considered most significant when evidence comes from smaller samples, such as large firms in their early years (Frank & Goyal, 2003). Over time, Frank and Goyal (2003) find that the support for the pecking order declines. Small firms do not follow the hierarchical pecking order in their early years or as they mature.

Fama and French (2005) empirically find that firms' financing decisions seem to not follow the central predictions of the pecking order model. The empirical estimation of US public-listed firms shows that half of the sample firms violate the pecking order. Leary and Roberts (2010) quantify the empirical relevance of the pecking order theory using a experimental empirical model. The study shows that the pecking order theory alone does not describe financing decisions. However, if we collaborate the pecking order theory with factors from the trade-off theory, the model's predictive accuracy increases significantly. The empirical findings of Leary and Roberts (2010) are consistent with the speculation from Fama and French (2005), who suggests treating the pecking order and trade-off models as stable partners to help describe firms' financing decisions.

There should be noted that the pecking order theory differs from other capital structure theories. A key difference between the pecking order theory and the trade-off theory is that managers do not have a well-defined target leverage ratio in the pecking order theory. On the other hand, the trade-off theory predicts that management will issue equity or debt towards a target leverage ratio. In view of the evidence presented above, the pecking order theory has received mixed empirical support. The pecking order theory does not apply for every firm, but it finds most significant evidence in smaller and more specific samples, such as large firms in their early years (Frank & Goyal, 2003). A firm's financing decisions cannot be described and predicted by pecking order theory alone, but empirical findings show that can achieve better predictive accuracy if we combine pecking order theory with other factors from other capital structure theories (Fama & French, 2005; Leary & Roberts, 2010).

2.4 Market Timing Theory

In corporate finance, equity market timing involves issuing shares at a high price and repurchasing them at a low price. As opposed to the trade-off theory and the pecking order theory, the market timing theory suggests firms' capital structure decisions are not only influenced by their financial needs but also by their beliefs about market conditions (Baker & Wurgler, 2002). Based on Baker and Wurgler (2002), firms' use of debt and equity is influenced by market timing as an important aspect of real financing decisions. As a result, firms do not generally care whether they finance with debt or equity. Instead, they simply select the form of financing that appears to be more highly valued by financial markets at that point in time. Baker and Wurgler (2002) describe two versions of equity market timing. The first version of equity market timing is a dynamic form of Myers and Majluf's (1984) model including issue-invest decisions with rational managers and investors, and adverse selection cost. An adverse selection occurs when buyers (investors) and sellers (managers) have different information. This is an example of asymmetric information being exploited. The second version of equity market timing involves irrational investors or managers and time-varying mispricing. The following version describes situations in which managers issue equity when they believe the cost to be irrationally low and repurchase equity when they believe the cost to be irrationally high.

Baker and Wurgler (2002) find that fluctuations in market valuations have large effects on capital structure. The result is hard to understand within traditional theories of capital structure. According to Baker and Wurgler (2002), the capital structure reflects the result of past attempts to time equity markets. As a result of this evidence, firms tend to reduce their leverage ratios by raising substantial amounts of capital when market-to-book ratios are high. Besides Baker and Wurgler (2002), several authors have studied the market timing theory and its implications for corporate finance. Alti (2006) proposes initial public offerings as a natural place to look for more robust measures of market timing. After an initial public offering, shares of the firms will be listed on one or more stock exchanges for free trading. Alti (2006) divides market timers into two groups, hot-market firms, and cold-market firms. Initial public offerings of equity are more common in hot-market firms, while they are less common in cold-market firms. Market timing had no significant effect on cold-market firms. For the hot-market firms, Alti (2006) finds market timing effective only in the short run, but its long-run effects are limited.

The definitions of book leverage and market leverage may differ between empirical tests regarding market timing theory. A broad definition of leverage, when it includes non-debt liabilities like accounts payable and pensions liabilities, will most likely overstate financial leverage. This definition may not provide a good indication of near future default profitability. A study by Kayhan and Titman (2007) examine how debt ratios are affected by cash flows, investment expenditures, and stock price histories. The study show empirical support on firms' behavior when they have target debt ratios, but their cash flows, investment needs, and realization of stock prices lead to significant deviations from the debt ratio targets. Kayhan and Titman (2007) use the same definition of book leverage and market leverage as Baker and Wurgler (2002). The leverage defined by Baker and Wurgler (2002) influences capital structure in the predicted direction; however, Kayhan and Titman (2007) show that the magnitude of the effect of this theory is quite small relative to the stock price and financial deficit effects.

In a study of time series patterns of external financing decisions, Huang and Ritter (2009) find that publicly traded US firms fund a greater proportion of their financing deficit with external equity when equity capital costs are low. The study presents empirical evidence regarding the relative importance of the three main theories of capital structure: static trade-off, pecking order and market timing theory. The pecking order hierarchy predicts that external equity is the least preferred financing resort. On other hand, market timing theory states that equity issues do not necessarily need to be expensive more than issuing debt when the equity risk premium is low. The firms will then want to increase funds when the cost of equity is low to build their internal funds. The study shows empirical evidence consistent with the market timing theory where firms use a larger proportion of their financing deficit with external equity when the expected equity risk premium is low (Huang & Ritter, 2009).

Leverage decreasing recapitalization is a financial strategy that involve reducing the amount of debt a firm has by issuing new shares of stock or other forms of equity. Kisser and Rapushi (2022) contribute to the literature on market timing by studying periods where firms do use a leverage recapitalization. Classical theories of capital structure do not predict leverage decreasing recapitalization, but the exercise of creditor control rights rationalizes it. Kisser and Rapushi (2022) are not able to reject the notion that leverage decreasing recapitalizations reflect managerial attempts to time the market to finance debt retirements. They show this through a comparison between debt retirements financed by illiquid asset sales and an analysis of discretionary cost items.

2.5 Capital Structure of Norwegian Firms

In this subsection, we will discuss some of the few empirical evidence that exists on the Norwegian market regarding capital structure. There are few empirical studies that focus solely on the Norwegian market in relation to capital structure. This leaves a gap in knowledge of Norwegian firms' capital structure. Frydenberg (2004) has done one of the few empirical studies on the capital structure of Norwegian firms. Frydenberg's (2004) study contributes by analyzing the maturity structure in Norwegian non-listed firms. He finds empirical support for the pecking order theory in his study. As a result of these findings, it appears that profitable firms tend to have less debt, and firms with a large amount of fixed assets tend to increase long-term debt and decrease short-term debt. The study indicates that non-debt tax shields have a significant and negative effect, indicating that firms substitute debt for such tax shields.

Mjøs's (2007) study presents empirical evidence on the capital structure of Norwegian private and public firms' population for 1992-2005. The study conducted a complete descriptive analysis of leverage by alternative ratios, over time, by firm categories, and by regression methods. He documents large differences in operational and financial leverage between firms and industry groups, similar to the findings of Frank and Goyal (2009) on US public firms regarding the importance of industry leverage. Mjøs (2007) also managed to analyze relevant and still large subsamples in his study. The subsamples in the study are the smallest and the largest size-quintiles, firms pay dividends at least 2/3 of the reported years and firms having auditor remarks in their accounts in more than ¼ of the years. The subsample definitions reflect the view that a consistent dividend payer should deliver a stable dividend stream. Mjøs (2007) assumes that auditor remarks in ¼ of the years is sufficient to inflict the firms with lasting reputational damage. The analysis finds significantly increased leverage in the largest firms of the Norwegian market. It should be noted that Mjøs (2007) urged further research to be conducted with more specific subsample definitions, since his definitions were relatively simple.

