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Post-Delisting Performance of Voluntary Privatized Companies

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Post-Delisting Performance of Voluntary Privatized Companies

– An Empirical Analysis of the Norwegian Market –

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Abstract

We analyze active owners' ability to realize incentives that motivate voluntary delisting of firms. Reduced agency and regulatory costs and an increased tax shield are primary motivational factors that should improve a firm's post-delisting performance. The transparency within the Norwegian market allowed us to analyze historic time trends for firms from their public to private state. We explore and test the treatment effects on the treated using an inverse probability of treatment weighted model. Our sample showed significant financial improvement after going private. ROCE, ROA, and ROE all increase as firms concentrated their ownership. Therefore, we believe that there is substantial support for delisting a firm if it cannot capture the benefits of being publicly traded.

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1.0.0 Introduction

In 2020, the number of listed firms reached new records with 56 new entries, resulting in 285 publicly listed companies in Norway (KPMG, 2021). Firms that go public often seek to raise capital to pursue growth opportunities. However, not all companies experience the same advantages in terms of capital availability or investor recognition. These firms might not have the same growth opportunities as their more visible peers. As a result, firms experience reduced incentives to stay listed. Being part of a stock exchange also leads to direct and indirect costs. Demanding reporting requirements, potentially poor interest alignment, and speculative shareholders are some of them. Therefore, it might be desirable to act inversely to the remaining market and delist the outstanding shares. We think that delisting can support active owners' long-term objectives. It is expected to be a viable option because it can facilitate decreased costs, less noise from external stakeholders, more streamlined decision-making processes, and mitigated agency costs. As a result, delisting of a firm could support operational improvements, thereby extend the business life cycle.

An example of such a delisting occurred when Nordic Capital and Öhman Group acquired Nordnet and subsequently delisted the firm. Nordnet is a "pan-Nordic digital platform for savings and investments" (Nordnet, n.d.). After delisting in 2017, the firm went through a significant strategic turnaround to create a user-friendly and low-cost platform for all investors (Tidestad, 2020). The operational change, supplemented with additional investments, led to an increase in equity value from 6,6 billion SEK to 24 billion SEK (Haugen & Nilsen, 2020). Increased ownership concentration allowed for the operational turnaround, which only took three years. We believe it would be challenging to go through the same transformation while being public. It is expected that lower ownership concentration, a more short-term mindset, and declining profitability (Nordnet, 2017) are key drivers that led Nordic Capital and Öhman Group to take Nordnet private.

As a result, we seek to explore incentives that motivate active owners to delist a firm and their ability to meet these expectations. The analysis will explore time trends of

public to private transactions (PTPs). We believe that Nordnet is a unique case with an abnormal increase in value creation. However, most active owners could be incentivized by more productive operations and improved resource allocation, which would enhance the firm's performance and value. It results in the following research question:

"Are active owners able to realize expected financial improvements that incentivize public to private transactions?"

The thesis is aimed at investors in Norway that can potentially initiate a public to private transaction. These active owners range from private equity funds to top management and industrial players. Investors are expected to consider acquisitions of publicly traded companies, such as the example with Nordnet. Therefore, it might be necessary to delist the company to transform the firm during the holding period. The analysis will attempt to map the main incentives for an acquirer to delist a target firm. Further, the incentives will be tested to confirm or reject the relevance of the proposed incentives. Our objective is to facilitate improved decision-making when delisting is a viable option.

Current literature on PTPs mainly explores incentives and characteristic differences that lead to voluntary privatizations. Low market value, concentrated ownership, modest analyst coverage, and high free cash flows are shared features. (Bharath & Dittmar, 2010) (Fidanza, Morresi, & Pezzi, 2018) (Lehn & Poulsen, 1989) The decision to delist is based on a trade-off between the benefits of staying listed and the perceived incentives to go private. Therefore, if owners believe that the equity is undervalued or they struggle to raise outside capital, the probability of delisting increases further. (Mehran & Peristiani, 2009) The main delisting incentives are reducing the agency and regulatory costs while profiting from an enlarged tax shield. (Marosi & Massoud, 2007) (Lehn & Poulsen, 1989) (Kaplan, 1989)

Most current research is based on pre-delisting data or theoretical expectations. It is a consequence of minimal data on firms after they go private. However, we believe that we have a unique opportunity to analyze post-delisting effects due to the transparency

in Norway. BRREG (Brønnøysund Register Centre) and CCGR (Centre for Corporate Governance Research) make the necessary information available to evaluate the post-delisting performance. Using available data, we seek to assess the causal impact of taking the firm private compared to peers that remained listed over the same periods. In addition, key financial measures can be evaluated based on time trends and treatment effects, which allows for an improved understanding of the validity of incentives to take a firm private.