Despite the lack of literature relating to Norwegian capital structures, some cross-country studies have included Norway as a subsample when examining differences among countries in capital structures. Porta et. al. examine firms' ability to raise debt or equity financing in different legal environments. They find empirical evidence that confirms countries' legal rules matters for the size of a country's capital market. It shows that the difference in shareholder rights, bankruptcy laws, and the quality of law implementation have a significant impact on capital structure. Porta et al. (1997) also find that credit rights in Norway are stronger than in the US. In addition to this, shareholder rights are weaker in Norway, which implies that we should expect a higher debt level in Norway compared to the US. As part of Bancel and Mittoo (2004) study, managers in sixteen European countries, including Norway, were surveyed regarding the factors that determine the capital structure of a firm. Bancel and Mittoo (2004) find that financial flexibility is the most important factor when a firm issues debt, while earnings per share dilution is the main concern when issuing common stock. Results of the study indicate that differences in financial decisions between Scandinavian and non-Scandinavian firms are the most significant.

We can infer how different the Norwegian market is from other markets from this brief overview of some of the few empirical evidence on capital structure in the Norwegian market. With stronger credit rights and weaker shareholder rights in Norway, Norwegian firms expect to have a higher debt level than US firms (Porta et al., 1997). Large firms in Norway are expected to have higher levels of debts (Mjøs, 2007), but the more profitable firms are expected to have less debt (Frydenberg, 2004). Apart from the differences between Norwegian and US firms, there are similarities, such as large differences in operational and financial leverage between firms and industries (Mjøs, 2007).

3. Testing the Dynamic Trade-Off Theory of Capital Structure

In terms of trade-off theory, researchers have expressed a variety of opinions. It has been demonstrated empirically that trade-off theory does not match empirical evidence in many instances. The traditional trade-off theory of capital structure predicts a positive relationship between profitability and leverage, contradictory to well-established empirical evidence (Myers, 1984; Strebulaev, 2007; Titman & Wessels, 1988). There is a widely held belief that the inverse relationship between leverage and profitability is a serious flaw in the trade-off theory (Frank & Goyal, 2009). This leads us to the well-known leverage-profitability puzzle.

The leverage-profitability puzzle is the tension between the positive correlation between leverage and profitability predicted by traditional trade-off theory and the negative relation revealed by empirical evidence. In an attempt to test a dynamic trade-off theory, Danis, Rettl, and Whited (2014) show that at times when firms are at or close to their optimal level of leverage, the cross-sectional correlation between profitability and leverage is positive. However, Eckbo and Kisser (2021) show that the cross-sectional correlation is negative in similar situations. In addition to existing empirical evidence, our study will contribute additional empirical evidence regarding capital structure theories and the leverage-profitability puzzle for Norwegian firms.

3.1 Leverage Dynamics

This subsection closely repeats arguments made by Eckbo and Kisser (2021). The dynamic inactivity theory illustrates a concave function (Figure 1) between levered firm value under the trade-off theory and the market leverage ratio (Fischer et al., 1989; Goldstein et al., 2001). The levered firm value is noted as *V(L)*, and the market leverage ratios are noted as *L*. In the dynamic trade-off theory, firms strive to balance the cost and benefits of leveraging. Tax deductions are available for interest on the debt, which provides the benefit of leverage. In the event of default on the debt payments, the debt will be liquidated, resulting in a deadweight loss for the firms. Therefore, *V(L)* is the discounted value of the after-tax expected cash flow to the firm's security holders plus the present value of the tax shield minus the present value of expected bankruptcy costs. The firm maximizes equity value as there are no agency disputes or information asymmetry. When after-tax profits are positive, they are distributed to shareholders. Due to the absence of cash, firms do not save cash; they have no cash balances, so raising leverage for capital structure rebalancing requires issuing new debt.

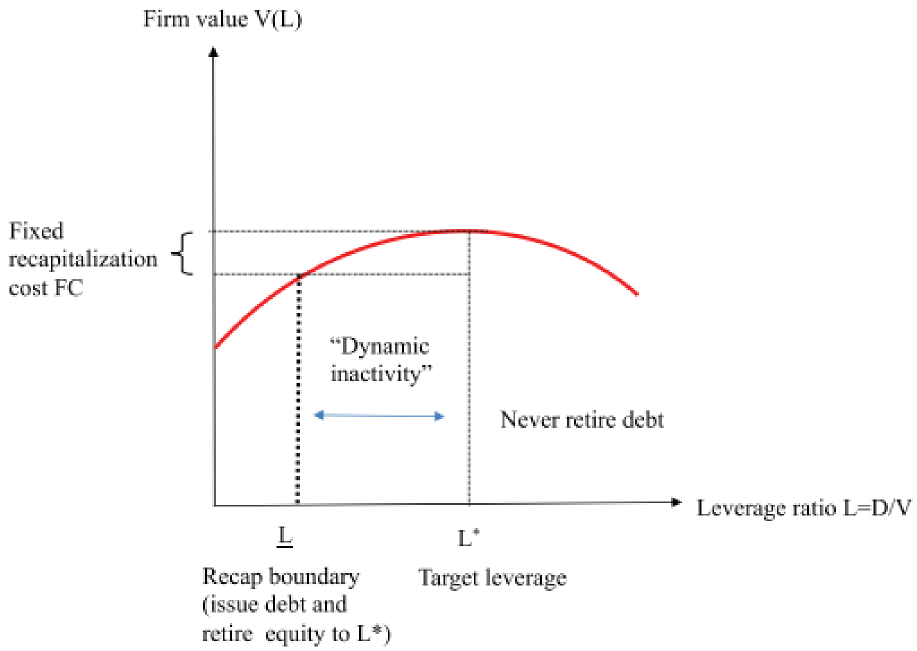

Figure 1. Debt issue cost and optimal rebalancing policy. (Eckbo & Kisser, 2021, p. 1092)

When firms trade off debt-interest tax shields and expected bankruptcy costs, they achieve the target leverage ratio *L**. However, the existence of fixed capital structure adjustment costs leads firms to accept temporary deviations from the L*. In fact, firms will optimally stay inactive until the benefit of adjustment capital structure outweighs the course. In Figure 1, this occurs when the leverage ratio reaches the recap boundary $\underline{L}$. At this point, the firm issues debt and distributes the proceeds to shareholders Afterwards, the firm achieves the target level ratio *L** by trading off the debt-interest tax shield and the expected bankruptcy cost. *FC* in Figure 1 is a fixed debt-issue cost between the recap boundary $\underline{L}$ and target leverage *L**. *FC*, along with the trade-off of debt-interest tax shield and bankruptcy cost, is an integral part of the dynamic inactivity theory (Goldstein et al., 2001, p. 500).

3.2 Existing Empirical Tests

There are two main empirical studies that have attempted to test dynamic trade-off theory of capital structure: Danis, Rettl, and Whited (2014) and Eckbo and Kisser (2021). Various regression equations and definitions of rebalancing were used in the studies, resulting in different results. The purpose of this subsection is to explain the similarities and differences between the two studies' test approach and regression equations.

Danis, Rettl, and Whited (2014) were the first to revisit the well-established puzzle that leverage negatively correlates with measures of profitability. In the study, debt issuance costs make it optimal for firms to stay dynamically inactive (by not adjusting capital structure). That is, firms remain inactive until the benefits of adjusting leverage outweigh the costs. Danis, Rettl, and Whited (2014) recognize that the sign of the relationship between profitability and leverage strongly depends on whether or not the firms actively adjust their capital structure. If the firm is not refinancing, a negative profitability-leverage relation occurs. On the other hand, if the firm is refinancing, the profitability-leverage relation is positive. Danis' definition of rebalancing includes both internal (cash balance drawdowns) and external sources of refinancing.

The research study of Danis, Rettl, and Whited (2014) has two goals. The first goal is to find a distinction between the pecking order theory and the dynamic trade-off theory. Danis, Rettl, and Whited (2014) document that most years, firms are not refinancing, and the correlation between leverage and profits in a large sample of firms cannot be used to distinguish the pecking order from dynamic trade-off theory. However, when firms are refinancing, the correlation can be used to make a distinction to support the dynamic trade-off inaction model. The second goal is to formulate and perform tests that exploit the time-series dimension of the data. Dynamic inaction models imply that refinancing firms experience an increase in profits (Danis et al., 2014). The evidence from the study shows that changes in profits forecast restructuring. Danis, Rettl, and Whited (2014) also finds that the observed decision behavior of rebalancing firms is consistent with the patterns predicted by dynamic inaction models.

In Danis, Rettl, and Whited (2014) the active optimal behavior of dynamic inaction models is when firms simultaneously increase leverage by either issuing debt or drawing down cash and, at the same time, repurchasing shares or paying cash dividends. The models predict a positive correlation between profitability and leverage at this refinancing point and negative otherwise. Danis, Rettl, and Whited (2014) leverage regression equation used to test this prediction is as follows:

$$L_{it+1} = \alpha_0 + \alpha_1 d_{it+1} + \beta_1 \pi_{it} + \beta_2 d_{it+1} \pi_{it} + \epsilon_{it+1}$$

Equation 1. Net Leverage (see Danis. Rettl, and Whited, (2014), p. 427)

In their analysis, net leverage is the dependent variable. The dummy variable d equals one if a firm is refinancing (by drawing down cash and/or issuing debt to finance an equity payout) and zero otherwise. Based on this specification, the cross-sectional sensitivity of leverage to profits at refinancing points can be calculated by summarizing the coefficients $\beta_1 + \beta_2$. This is the equivalent of running separate regressions on financing and non-refinancing observations. Danis, Rettl, and Whited (2014) present evidence supporting dynamic trade-off theory.

Eckbo and Kisser (2021) revisit the empirical analysis of Danis, Rettl, and Whited (2014). The authors emphasize that dynamic trade-off theory predicts a positive correlation between leverage and profitability when firms pay rebalancing costs and actively rebalance their capital structures (Fischer et al., 1989). Eckbo and Kisser (2021) argue that cash drawdowns should not be part of the rebalancing defition since dynamic tradeoff models are about costly debt issues. As shown below, this seemling small change is sufficient to resurrect the leverage-profitability puzzle.

Eckbo and Kisser (2021) motivate two alternative net- and gross-leverage rebalancing event definitions that form the core of their research article. While Danis, Rettl, and Whited (2014) use net leverage as the dependent variable and include cash draw-downs in the rebalancing definition, Eckbo and Kisser (2021) primarily put to use gross leverage (L) and the debt-financed event indicator a:

$$L_{it} = \alpha + \gamma_0 \Pi_{i,t-1} + \gamma_1 \Pi_{i,t-1} \alpha_{it} + \gamma_2 \alpha_{it} + \beta X_{i,t-1} + \epsilon_{it}$$

Equation 2. Gross Leverage (see Eckbo & Kisser, 2021, p. 1095)

$L_{it} \equiv (D/MV)$, where *D* is the firm *i*'s book value of short- and long-term debt and *MV* is the market value of total equity and the sum of short- and long-term debt *D*. The operating profit, denoted as $\Pi_{i,t-1}$ is measured as earnings before interest, taxes, depreciation, and amortization *EBITDA*. The *EBITDA* is standardized by the book value *A* of total assets. Lagged control variables are denoted as $X_{i,t-1}$.

Eckbo and Kisser (2021) show that the leverage profitability relation turns negative when focusing on debt financed shareholder payouts. Hence, when rebalancing is costly (as predicted by the theory), then the leverage profitability correlation is not positive. This finding is robust to replacing gross leverage with net leverage and instead suggests that cash drawdowns drive the positive correlation documented by Danis, Rettl, and Whited (2014).

4. Methodology

The following section is a description of our hypothesis development and regression model. To test the relationship between leverage and profitability in the Norwegian market, we will examine the existing empirical evidence on the leverage-profitability puzzle. In this thesis, we attempt to resolve the leverage-profitability puzzle by making use of quarters in which firms take on large leverage rebalancing by issuing debt and distributing the proceeds to shareholders. Our results will provide the first empirical evidence on the Norwegian market. Our goal is to provide new empirical evidence from another interesting market, and our dependent variable will be gross leverage rather than net leverage. In order to better understand our hypothesis, we would like to explain the theoretical trade-off proposition briefly.

4.1 Leverage-Profitability Regression Model

The theoretical regression framework used for this thesis are in line with the modelling presented by Eckbo and Kisser (2021). We need the following debt-financed rebalancing event indicator a to achieve the regression model. The equation of debt-financed rebalancing event is the following:

$$a_t = 1 \; if \; \frac{\Delta D_t^e}{A_t} > s \; and \; \frac{ER_t^e}{A_t} > s, otherwise \; a = 0$$

Equation 3. Debt-Financed Rebalancing Requirements (Eckbo & Kisser, 2021, p. 1093)

Where ΔD^e is the change in long-term debt and ER^e is the sum of cash dividends and equity repurchases in excess of equity issues. Following this rebalancing event, we achieve the regression model of gross leverage:

$$L_t = y_0 + y_1 \Pi_{t-1} + y_2 \Pi_{t-1} a_t + y_3 a_t + y_4 M/B_{t-1} + y5Risk_{t-1} + y_6 Tan_{t-1} + y_7 Size_{t-1} + \epsilon_t$$

Equation 4. Gross Leverage before shortening

where Π is operating profit. The regression model is then further shortened by employing the vector X_{t-1}. The standard deviation of operating profitability (*Risk*), the market-to-book ratio (*M/B*), asset tangibility (*Tan*), and firm size (*Size*) make up the vector of lagged control variables. The main regression model of this thesis is then the following:

$$L_t = y_0 + y_1 \Pi_{t-1} + y_2 \Pi_{t-1} a_t + y_3 a_t + \beta X_{t-1} + \epsilon_t$$

Equation 5. Gross Leverage after shortening

4.2 Dynamic Trade-Off Hypothesis

The focus of this empirical analysis is the following empirical dynamic trade-off hypothesis:

$$Dynamic\ trade - off\ hypothesis: y_1 < 0\ and\ y_1 + y_2 > 0$$

Equation 6. Dynamic Trade-Off Hypothesis (Eckbo & Kisser, 2021, p. 1096)

Eckbo and Kisser (2021) describe that in periods with rebalancing inactivity when ($a_t = 0$), leverage has been driven down mechanically by higher profits, so $y_1 < 0$. On the other hand, when firms actively rebalance ($a_t = 1$), two conditions must be fulfilled: The first is that leverage and profitability must be positively correlated when $y_2 > 0$. The second condition is that more profitable firms move to higher leverage, so $y_1 + y2 > 0$. The theory is rejected outright if $y_2 < 0$, and if $y_2 > 0$ but $y_1 + y2 < 0$, then the trade-off hypothesis is also rejected. Since the positive y_2 shows a less negative relation between leverage and profitability, in the end, for any evidence that more profitable firms move to higher leverage when they rebalance, both conditions must be satisfied in our data.