In our analysis, we apply an inverse probability of treatment weighted (IPTW) model. By using the model, we estimate a potential outcome effect of delisting on a pseudo population scale. The model prioritizes improbable delisted targets through an increased weighting to reduce the selection bias. It is done to mitigate the consequences based on asymmetric information from missing data and survivorship biases. We quantify the privatization effect by testing the treatment effects on the treated to explore the time trends for delisted firms. A staggered time-dependent analysis is used to match companies against their peers to create control groups dependent on parallel trends. (Austin & Stuart, 2015) (Abadie, 2005) The model includes year, revenue, assets, and industry for the propensity score matching. It requires the control groups to have a similar development as our delisted sample if the privatized companies remained untreated. In addition, our analysis also encountered substantial outliers, which are treated through winsorization.

Our results show strong support for our hypothesis of increased financial performance after voluntarily delisting. The EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) margin, return on capital employed (ROCE), return on assets (ROA), and return on equity (ROE) all experience significant improvements after undergoing the treatment. It occurs after firms raise more debt and increase the ownership concentrations, which is in line with previous research from Jensen and Meckling (1976). Thus, the results partly support our three sub-hypotheses of reduced agency costs (a), a higher tax shield (b), and declining regulatory expenses (c). The drawback of the model is the inability to differentiate between the impact from each sub-hypothesis.

2.0.0 Literature Review

In the literature review, we seek to explore historical statistics and research related to public to private transactions. The first part explores the foundation of the phenomenon. Information related to historical trends and findings will allow for an improved understanding of the core concept. It is supplemented with information about the underlying factors that lead to privatization and the types of delisting procedures. Further, we explore the motivating incentives. Research on each motivational factor will be included and combined with available documentation on the effect after a delisting occurs.

2.1.0 Historical Development

The world's first stock exchange was established at the beginning of the 17th century in Amsterdam. 1 143 participants acquired shares in the Dutch East India Company. (Petram, 2011) It was the start of stock exchanges operating as today, which allowed firms to go public. The transition to being a publicly traded company gave a firm advantage in terms of capital availability and increased exposure. Over time, new entities entered the stock exchange while others went through a delisting.

In the 1980s, an increase in going-private transactions transpired. It was mainly driven by an increased number of leveraged buyouts (LBOs), which resulted in a takeover wave. The public to private transactions reached a maximum of almost 3% of the stock exchange's market value. In comparison, less than 0,2% of the exchange's volume went private in 1979. (Holmstrom & Kaplan, 2001) It was a result of financial institutions seeing more significant potential in the active ownership than being listed. KKR, led by Henry Kravis and George Roberts, initiated the new LBO wave when they acquired the publicly listed company, Houdaille Industries Inc., in 1979. (Karson, Kaufman, & Zacharias, 1995). The LBO model allowed them to take on substantial debt due to the high and stable profitability. With the capital advantage from the tax shield, KKR increased the firm's equity value. The trend continued until its peak in 1988 when KKR acquired RJR Nabisco. The transactions included debt obligations,

which required RJR Nabisco to grow its cash flows by 18% annually. (Michel & Shaked, 1991)

After a temporary increase in the number of listed firms, a long-lasting delisting trend has occurred in the United States. The number of publicly listed companies has decreased by 50% from 1996 until 2018. It results from bankruptcies, public to private merger and acquisition (M&A) transactions, and a reduced number of initial public offerings (IPOs). (Govindarajan, Rajgopal, & Srivas, 2018) In addition, PTPs continue to be affected by LBO models, as strategic and financial acquirers see a superior potential of targets if firms are privatized.

2.2.0 Delisting Types

PTPs could then be separated into two main groups, regulatory and voluntary privatization. A regulatory or forced delisting occurred when a firm cannot stay listed due to legal or economic considerations. Out of the 9 000 delisted firms in the United States since 1995, more than half delisted involuntarily. Macey et al. (2008) also mapped the forced share removals from NYSE and NASDAQ between 1999 and 2004. Their research showed that the main reason for an involuntarily delisting, with 47% of the sample, was because the share price was below the exchanges' minimum requirement. Bankruptcy or liquidation was only the reason for 16% of the delisted firms, which signals strict regulatory requirements by the stock exchanges.

The remaining observations are considered voluntary. They are based on stock exchange changes, voluntary liquidation, mergers by external acquirers, and existing owners' decisions to go private. (Macey, O'Hara, & Pompilio, 2008) The first one is a movement of the listed shares to another stock exchange. It is considered a delisting to the exchange, but the outstanding shares will still be publicly available. The second type is voluntary liquidation. It usually occurs for financially distressed firms where a liquidation creates more value than expected future cash flows (Balcaen, Buyze, Manigart, & Ooghe, 2011). A firm that undergoes any of these organizational changes is not considered part of our scope as the shares are still publicly traded or operations are discontinued.

The third type of delisting is done through M&A transactions by external acquirers. Buyers are then considered either strategic or financial, depending on their main objective for the firm. A financial buyer can be a private equity fund or another financial institution that seeks to maximize capital gains through continued independence of the target's operations. For a strategic acquisition, the buyer often integrates the operations to create synergies, which allows for additional value creation (Harford, Martos-Vila, & Rhodes-Kropf, 2014).

Macey et al. (2008) also described the last type of voluntary delisting, which included buyouts by an internal stakeholder. It is usually an acquisition done by the majority shareholder or existing management through MBOs (management buyouts). The concept of MBO transactions was introduced in the 1970s after a decline in the stock market prices. These targets are often delisted based on undervaluation caused by asymmetric information (Lowenstein, 1985). In addition, the internal stakeholder can have an improved understanding of the trade-off from being listed, thereby incentivizing acquisitions of outstanding shares (Renneboog & Simons, 2005).

With the increasing number of delisted firms, researchers started to explore the incentives and characteristics of firms that decided to go private. Bharath and Dittmar (2010) created a model that could predict a delisting with 83% accuracy based on a company's characteristics. Firms tended to reduce their market-to-book ratio, raise more debt, and lower share turnover compared to the listing year. They also explored characteristic differences between delisted and control groups at the IPO time. The privatized firms more often paid dividends, had less analyst coverage, and a lower market value. (Bharath & Dittmar, 2010)

Further research has mapped the trade-off of being listed. Among the main drivers for firms to stay public is raising new funds with a lower cost of credit. Thus, reducing the cost of capital. (Pagano, Panetta, & Zingales, 1998) The availability of equity is also increased as the stock liquidity rises. (Boot, Gopalan, & Thakor, 2006) It allows the firm to take on new investment opportunities or rebalance the current capital structure. In addition, being listed increases the public's awareness and investor recognition

through increased analyst coverage. Firms that delist voluntarily fail to take advantage of the expected benefits from being listed. (Lasfer & Pour, 2013)

2.3.0 Incentives

2.3.1 Ownership Concentration

As ownership is concentrated, the relative power of each equity holder increases. Therefore, the remaining shareholders experience an increased influence on the management's decision-making, thereby improving the interest alignment. The managers can initially seek to exploit the shareholders to increase their private benefits instead of maximizing the equity value. Active owners often seek to use their influence to facilitate improved financial performance. In addition, one may assume that active owners are professionals who seek to guide firms into more efficient vehicles. An active owner will also have incentives to privatize a firm if they observe inefficiencies in the current ownership structure and have a strategic vision hindered by shareholder oversight.

A significant obstacle for privatization is existing shareholders, the diversity of their involvements, the relation to the company, and the size of their stake. If the existing base of shareholders is immense, it might be challenging to delist the firm as most votes must favor the action. Renneboog et al. (2007) show that ownership concentration and increased concentration imply fewer interest conflicts between shareholders and managers. Achleitner et al. (2013) state that concentrated ownership increases the probability of delisting in the European market.

International literature on the effects of ownership concentration is usually conducted on firms in the United States. However, some researchers focus on continental European markets. A positive relationship between firm performance and insider holdings was predicted by (Jensen & Meckling, 1976). Bøhren and Ødegaard (2001) used a Norwegian sample for part of their analysis in 2001. They concluded that increased insider ownership supported financial improvements up to a limit of 60%. If the ownership structure was further concentrated, firms experienced declining performance.

Demsetz and Villalonga (2001) found no statistically significant relationship between ownership structure and firm performance. Yet, in less generalized cases, they explored that insider ownership could have a positive impact. Gugler (2001) partly reached the same conclusion. He discovered that managerial ownership positively impacted a firm's performance. Further research by Gugler et al. (2008) explored the trade-off between insider ownership's entrenchment effect and wealth effects. Their study found that companies experienced a positive trade-off up until 60% ownership concentration.

The likelihood of delisting is also increased for firms with higher insider ownership. Interest alignment between the management and the shareholders is improved, and it is desirable to protect their controlling stake. (Fidanza, Morresi, & Pezzi, 2018) Additionally, we expect there to be an informational asymmetry between internal shareholders and external investors. The insiders can have an improved understanding of equity value compared to external counterparts. As a result, a perceived undervaluation will incentivize the insiders to delist. (Kim & Lyn, 1991)

2.3.2 Principal and Agent Relationship

Jensen and Meckling (1976) describe the *"agency relationship as a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf".* They further explain how both counterparts are self-maximizers, which is the foundation for the difference between the agent and principals' best interests. Amit and Villalonga (2006) split the agency problem into two. The first issue is a conflict of interests between actors with and without ownership stakes. It usually impacts publicly listed firms. Secondly, the lack of agreement between majority and minority owners could lead to issues, which is more common for private companies.