5. Analysis of Debt-Financed Rebalancing Events

This section presents conditional leverage-profitability correlations derived from regression Equation 5, first with gross leverage as the dependent variable and then with net leverage as the dependent variable. Moreover, this section describes sample selection and examines how the presented results can be used to answer our research question. We report our main findings based on debt-financed rebalancing events. In order to provide support for our main findings, robustness tests are conducted.

5.1 Data Sample

The Eikon database provides a starting data sample of 1,279 Norwegian public-listed firms. This sample includes firms that declared bankruptcy during the sample period and does not suffer from survivorship bias. The sample period begins Q1/1991, the first year with data consistently available, and ends in fiscal Q4/2022, a total of 128 consecutive quarters. The year 1991 was the furthest back in time we could gather data with the restrictions of Eikon. Our choice of such a long period is due to the fact that each firm must have twenty contiguous observations on profitability. Firms in the final sample must also have non-missing entries of key balance sheets, income statements, and cash flow data. To better perform our analysis, standard restrictions were imposed in order to clean the data. As a first step, we removed financial and utility firms from the sample because they are subject to specific regulatory and accounting requirements (Frank & Goyal, 2003). Using SIC codes, Eckbo and Kisser (2021) eliminated financial and utilities firms. The financial and utilities firms were eliminated by using the European standard classification NACE. All variables are denominated in USD. The definitions of all the variables are included in Appendix A, Appendix B, and Appendix C.

After imposing all the standard restrictions, we produce an overall sample of 18,566 firm-quarters and 470 firms, as seen in Panel A of Table 1. In Panel B of Table 1, we can see the impact in the sample with the addition of *Risk*. *Risk* is computed as the standard deviation of profitability, which is estimated based on a rolling basis. Following Eckbo and Kisser (2021), the sample size changes since we need at least an estimation period of at least 4 or 20 observations to compute the variable *Risk*. In the case of four observations, the first three observations are set as missing, and in the case of 20 observations, the first 19 observations are set as missing. With four contiguous quarterly observations ($T = 4$) on profitability, the filtered sample contains 16,129 firm-quarters and 453 firms. With 20 contiguous observations ($T = 20$), our sample is further reduced to 7,929 firm-quarters and 316 firms.

Sample Restriction	Number of firm-quarters	Number of firms
Panel A: Total sample w/o a minimum estimation period for Risk		
Raw sample	118,635	1,278
Industrial firms only	-25,136	-252
No corrupted data	-255	-255
No multiple quarterly observations	-38	0
No missing information on profitability	-62,859	-22
At least 20 contiguous observations on profitability	-4,384	-250
Non-missing balance sheet	-7,357	-29
Non-missing retained earning	-40	0
Final Sample	18,566	470
Panel B: Sample for different minimum estimation periods for Risk		
Estimation period for Risk is $T = 4$ quarters	16,129	453
Estimation period for Risk is $T = 20$ quarters	7,929	316

Table 1. Quarterly Eikon sample selection, 1991–2022

5.2 Main Empirical Result

On the basis of Equation 3 and Equation 5, we performed an empirical regression of gross leverage and profitability with debt-financed events. The conditional leverage-profitability correlation estimates y_1 and y_2 are presented in Table 2. The coefficients are estimated with the selected sample using three different size thresholds (1.25%, 5%, and 7.5%) in order to achieve robustness. The issue size threshold (s) is measured in percent of book assets A, and is affecting our empirical results if we change it. The sample of rebalancing events substantially changes when we re-estimate the coefficient after changing the size threshold. In Columns (1) and (2), an issue size threshold of 5% was used. In the literature on security issuances, a 5% issue size threshold is commonplace (Eckbo et al., 2007; Leary & Roberts, 2010). The number of rebalancings increases when the estimation reduces the size threshold to s = 1.25% (Columns (3) and (4)). On the other hand, when the estimation increases the size threshold to s = 7.5%, the number of rebalancings decreases (Columns (5) and (6)). Moreover, the table reports the coefficient estimates of vector X_{t-1}, as well as an additional two rows at the bottom of the table for ease of presentation. The bottom two rows of Table 2 highlight the results of testing the dynamic trade-off hypothesis (Equation 6) using the Wald test statistic.

As in Equation 5, the vector X_{t-1} contains the lagged control variables including the standard deviation of profitability, the market-to-book ratio, asset tangibility, and the firm size. Table 2 presents the coefficient estimates of the lagged control variables X_{t-1} in all the columns. Compared to Eckbo and Kisser (2021), the coefficients of the lagged control variables are almost similar to our results. The standard deviation of profitability (labeled as *Risk*) was the only variable that produced a different result. Contrasting to Eckbo and Kisser (2021), the coefficient of *Risk* in our regression is positive and very close to zero. This indicates that the *Risk* has a positive impact on the gross leverage parameter.

In periods without rebalancing activity, the leverage-profitability correlation of y_1 is presented in Table 2 (the first row) with negative correlation estimates when $T = 20$ in all the issue size thresholds. When $T = 4$, y_1 is positive, but also very close to zero. The pattern of $T = 4$, where every y_1 is 0.001 also occurs in the following analysis. The correlation estimates for y_1 vary depending on the number of consecutive quarters, ranging from -0.775 when $T = 20$ to 0.001 when $T = 4$. According to the regression, the significance level of y_1 in the regression is 1% or lower when $T = 20$; however, when $T = 4$, the significance level of the correlation is insignificant. It is necessary to examine y_2 in order to reject the hypothesis. The leverage-profitability correlation of y_2 is statistically insignificant except in Column (4).

In the regression's last two rows, we include the estimated sum of $y_1 + y_2$ and the Wald test statistic that tests the results of the dynamic trade-off theory. The sum of $y_1 + y_2$ is reported as negative everywhere in the regression, ranging from -1.339 in Column (3) to -0.177 in Column (2). The Wald test statistic explains if the sum of $y_1 + y_2$ is significant. The Wald test need to be below 0.05 such that we can conclude that the coefficient sum is significant and statistically different from zero. In Table 2, the coefficients sums are only statistically significant in Column (3) to (5).