The agency cost hypothesis is linked to a firm's free cash flow after investments are committed. It states that managers use excess cash to invest in projects with an internal rate of return below the cost of capital. Thus, a higher free cash flow increases the likelihood of privatization (Jensen, 1986) (Lehn & Poulsen, 1989). The excess cash should be distributed to shareholders to avoid increased agency costs. A leveraged

buyout transaction is incentivized to reduce the conflict of interest. (Panetta & Tutino, 2013) Agency costs are essential for high free cash flow firms as agents in such firms may have increased motivations to exploit and waste companies' potential instead of focusing on shareholder value. (Lehn & Poulsen, 1989)

Another essential aspect regarding the privatization of publicly traded firms is related to the management's decision-making. While being listed, firms experience incentives to deliver short-term results to satisfy shareholders. However, long-term investments that potentially deteriorate short-term performance can be neglected. As a result, the European Union Commission has been critical to public firms' reporting frequency. In 2013 they published a directive stating, "to encourage sustainable value creation and long-term oriented investment strategy, it is essential to reduce short-term pressure." (European Parliament, 2013)

The information asymmetry hypothesis focuses on the knowledge gap between the management and the owners. In public firms, it is expected to increase the hurdle rate, which will reduce the likelihood of accepting new projects. It is a result of the owner's ability to share risk with external shareholders. Shah and Thakor (1988) and Bharath and Dittmar (2010) theorized that insiders use private information to conduct privatizations of companies. As a result, insiders can exploit their advantage by acquiring outstanding shares before news are incorporated into the stock prices.

Finally, monitoring is a tool that can reduce agency costs. Demsetz and Lehn (1985) found that principals are incentivized to request information and demand effective operations when their ownership share increases. In addition, they a positive relationship between ownership concentration and the perceived risk of a firm's cash flows. As a result, supervision is expected to improve the interest alignment while bearing some monitoring costs for the owner.

2.3.3 Capital Structure and Tax Shield

A link between ownership structure and capital structure was identified by Brailsford et al. (1999). They showed a clear relationship between concentrated ownership and increased leverage. Brav (2009) demonstrated that private companies rely less on

equity financing than their listed peers and instead opt to use debt financing. He also identified that cash reserves decreased instantly after delisting. Subsequently, literature usually focuses on the tax benefits of increased leverage where the trade-off between raised tax shields and risk of financial distress are balancing factors. Literature suggests that performance measures may be adversely impacted in the short term after going private as the companies realign their focus and take on increased leverage. (Fidanza, Morresi, & Pezzi, 2018)

Guo et al. (2011) explore whether tax shields function as a transfer or otherwise paid expenses from taxpayers to the companies indirectly from the corporation's stakeholders. They suggest that the state effectively subsidizes the operations rather than creating economic value. Moreover, it is noteworthy that in our case, there is a difference between the profits of domestic and international owners, as international owners do not have equal tax obligations in the country as their domestic counterparts.

There is substantial criticism towards the tax shield hypothesis as a core motivation of leveraged buyouts and other public to private transactions. Fidanza et al. (2018) state that "tax deductibility of the interest on the new loans constitutes a major tax shield increasing the pretransition value." The tax benefits of the financing are closely related to the fiscal regime where the transactions take place. Kaplan (1989) showed support for the tax reduction hypothesis for the US market. Fidanza et al. (2018) also argue for the tax benefits, but they believe it only benefits pre-existing shareholders. Thus, excluding new investors from the capital gains. As a result, the incentive to take a company private is reduced if the debt is raised while it is publicly listed.

2.3.4 Regulatory Cost

The cost of increased regulation is also a core reason leading to the privatization of listed companies. An example is the adoption of International Financial Reporting Standards (IFRS) by the European Union (EU) in 2005, under which firms' financial statements must be standardized. As costs are associated with increased regulatory constraints, the incentive to privatize the firm increases. The costs may be viewed as derogatory to the firms' financial performance. Vulcheva (2018) argued that the cost of adhering to IFRS could be as high as 31% and 0,06% (initial and recurring) of a

public firm's yearly turnover. Marosi and Massoud (2007) also argue that indirect and direct regulatory costs are a dominant incentive to initiate a public to private transaction. Thus, showing that an easing of regulatory pressure is a motivating factor. These costs may be closely relatable to the perceived advantages of remaining listed, thereby represent a core motivation for companies that consider delisting.

2.3.5 Market Access and Visibility

The market access hypothesis predicts that listed firms often seek to recapitalize their current capital structure, for example, by raising public equity. (Pagano, Panetta, & Zingales, 1998) However, firms might not be able to get the necessary funds from external investors. They will then lack the main benefit of being publicly traded. As a result, firms that delist often have a higher leverage ratio than other firms in the market. (Leuz, Triantis, & Wang, 2008)

The financial visibility hypothesis states that a decrease in market recognition and analyst coverage can motivate public to private transactions. Firms then struggle to grasp the full benefit of being publicly traded. (Mehran & Peristiani, 2009) Consequently, these firms experience a reduced potential to raise new capital and marketing, which again can influence the firm's revenue growth. In addition, such firms will often see lower stock prices. Therefore, they might also become targets for acquisitions as they may be reasonably priced compared to their peers.

2.4.0 Delisting in Norway

There is currently limited research on the incentives and impacts of privatization on Norwegian firms. Berzins et al. (2008) explored the general differences between public and private firms in Norway. The analysis included 77 000 limited liability firms from 1994 until 2005. Private firms' economic performance was higher in terms of ROA. The magnitude of the difference increased for firms with a small board, CEO (chief executive officer) with voting rights, high payout ratio, and high personal ownership. They conclude that the listing status mattered for a firm's ability to create economic value. In addition, they discovered characteristic differences between the two groups. Most private firms were a lot smaller in terms of revenue, assets, and employees. It led to an increased ownership concentration, which was also present for the large non-

listed firms. Further, the private companies had an increased debt ratio and usually invested less. They expect it to be caused by the reduced availability of public equity. (Berzins, Bøhren, & Rydland, 2008)

In addition, Bienz (2016) explored the impact of leveraged buyouts by a private equity firm on Norwegian companies. It included both private to private and public to private transactions. The research showed little to no change in the leverage ratio after undergoing the treatment. However, the financial performance was improved in the following years. EBITDA, return on total assets, and asset turnover all experienced significant improvements.

2.5.0 Hypothesis

Based on the literature review, we believe that delisted firms should experience substantial improvements in their financial performance after delisting. It results from the expected outcome due to a change in agency costs, tax shield, and regulatory costs. These changes are necessary for the firm to experience a positive trade-off from going private. The incentives cannot be measured, but the consequential effect can be observed through the financial statements. Therefore, the implied developments are separated into three sub hypotheses: agency cost (a), tax shield (b), and regulatory cost (c). Each incentive's expected impact on the fundamental factors and performance measures is displayed in Table I.

– Table I –

Hypothesis Relevance

	Model Variable	(a) Agency Cost	(b) Tax Shield	(c) Regulatory Cost
Fundamental	Herfindahl-Hirschman Index	Pos.	N.A.	N.A.
	Interest-Bearing Debt	Pos.	Pos.	N.A.
Performance	EBITDA Margin	Pos.	N.A.	Pos.
	Asset Turnover	Pos.	N.A.	N.A.
	ROCE	Pos.	N.A.	Pos.
	ROA	Pos.	Neg.	Pos.
	ROE	Pos.	Pos.	Pos.

This table shows how each incentive is expected to impact a firm's financial statements after undergoing a public to private transaction. The changes are separated into fundamental factors and performance measures. Fundamental factors include the Herfindahl-Hirschman Index and interest-bearing debt. Performance measures include EBITDA margin, asset turnover, return on capital employed (ROCE), return on assets (ROA), and return on equity (ROE). The assumptions are based on previous literature. "Pos." and "Neg." indicates a prediction of an increased and decreased development, respectively. "N.A." is used for model variables that are not expected to be impacted by the underlying hypotheses.

The fundamental factors themselves do not lead to improved financial performance. However, a change is expected to facilitate improvements caused by the three incentives. For us to believe that an increased tax shield leads to enhanced shareholder value, firms need to raise their debt level after going private. The same dependency is present for the agency cost hypothesis. Further, we expect enhanced efficiency due to improved interest alignment between the owners and the management. The interest alignment should be caused by higher ownership concentration and more outstanding

debt, as documented by Jensen and Meckling (1976). It is also supported by Bøhren and Ødegaard (2001) for insider ownership up to 60%. Contrarily, the performance measures are the financial ratios that we assume the three sub-hypotheses will positively impact. Asset turnover, EBITDA margin, return on capital employed, return on assets, and return on equity are used as our selected financial ratios. We expect all these variables to improve after a firm undergoes a voluntarily delisting, as presented in Table 1.

Each of the three sub-hypotheses is based on our expectations after considering current research on public to private transactions. The regulatory cost hypothesis (c) should lead to decreased operating costs. (Marosi & Massoud, 2007) Consequently, EBITDA is expected to increase, leading to a higher operating- and net income. It results in a higher EBITDA margin, ROA, ROCE, and ROE if the incentive is valid. The agency cost (a) will have a similar impact as we expect the firm to benefit from improved efficiency (Lehn & Poulsen, 1989). It should lead to decreased costs and improved asset allocation. If sub-hypothesis (a) is plausible, firms should improve all the selected performance measures. The tax shield hypothesis (b) should have the opposite impact due to the higher interest costs. (Kaplan, 1989) It will reduce a firm's net income, which leads to a reduction of ROA. However, with the changed capital structure, ROE is expected to increase. If the three sub-hypotheses are valid, a firm that delists will fulfill our overall hypothesis of improved financial performance after going private.

3.0.0 Data and Sample Construction

3.1.0 Data Description & Sample Construction

The foundation of our analysis is financial data, which is collected from the income statements and balance sheets. CCGR at BI Norwegian Business School has a database containing the necessary data for all Norwegian firms between 2000 and 2018. It includes more than four million unique data points, each representing a specific year and company. In total, the dataset consists of more than 550 000 different entities. With the panel data setup, it is possible to follow time trends and analyze the impact of certain events. CCGR allows for extracting all reported values from the income statements and the balance sheets, including 109 different accounting variables. Each factor is also available based on consolidated accounting.