As a result, using debt-financed rebalancing events a_t, Table 2 shows that the cross-sectional leverage-profitability correlation is negative rather than positive, as predicted by dynamic trade-off theory. The dynamic trade-off hypothesis is rejected outright if $y_2 < 0$, and if $y_2 > 0$ but $y_1 + y2 < 0$. In Table 2, the regression shows $y_1 < 0$ and $y_1 + y2 < 0$ in all columns. Our empirical results rejects the dynamic trade-off hypothesis in the Norwegian market when we ease the issue size threshold to 1.25% for both definitions of contiguous quarters ($T = 4$ and $T = 20$), and when the issue size threshold is 7.5% for $T = 20$.

Issue size threshold *s*	*s = 5%*		*s = 1.25%*		*s = 7.5%*	
Contiguous quarters	*T = 20*	*T = 4*	*T = 20*	*T = 4*	*T = 20*	*T = 4*
T for *Risk*	(1)	(2)	(3)	(4)	(5)	(6)
Firm profitability and rebalancing						
Π (y_1)	-0.775***	0.001	-0.722***	0.001	-0.765***	0.001
	(0.082)	(0.000)	(0.084)	(0.000)	(0.081)	(0.000)
a x Π (y_2)	0.382	-0.178	-0.617*	-0.790***	0.060	-0.319
	(0.332)	(0.194)	(0.319)	(0.136)	(0.319)	(0.252)
a	0.031*	0.057***	0.046***	0.055***	0.071***	0.113***
	(0.017)	(0.015)	(0.010)	(0.007)	(0.022)	(0.024)
Firm controls						
Risk	0.008***	0.006***	0.008***	0.007***	0.008***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
M/B	-0.099***	-0.060***	-0.099***	-0.060***	-0.099***	-0.060***
	(0.006)	(0.003)	(0.006)	(0.003)	(0.006)	(0.003)
Size	-0.005***	0.002**	-0.006***	0.003**	-0.005***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tan	0.604***	0.531***	0.603***	0.530***	0.604***	0.531***
	(0.009)	(0.007)	(0.009)	(0.007)	(0.009)	(0.007)
y_0	0.433***	0.217***	0.431***	0.211***	0.430***	0.214***
	(0.032)	(0.023)	(0.032)	(0.023)	(0.032)	(0.023)
Observations	7,582	15,455	7,582	15,455	7,582	15,455
Adj. R^2	0.512	0.436	0.513	0.439	0.512	0.437
Rebalancings	144	237	629	1,189	62	117
Dynamic trade-off hypothesis: $y_1 < 0$ and $y_1 + y_2 > 0$						
$y_1 + y_2$	-0.393	-0.177	-1.339***	-0.789***	-0.705**	-0.318
Wald test (y_1+y_2 = 0)	0.222	0.359	0.000	0.000	0.023	0.207

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2. Leverage–profitability regressions with debt-financed rebalancing events.

5.3 Robustness Test: Additional restrictions

To increase the reliability of our findings, we conduct robustness tests in Table 3 and Table 4 based on debt-financed rebalancing events a_t restrictions with $s = 5\%$. In the first robustness test, we exclude any same-period cash balance drawdowns from our sample of capital structure rebalancing events: $a_t = 0$ if $\Delta C_t < 0$. We can see that the sum of y_1 and y_2 remains almost negative regardless of which sample excepts for in Column (2). The findings of the first robustness test reject the dynamic trade-off hypothesis when $T = 20$ as the sum of $y_1 + y_2$ is negative but insignificant per the Wald test. When $T = 4$ in Column (2), the findings show that $y_1 + y_2$ is positive but statistically insignificant as per our Wald test statistic of 0.854.

In the second robustness test, we zero out rebalancing events in quarters where the lagged profit is negative: $a_t = 0$ if $\Pi_{t-1} < 0$. Eckbo and Kisser (2021) state that, since Π_{t-1} serves as a proxy for future expected profitability, rebalancings of the type predicted by trade-off theory are more likely to occur in periods when $\Pi_{t-1} > 0$. In the second robustness test shown in Columns (3) and (4), the sum of y_1 and y_2 remains negative and significant as per the Wald test.

For the third robustness test, we will restrict the data panel to rebalancing firms only. From our result in Table 2, only a fraction of the data panel contains quarters with rebalancing events. According to Eckbo and Kisser (2021), non-rebalancing firms may drive the coefficient estimate of y_1 to be too low to be overcome by the estimate of y_2 driven by rebalancing. In Table 4, we report leverage-profitability correlation estimates after restricting the data panel to only rebalancing firms to examine how this issue impacts our main regression findings. Interestingly, compared to Eckbo and Kisser (2021) findings that the coefficient estimate of y_2 is positive, ours increase when $T = 4$, but we find the opposite result when $T = 20$. However, the coefficients sum of $y_1 + y_2$ remains negative in all cases and significant per the Wald-test in most cases (except for when *s = 5%, then the sum is negative but insignificant)*. The dynamic trade-off hypothesis is rejected in multiple cases, even with these additional robustness restrictions.

Additional restriction: exclude if	$\Delta C_t < 0$		$\Pi_{t-1} < 0$	
Contiguous quarters	*T = 20*	*T = 4*	*T = 20*	*T = 4*
T for *Risk*	(1)	(2)	(3)	(4)
Firms' profitability and rebalancing				
Π (y_1)	-0.777***	0.001	-0.771***	0.001
	(0.081)	(0.000)	(0.080)	(0.000)
a x Π (y_2)	0.551	0.037	-0.327	-1.910***
	(0.389)	(0.208)	(0.412)	(0.530)
a	0.036*	0.061***	0.066***	0.129***
	(0.019)	(0.016)	(0.023)	(0.024)
Firm controls				
Risk	0.008***	0.006***	0.008***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
M/B	-0.099***	-0.060***	-0.099***	-0.060***
	(0.006)	(0.003)	(0.006)	(0.003)
Size	-0.006***	0.002**	-0.005***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Tan	0.603***	0.531***	0.603***	0.531***
	(0.009)	(0.007)	(0.009)	(0.007)
y_0	0.434***	0.219***	0.433***	0.221***
	(0.032)	(0.023)	(0.032)	(0.023)
Observations	7,582	15,455	7,582	15,455
R-squared	0.512	0.436	0.512	0.436
Rebalancings	102	165	110	161
Dynamic trade-off hypothesis: $y_1 < 0$ and $y_1 + y_2 > 0$				
$y_1 + y_2$	-0.226	0.038	-1.098***	-1.909***
Wald test ($y_1 + y_2 = 0$)	0.551	0.856	0.007	0.000

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Regressions with restricted samples of debt-financed rebalancings and gross leverage as dependent variable.