Further, the accounting database is merged with other information related to the listing status, ownership concentration, and firm characteristics. The listing status is based on Oslo Stock Exchange (OSE), which allows for the time trend evaluations based on the underlying variables. A changed listing status can be considered a treatment to the firm as the company privatizes the outstanding shares. However, a drawback of the dataset is the lack of complete information in 2018. The listing status is, for example, not included. The sum of data points from 2018 is a fraction of other years' data, indicating missing variables for most firms. The observations are filtered out to prevent any false conclusions. It leads to a requirement of the delisting to occur in 2016 or earlier as PTPs in 2017 do not have any post-treatment observations.

A complication is the lack of data on foreign entities listed in Norway. It leads to discrepancies between our dataset and Oslo Stock Exchange's listed entities (Oslo Børs Markedsdata, 2021). Ideally, the financial statements of these entities would be added to the dataset, but the lack of post-delisting data defeats the purpose. Only firms with available data and delisting which happened between 2001 and 2016 will be considered. It reduces the total number of delisted firms from 244 to 232. Some of the delisted firms were acquired by a listed owner. These account for 9% of our PTPs. We

chose to include these companies as they have strong ownership concentration post-delisting.

The characterizing variables allow for extended matching of the control groups, thereby allowing for improved isolation of the treatment effect. Factors such as ownership concentration and industry are essential to support the model and the underlying assumptions for each firm. The industry factor is modified to represent a broader scope as there are minimal matches for each specific industry code. SSB (Statistics Norway) supplies the entire hierarchy, which allows for a reverse modification. The data has been updated with changes in 2002 and 2007. Some adjustments have therefore been made to prevent mismatching across periods. (Lightfoot, 2009) Added classification separates firms into ten groups, ranging from "Mining and quarrying" to "Financial intermediation".

Some firms report their financials in other currencies than NOK (Norwegian krone), most commonly EUR (Euro) or USD (United States dollar). When firms change their reporting currency within the dataset, it leads to deviations to the trend of the underlying performance variables. Therefore, all observations denoted in a foreign currency are converted to NOK based on Norges Bank's average exchange rate per year. (Norges Bank, 2020) It allows us to include the observations in our analysis.

The dependent variables then have some extreme outliers for each factor. These outliers can dominate the mean, especially for ratios. The most considerable impact is present when the denominator approaches zero while the numerator stays relatively high. The EBITDA margin is a variable with such outliers. R&D (research and development) dependent firms can experience a lack of revenue while operating costs remain high. The value of the outlier can be of a high multiple of the remaining values, which skews the mean. Simultaneously, profitability is considered less critical for these firms compared to the remaining organizations. Winsorization of our variables is therefore essential for our analysis, which is further described in section 4.3.0. Logarithmic values are used for the continuous variables as it is required for the IPTW model. All variable adjustments are displayed in Table II.

– Table II –

Variable Adjustments

	Model Variable	Consolidated Preference	Currency Conversion	Winsorization	Logarithmic
Fundamental	Herfindahl-Hirschman Index	Yes	No	2,5% - 97,5%	No
	Interest-Bearing Debt	Yes	Yes	2,5% - 97,5%	Yes
	EBITDA Margin	Yes	No	10,0% - 97,5%	No
Performance	Asset Turnover	Yes	No	2,5% - 97,5%	No
	ROCE	Yes	No	2,5% - 97,5%	No
	ROA	Yes	No	2,5% - 97,5%	No
	ROE	Yes	No	2,5% - 97,5%	No
Matching	Operating Revenue	Yes	Yes	2,5% - 97,5%	Yes
	Assets Value	Yes	Yes	2,5% - 97,5%	Yes

This table shows the adjustments conducted for each of the model variables. The factors are separated into fundamental factors, performance measures, and matching variables. "Consolidated Preference" indicates a desire to use a firm's value from the consolidated financial statements if it exists in the dataset. "Currency conversion" is an adjustment if the reported currency is foreign. The values will then be modified based on the average exchange rate. "Winsorization" describes the upper and lower limit used to winsorize the variables' outliers. "Logarithmic" represents the variables that need to be converted into logarithmic values.

Most observations in the dataset can be considered obsolete as the observations are not related to the transition from a public to a private state. As the treatment is based on listed firms going private, companies that have been listed for at least one period are

the most relevant. It will allow for a treatment group with firms that have been listed and a control group with publicly traded firms. Therefore, all other entities are excluded from the dataset when conducting the empirical methods.

In addition, adjustments to the data are required to categorize the delisted treatments. The owners' justification for going private is collected from varying sources, mainly press releases from Oslo Stock Exchange and Norwegian news articles. It allowed for a separation between voluntary and involuntary privatization. Firms forced to delist due to regulatory constraints such as too low equity value are kept outside our scope. Other firms experience a "false" delisting as their organizational IDs are changed, but the outstanding share in the newly established organizations are still publicly traded. These firms are kept available for the control groups, but any treatment is neglected.

Some of the other observed firms that went through a public to private transaction had their organizational IDs deleted at the time of delisting. As a result, firms lack post-delisting data, which removes the opportunity to evaluate any treatment effects. Thus, these delisted firms are also excluded from the analysis. Other firms have their operations moved to another corporate structure with proportional dimensions. Linking the IDs could make it possible to keep the observation as part of the scope. However, lack of information makes us exclude these data points to avoid any false conclusions.