Issue size threshold *s*	*s = 5%*		*s = 1.25%*		*s = 7.5%*	
Contiguous quarters	*T = 20*	*T = 4*	*T = 20*	*T = 4*	*T = 20*	*T = 4*
T for *Risk*	(1)	(2)	(3)	(4)	(5)	(6)
Firm profitability and rebalancing						
Π (y_1)	-0.557***	-0.616***	-0.712***	-0.553***	-0.609***	-0.735***
	(0.098)	(0.046)	(0.088)	(0.053)	(0.114)	(0.054)
a x Π (y_2)	0.016	0.337*	-0.665**	-0.316**	-0.184	0.204
	(0.347)	(0.199)	(0.315)	(0.142)	(0.337)	(0.249)
a	0.018	0.038**	0.041***	0.045***	0.058***	0.077***
	(0.017)	(0.015)	(0.010)	(0.007)	(0.020)	(0.024)
Firm controls						
Risk	0.699***	-0.228***	-0.482***	-0.200***	1.520***	-0.361***
	(0.205)	(0.086)	(0.130)	(0.067)	(0.218)	(0.101)
M/B	-0.089***	-0.058***	-0.097***	-0.068***	-0.107***	-0.059***
	(0.006)	(0.004)	(0.006)	(0.003)	(0.007)	(0.005)
Size	0.012***	0.006***	-0.009***	0.004***	0.026***	0.010***
	(0.003)	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)
Tan	0.654***	0.596***	0.582***	0.521***	0.710***	0.601***
	(0.015)	(0.011)	(0.010)	(0.007)	(0.018)	(0.013)
y_0	0.004	0.139***	0.542***	0.203***	-0.312***	0.077*
	(0.064)	(0.034)	(0.042)	(0.025)	(0.075)	(0.041)
Observations	3,695	6,603	7,029	13,677	2,785	4,841
Adj. R^2	0.541	0.509	0.501	0.441	0.549	0.504
Rebalancings	144	237	629	1,189	62	117
Dynamic trade-off hypothesis: $y_1 < 0$ and $y_1 + y_2 > 0$						
$y_1 + y_2$	-0.541	-0.279	-1.337***	-0.869***	-0.793**	-0.531**
Wald test (y_1+y_2 = 0)	0.106	0.154	0.000	0.000	0.013	0.031

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Regressions with debt-financed rebalancings: rebalancing firms only

5.4 Net Leverage as Dependent Variable

As discussed earlier in this section, we present the main regression analysis based on gross leverage as the dependent variable. In the current empirical literature on the unconditional leverage–profitability correlation, gross leverage is commonly used (Frank & Goyal, 2009; Rajan & Zingales, 1995; Titman & Wessels, 1988). However, in this subsection, we present a regression analysis based on net leverage L^N as the dependent variable. Similar to Eckbo and Kisser (2021), it will be interesting to examine whether L^N as the dependent variable will affect the regression results.

Table 5 shows a regression analysis of Equation 5 with L^N as the dependent variable. The regression results shows a negative coefficient sum $y_1 + y_2$, however, it is somewhat positive in Column (2) and (6). The correlation is positive though insignificant in Column (2) and (6), despite the negative correlation in the other columns. Similar to Table 2, $y_1 + y_2$ is only statistically significant in Columns (3) to (5). This differs slightly from Eckbo and Kisser (2021), who find that net leverage-profitability correlations are strongly negatively correlated and highly statistically significant with rebalancings financed by debt.

Issue size threshold *s*	*s = 5%*		*s = 1.25%*		*s = 7.5%*	
Contiguous quarters	*T = 20*	*T = 4*	*T = 20*	*T = 4*	*T = 20*	*T = 4*
T for *Risk*	(1)	(2)	(3)	(4)	(5)	(6)
Firm profitability and rebalancing						
Π (y_1)	-0.674***	0.001	-0.625***	0.001	-0.662***	0.001
	(0.129)	(0.001)	(0.133)	(0.001)	(0.128)	(0.001)
a x Π (y_2)	0.322	0.203	-0.484	-0.529***	-0.103	0.095
	(0.393)	(0.259)	(0.368)	(0.197)	(0.363)	(0.345)
a	0.058***	0.102***	0.065***	0.109***	0.110***	0.167***
	(0.019)	(0.020)	(0.012)	(0.016)	(0.022)	(0.029)
Firm controls						
Risk	0.011***	0.008***	0.011***	0.008***	0.011***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
M/B	-0.081***	-0.040***	-0.081***	-0.040***	-0.081***	-0.040***
	(0.005)	(0.010)	(0.005)	(0.010)	(0.005)	(0.010)
Size	0.007***	-0.010	0.006***	-0.010	0.007***	-0.010
	(0.002)	(0.007)	(0.002)	(0.007)	(0.002)	(0.007)
Tan	0.706***	0.732***	0.705***	0.730***	0.706***	0.732***
	(0.013)	(0.058)	(0.013)	(0.058)	(0.013)	(0.058)
y_0	0.037	0.273*	0.041	0.275*	0.034	0.270*
	(0.044)	(0.145)	(0.044)	(0.146)	(0.044)	(0.145)
Observations	7,582	15,455	7,582	15,455	7,582	15,455
Adj. R^2	0.404	0.014	0.406	0.014	0.405	0.014
Rebalancings	144	237	629	1,189	62	117
Dynamic trade-off hypothesis: $y_1 < 0$ and $y_1 + y_2 > 0$						
$y_1 + y_2$	-0.352	0.204	-1.109***	-0.528***	-0.765**	0.096
Wald test ($y_1+y_2 = 0$)	0.341	0.430	0.001	0.007	0.024	0.782

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Regressions with net leverage and debt-financed rebalancing events

5.5 Robustness Test: Net Leverage as Dependent Variable

The results of Table 6 further demonstrate that net leverage results remain robust to narrowing the rebalancing event, as in Table 3, to regressions with L^N as a dependent variable. Identical to our result in the robustness test with gross leverage, the sum of y_1 and y_2 remains negative. However for Column (2) when $T = 4$, the coefficient sum is positive but insignificant. Similar to Eckbo and Kisser (2021), we find that whether gross or net leverage is used as a dependent variable in regression with debt-financed rebalancing events, the dynamic trade-off hypothesis is robustly rejected when the recapitalization is financed by a debt issue. In sum, the analysis of net leverage as dependent variable provides no evidence to support that the conditional relation is positive, as it is statistically insignificant in cases where the sum of y_1 and y_2 is positive.

Additional restriction: exclude if	$\Delta C_t < 0$		$\Pi_{t-1} < 0$	
Contiguous quarters	*T = 20*	*T = 4*	*T = 20*	*T = 4*
T for *Risk*	(1)	(2)	(3)	(4)
Firms profitability and rebalancing				
Π (y_1)	-0.777***	0.001	-0.771***	0.001
	(0.081)	(0.000)	(0.080)	(0.000)
a x Π (y_2)	0.551	0.037	-0.327	-1.910***
	(0.389)	(0.208)	(0.412)	(0.530)
a	0.036*	0.061***	0.066***	0.129***
	(0.019)	(0.016)	(0.023)	(0.024)
Firm controls				
Risk	0.008***	0.006***	0.008***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
M/B	-0.099***	-0.060***	-0.099***	-0.060***
	(0.006)	(0.003)	(0.006)	(0.003)
Size	-0.006***	0.002**	-0.005***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Tan	0.603***	0.531***	0.603***	0.531***
	(0.009)	(0.007)	(0.009)	(0.007)
y_0	0.434***	0.219***	0.433***	0.221***
	(0.032)	(0.023)	(0.032)	(0.023)
Observations	7,582	15,455	7,582	15,455
R-squared	0.512	0.436	0.512	0.436
Rebalancings	102	165	110	161
Dynamic trade-off hypothesis: $y_1 < 0$ and $y_1 + y_2 > 0$				
$y_1 + y_2$	-0.226	0.038	-1.098**	-1.909***
Wald test ($y_1 + y_2 = 0$)	0.592	0.169	0.028	0.001

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Regressions with restricted samples of debt-financed rebalancings and net leverage as dependent variable.

6. Analysis of Cash-Financed Rebalancing Events

To conclude, we follow Eckbo and Kisser (2021) and explore the role of cash drawdowns to finance equity retirements. This exercise allows us to tie our analysis also to Danis, Rettl, and Whited (2014).

6.1 The Definitions of Cash-Financed Rebalancing Events

In the Methodology section, we defined the equation for the debt-financed rebalancing event a_t. Further, we follow Eckbo and Kisser (2021) and introduce three different rebalancing events: cash-and-debt financed rebalancings, cash-financed rebalancings, and cash-only rebalancings. There will be a clear distinction between rebalancings financed with cash and rebalancings financed with debt as a result of this clarification. In Danis, Rettl, and Whiteds' (2014) study, the cash-and-debt financed rebalancings dominate their evidence supporting the dynamic trade-off theory. The equation of cash-and-debt-financed rebalancing event is the following:

$$a_t^N = 1 \; if \; \frac{\Delta D_t^e - \Delta C_t}{A_t} > s \; and \; \frac{ER_t^e}{A_t} > s, otherwise \; a_t^N = 0$$

Equation 7. Cash-And-Debt-Financed Rebalancing Requirements

The cash-financed rebalancing and cash-only rebalancings are the subgroups of a_t^N-type events. These subgroups put a greater weight on the cash portion in the total financing of the shareholder distribution. The equation of cash-financed rebalancing events is the following:

$$a_t^{CF} = 1 \; if \; \frac{-\Delta C_t}{A_t} > s \; and \; \frac{ER_t^e}{A_t} > s, otherwise \; a_t^{CF} = 0$$

Equation 8. Cash-Financed Rebalancing Requirements

The equation of cash-only rebalancing events is the following:

$$a_t^{CO} = 1 \; if \; a_t^{CF} = 1 \; and \; \Delta D_t^e \leq 0, otherwise \; a_t^{CO} = 0$$

Equation 9. Cash-Only Rebalancing Requirements

Almost identical to Equation 5, we define the regression model for the cash-financed rebalancing events. An event indicator a_t^* is used in the regression model and varies between the three rebalancing events introduced above: cash-and-debt-financed a_t^N, cash-financed a_t^{CF}, and cash-only a_t^{CO}. The regression model is then the following:

$$L_t^N = y_0 + y_1 \Pi_{t-1} + y_2 \Pi_{t-1} a_t^* + y_3 a_t^* + \beta X_{t-1} + \epsilon_t$$

Equation 10. Net Leverage Including Cash-Financed Rebalancing Events

6.2 Cash-and-debt-financed Rebalancing Events

On the basis of Equation 7 and Equation 10, we perform an empirical regression of net leverage and profitability with cash-and-debt-financed rebalancing events. In Table 7, the regression include the correlation results for three different rebalancing events using $s = 5\%$. Column (1) and (2) produce the same conclusion as Danis, Rettl, and Whited (2014), where the correlation between leverage and profitability is positive using cash-and-debt financed rebalancing events a_t^N and net leverage L^N as the dependent variable. When adding cash-financing of the shareholder distribution, it increase the number of rebalancing events. Similar to Table 2, most of the coefficient estimates are similar except for y_2 and *Size*.

In contrast to debt-only-financed rebalancing events a_t, the coefficent estimates of *Size* are opposite when cash-and-debt-financed rebalancing events a_t^N are used. As a result, *Size* has a positive impact on net leverage when the regression restricts for at least 20 consecutive quarters. However, *Size* has a negative impact on net leverage when it restricts for at least four contiguous quarters. The introduction of cash draw-downs changes correlation estimates somewhat. For example, the coefficient sum of y_1 and y_2 is now positive across all six columns. However, different to Danis, Rettl, and Whited (2014) and Eckbo and Kisser (2021), none of the coefficient sums is statistically different from zero.

Event indicator	a^N		a^{CF}		a^{CO}	
Contiguous quarters	*T = 20*	*T = 4*	*T = 20*	*T = 4*	*T = 20*	*T = 4*
T for *Risk*	(1)	(2)	(3)	(4)	(5)	(6)
Firm profitability and rebalancing						
Π (y_1)	-0.794***	0.001***	-0.814***	0.001***	-0.804***	0.001***
	(0.122)	(0.000)	(0.128)	(0.000)	(0.126)	(0.000)
a x Π (y_2)	1.431**	-1.200	0.934	-1.246	0.929	-1.297
	(0.620)	(1.414)	(0.594)	(1.337)	(0.633)	(1.405)
a	0.005	0.073	-0.041*	0.043	-0.045*	0.076
	(0.018)	(0.083)	(0.021)	(0.097)	(0.024)	(0.137)
Firm controls						
Risk	0.011***	0.009***	0.011***	0.009***	0.011***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
M/B	-0.080***	-0.045***	-0.078***	-0.045***	-0.078***	-0.046***
	(0.005)	(0.011)	(0.005)	(0.011)	(0.005)	(0.011)
Size	0.006***	-0.007	0.006***	-0.007	0.006***	-0.007
	(0.002)	(0.005)	(0.002)	(0.005)	(0.002)	(0.005)
Tan	0.707***	0.740***	0.706***	0.740***	0.706***	0.741***
	(0.013)	(0.055)	(0.013)	(0.054)	(0.013)	(0.054)
y_0	0.053	0.198**	0.058	0.206**	0.055	0.206**
	(0.044)	(0.099)	(0.044)	(0.096)	(0.044)	(0.097)
Observations	7,582	15,455	7,582	15,455	7,582	15,455
Adj. R^2	0.406	0.015	0.406	0.015	0.406	0.015
Rebalancings	332	918	243	797	174	602
Dynamic trade-off hypothesis: $y_1 < 0$ and $y_1 + y_2 > 0$						
$y_1 + y_2$	0.637	-1.199	0.120	-1.245	0.125	-1.296
Wald test ($y_1+y_2 = 0$)	0.294	0.394	0.832	0.352	0.841	0.357

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Regressions with net leverage and cash-and-debt-financed rebalancing events

6.3 Cash-only-financed Rebalancing Events

Similar to Eckbo and Kisser (2021), we decompose the cash-and-debt-financed rebalancing event in order to illuminate the role of the cash-financed rebalancing events. In Equation 8 and Equation 9, we show that the subgroups (a^{CF} and a^{CO}) focus more on the cash portion in the total financing of the shareholder distribution. The empirical results of the cash-financed and cash-only rebalancing events are shown in Columns (3) to (6) of Table 7. In Column (3) and (4), the number of rebalancings is reduced due to the restriction ($\frac{-\Delta C_t}{A_t} > 5\ \%\ and\ \frac{ER_t^e}{A_t} > 5\ \%$), to focus solely on the cash portion in the total financing of the shareholder distribution. However, in Column (5) and (6), where we further restrict the rebalancings by elminitating events where firm issue any long term debt ($in\ addition\ to\ the\ restrictions\ of\ a^{CF}: \Delta D_t^e \leq 0$), further reinforce our results.