The remaining PTPs are done through M&A transactions. These can be conducted by the existing majority owner, the management, or an external acquirer. The data availability varied significantly due to the potential integration of financial statements and changed reporting to another country. An analysis of the impact of active ownership after delisting is dependent on available financial data. Therefore, it is set as a requirement to evaluate the treatment effect. Table A.I in the Appendix groups all PTP transactions based on the requirements each year. Any firm that delists due to an M&A transaction while continuing with isolated financial statements will be a part of our scope. The remaining public to private transactions are excluded from the analysis. In total, 109 out of the 232 delisted firms fulfill our requirements.

3.2.0 Descriptive Statistics

After filtering out all firms that have never been listed in Norway, the dataset is reduced to 5 590 observations across 416 different firms. The average number of data points per firm is 13,4 years, while they were listed 8,2 years. During the dataset's duration, the number of listed firms per year varied between 157 in 2003 and 208 in 2007. 109 out of the 232 firms that were delisted are included as part of the thesis's scope. The number of relevant PTPs ranges from 3 to 15 per year. The considerable variation indicates cyclical trends in the market, which is also documented for IPO transactions. (Lowry & Schwert, 2000)

Each delisting is separated into ten industry-based categories. It is displayed in Table A.II in the Appendix. The dominating industries are transport and communication, manufacturing, and real estate, which account for 65% of the relevant firms. On the other hand, construction is the industry with the least number of delisted firms, with only one firm. On average, each sector contains 10,9 treatments, which allows most observations to be matched based on industry.

The dataset is separated into two parts, treated and untreated. The treated observations are based on firms that delisted and are within our scope. Untreated data points include all listed firms, including firms within the scope that are not treated yet. It leads to a distribution of 13% treated and 87% untreated observations. Factors from the balance sheet are based on the average between two years, thereby requiring sequential observations. The distribution of data for each model variable is presented in Table A.III in the Appendix.

Mean comparison of the model variables is conducted to observe the difference between being inside or outside the scope. The mean is based on listed observations only. Thus, representing the characteristics differences between firms that decide to delist compared to firms that choose to stay listed. Data points within the scope have a lower ownership concentration and interest-bearing debt (IBD) while being listed. These firms are also smaller in terms of both asset value and revenue generation. Each profitability and return measure is also lower for the privatized firms while being listed.

Asset turnover is the only factor that is higher compared to the remaining listed firms on OSE.

– Table III –

Mean of Listed

	Model Variable	Outside Scope	Inside Scope	Mean Difference
Fundamental	Herfindahl-Hirschman Index	0,1541	0,1352	-0,0189
	Interest-Bearing Debt	20,7630	19,5809	-1,1821
	EBITDA Margin	0,1020	0,0552	-0,0468
Performance	Asset Turnover	0,5978	0,9174	0,3196
	ROCE	-0,0219	-0,0435	-0,0216
	ROA	-0,0408	-0,0527	-0,0120
	ROE	-0,0055	-0,0894	-0,0839
Matching	Operating Revenue	20,1117	19,7522	-0,3595
	Assets Value	21,4075	20,3061	-1,1014

This table shows the average value for each of the nine model variables. The factors are separated into fundamental factors, performance measures, and matching variables. "Scope" is used to split the data based on each observation's corporate ID. Firms that delist voluntarily and have post-delisting data will have all observations as part of "Inside Scope". The remaining data points are categorized as "Outside Scope". All calculations are conducted after adjusting the model variables according to Table II.

An additional mean comparison is conducted in Table IV. The table compares firms within the scope based on the observations before and after the treatment is undergone. The fundamental variables display an increase in ownership concentrations and a

further reduction in interest-bearing debt. The revenue decreases while the asset value increases. The performance variables seem to converge towards the mean of the listed firms outside the scope. EBITDA margin, ROCE, ROA, and ROE increase after the treatment while asset turnover is reduced. It indicates some financial improvements for the firm after going private. The mean comparison tends to be in line with our expected sub-hypotheses of reduced agency (a) and regulatory costs (c), and increased tax shield (b). It is a result of the positive differences for each performance variable except for asset turnover.

– Table IV –

Mean of Scope

	Model Variable	Before Treatment	After Treatment	Mean Difference
Fundamental	Herfindahl-Hirschman Index	0,1352	0,6213	0,4861
	Interest-Bearing Debt	19,5809	19,6966	0,1157
	EBITDA Margin	0,0552	0,0764	0,0212
Performance	Asset Turnover	0,9174	0,5958	-0,3216
	ROCE	-0,0435	0,0123	0,0559
	ROA	-0,0527	0,0194	0,0721
	ROE	-0,0894	0,0515	0,1409
Matching	Operating Revenue	19,7522	18,9858	-0,7664
	Assets Value	20,3061	20,4710	0,1650

This table shows the average value for each of the nine model variables. The factors are separated into fundamental factors, performance measures, and matching variables. Only observations for organizational IDs within the scope are included. It requires the firm to undergo a voluntary delisting and have post-treatment data in the dataset. “Before Treatment” consists of all observations when firms are still listed. “After Treatment”

includes observations after the delisting occurred, limited to a maximum of five years. All calculations are conducted after adjusting the model variables according to Table II.