In Table 8, we compare our findings when using cash-financed and debt-financed rebalancing events with net leverage as the dependent variable. Following Danis, Rettl, and Whited (2014), we will primarily compare our empirical result when $T = 20$ and an issue threshold of 5%. Similar to the empirical results for a^N, we achieve only positive $y_1 + y_2$ for a^{CF} and a^{CO} when $T = 20$ contiguous quarters is used to estimate *Risk*. Eckbo and Kisser (2021) states that y_2 should increase to explain the role of cash-financed rebalancing events. The cash-financed rebalancing events changes the correlation estimates somewhat, but y_2 does not increase as the regression restricts the rebalancing events. Different to Danis, Rettl, and Whited (2014) and Eckbo and Kisser (2021), none of $y_1 + y_2$ is statistically different from zero in Table 8.

Importantly, Eckbo and Kisser (2021) note that while the event indicator a_t follows from the trade-off theory, for this situation, the inclusion of cash balances in a^N does not. For this situation, the nature of cash-financed events does not necessarily support the dynamic trade-off theory, even if there is a positive correlation. Eckbo and Kisser (2021) find that firms maintaining a cash balance produce from time to time cash distributions to shareholders to restore a target cash holding rather than a target leverage ratio.

Event identicator	a_t	a^N	a^{CF}	a^{CO}
Contiguous quarters	*T = 20*	*T = 20*	*T = 20*	*T = 20*
T for *Risk*	(1)	(2)	(3)	(4)
Firms profitability and rebalancing				
Π (y_1)	-0.674***	-0.794***	-0.814***	-0.804***
	(0.129)	(0.122)	(0.128)	(0.126)
a x Π (y_2)	0.322	1.431**	0.934	0.929
	(0.393)	(0.620)	(0.594)	(0.633)
a	0.058***	0.005	-0.041*	-0.045*
	(0.019)	(0.018)	(0.021)	(0.024)
Firm controls				
Risk	0.011***	0.011***	0.011***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)
M/B	-0.081***	-0.080***	-0.078***	-0.078***
	(0.005)	(0.005)	(0.005)	(0.005)
Size	0.007***	0.006***	0.006***	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)
Tan	0.706***	0.707***	0.706***	0.706***
	(0.013)	(0.013)	(0.013)	(0.013)
y_0	0.037	0.053	0.058	0.055
	(0.044)	(0.044)	(0.044)	(0.044)
Observations	7,582	7,582	7,582	7,582
R-squared	0.404	0.406	0.406	0.406
Rebalancings	144	332	243	174
Dynamic trade-off hypothesis: $y_1 < 0$ and $y_1 + y_2 > 0$				
$y_1 + y_2$	-0.352	0.637	0.120	0.125
Wald test ($y_1 + y_2 = 0$)	0.341	0.294	0.832	0.841

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Regression with net leverage and the four different rebalancing events used..

7. Conclusion

In this section, we will conclude our thesis by summarizing the main empirical findings. We will also identify the limitations of our thesis and make suggestions for future research. The objective of this thesis is to determine the relationship between leverage and profitability in the Norwegian market when debt is issued, and proceeds are distributed to shareholders. To answer our research question, we replicate the methodology of Eckbo and Kisser (2021). It has been found that the dynamic trade-off theory is not supported by the data, and we often refer to one of these empirical inconsistencies as *The Leverage-Profitability Puzzle*. When firms undertake large capital structure rebalancings financed by debt issues, the theory predicts a positive correlation between leverage and profitability. Our main finding contradicts the theory, finding that the leverage-profitability correlation is negative among Norwegian firms when they undertake debt-financed capital structure rebalancings. The results are robust to variations in the size threshold used to define rebalancing events, as well as the definitions of leverage and profitability.

Our analysis also revealed a negative correlation between leverage and profitability in the majority of cases when the dependent variable was switched from gross leverage to net leverage. Regardless of the type of leverage used, Eckbo and Kisser (2021) find that leverage-profitability correlations are negatively correlated with debt-financed rebalancings. In spite of finding negative correlations between net leverage and profitability, our coefficient estimates are statistically insignificant. Aside from the debt-only-financed rebalancings, we also highlight the important difference between cash-financed and debt-financed rebalancings. As we included restrictions on cash-financed rebalancing events in our regressions, leverage and profitability were positively correlated. However, different to Eckbo and Kisser (2021) and Danis, Rettl, and Whited (2014), our coefficient estimates are statistically insignificant. The findings of this thesis are interesting and should be further investigated in order to facilitate a greater understanding of the Norwegian market.

Appendix

Appendix A

Symbol	Variable name	Variable explanation
Balance Sheet and Income statement variables		
Π	Profitability	EBITDA
D	Total Debt	
MC	Market capitalization	
MV	Market Value of Firm	Total Debt + Market Capitalization
C	Cash & Cash Equivalents	Cash & Cash Equivalents
A	Total assets	
L	Market Leverage	Total Debt/Market Value of Firm
L^N	Net Market Leverage	(Total Debt - Cash Holdings)/(Market Value of Firm - Cash Holdings)
BL	Book Leverage	Total Debt/Total Assets
	Long Term Debt	
ΔD^e	Change Long Term Debt	Long Term Debt - lag(Long Term Debt)
CR	Cash Ratio	Cash & Cash Equivalents/Total Assets
ΔC	Standard deviation of Profitability (Risk)	Standard deviation of Profitability (over at least T periods)
Size	Firm Size	Log(Total Assets)
M/B	Tobin's Q	Market Value of Firm/Total Assets
	Property/Plant/Equipment	
Tan	Tangibility	(Property/Plant/Equipment)/Total Assets
	Total Equity	
	Retained earnings	

Appendix B

Symbol	Variable name	Variable explanation
	Cash Flow Statements Variables	
	Change in Common & preferred stock	Total Equity - Retained earnings
ER^e	Equity issue minus equity distributions	Change in common & preferred stock - Cash dividends

Appendix C

Symbol	Variable name	Variable explanation
	Rebalancing definitions (dummy variables)	
a_t	at Debt-financed rebalancing (ignores ΔC)	$= 1\ if\ \frac{\Delta D_t^e}{A_t} > s\ and\ \frac{ER_t^e}{A_t} > s, otherwise\ a = 0$
a_t'	Debt-only financed rebalancing (no cash draw-down)	$= 1\ if\ a_t = 1\ and\ \Delta C_t \geq s\ (= 0\ otherwise)$
a_t^N	Mixed cash-and-debt-financed rebalancing	$= 1\ if\ \frac{\Delta D_t^e - \Delta C_t}{A_t} > s\ and\ \frac{ER_t^e}{A_t} > s\ (= 0\ otherwise)$
a_t^c	Cash-financed rebalancing (ignores ΔD^e)	$= 1\ if\ \frac{-\Delta C_t}{A_t} > s\ and\ \frac{ER_t^e}{A_t} > s\ (= 0\ otherwise)$
$a_t^{c'}$	Cash-only financed rebalancing (no net debt issue)	$= 1\ if\ a_t^c = 1\ and\ \Delta D_t^e \leq 0\ (= 0\ otherwise)$

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