4.0.0 Methodology

Our analysis is based on a regression model that identifies statistically significant changes in firms' financial development after a delisting. The dataset has a panel data setup as it combines cross-sectional information on companies and their dynamic developments over time. The shifting corporate environment leads to gaps in the dataset caused by organizational changes, such as bankruptcies and liquidations. Therefore, our panel data is unbalanced as each firm does not have an observation for each period.

4.1.0 Treatment Variables and Matching

We use HHI, IBD, EBITDA margin, asset turnover, ROCE, ROA, and ROE as model variables for our analysis. Each observation is divided into two groups, one pooled control group for listed firms and one treatment group for firms up to five years after going private. Subsequently, the treatment variable takes on a value from one to five based on the number of periods after delisting. Thus, the coefficients in our model may be interpreted as the deviation from its matched peers. To generate time-specific matches, we include year, revenue, assets, and industry as independent variables to match each treated firm with comparable peers. It leads to improved matching as it uses narrower control groups, which increases the underlying propensity score.

Matching is executed on the characteristics of delisted firms in the year before privatization. Treated firms were controlled for group identifiers that differ from the firm's corporate ID. Therefore, no adjustments are made to the higher-level corporate ownership and financial performance of potential group firms. For the interpretation of our results, we utilize a two-tailed t-test at the; one-, five- and ten percent levels to quantify the statistical significance of our findings.

The treatment effect model is based on a parallel trend assumption. It requires the delisted companies to develop alongside the control group before going private (Callaway & Sant'Anna, 2020). To estimate the treatment effect, we must ensure that the untreated control group is independent of the treatment group. In addition, the outcome in the untreated state must be independent of the treatment (Dehejia & Wahba, 2002). Through the separation of firms based on a treatment group and a control group. The time-varying trend will be isolated in the regression. As a result, the actual impact of a delisting can be evaluated.

4.2.0 Treatment effects

It is essential to note the non-randomness of the distribution of the treatment in our sample as voluntary privatizations are non-randomly assigned to the companies in our observational data. It will impact the construction of our model, especially in the choice of treatment effect. Our analysis utilizes the average treatment effect on the treated (ATT) instead of the average treatment effect (ATE). ATE gives the treatment outcome as if the treatment were randomly distributed among the companies in the study. It is represented by the following formula: $ATE: T_{ATE} = E\ (T)\ = E\ [Y\ (1) - Y\ (0)]$.

The average treatment effect on the treated includes firm-specific trends. All treated companies with the treatment effect are set equal to the difference between the expected treatment effect less the expected value if the company is not treated. The relationship is expressed using the following formula: $ATT: T_{ATT} = E\ (T \mid D = 1) = E\ [Y\ (1) \mid D = 1] - E\ [Y\ (0 \mid D = 1)]$. From these equations, we observe that E (Y (0 | D = 1) would be equivalent to E (Y (0 | D = 0) if the treatment selection was randomly assigned. Thus, ATT equal to ATE. The usage of the ATT effect implies that the inverse propensity score matching model does not allow for testing the P0mean, which would have the following hypothesis test: $P0mean: H_0: x_i = 0,\ H_1: x_i \neq 0$.

In observational studies, we do not have randomly distributed treatments in the data. Treatments are instead distributed among companies with specific characteristics as active owners select companies to go private. It may result in confounding where differences arise in characteristics between treated and untreated groups. Therefore, we may utilize methods related to propensity scores and difference-in-differences (DiD)

in a staggered format. It means that treatments are carried out in different periods. In addition, the treated status is retained for each organizational ID's successive data points.

There are three main techniques for DiD estimation in a staggered configuration (i) outcome regressions as proposed by Heckman (1997), (ii) doubly robust methodology (Sant'Anna & Zhao, 2020), and (iii) inverse probability weighting (Abadie, 2005) (Austin & Stuart, 2015). In our analysis, an IPTW model is applied. The inverse probability of treatment weighted model uses weighted propensity scores to create a synthetic control group. The distribution of covariates is independent of treatment assignment. Thus, the model allows us to simulate the extended population of delisted firms as companies with insufficient data have been excluded. The IPTW model estimates expected outcomes as no firms have treated and untreated observations in the same periods.

The weighting adjustment is achieved by estimating a potential outcome mean for the treatment at each period with outcome variable y and treatment variable $t \in (0,1)$. As we utilize observational data, the outcome is defined as $y_1 t_i$ instead of $y_i t_i$ at each subsequent period. The treatment is unobservable beforehand. Therefore, we estimate the inverse probability of treatment for $E(y_1) = \frac{1}{N}\sum_{i=1}^{N} \frac{y_i t_i}{p(x_i)}$ where $p(x_i)$ is $P(t_i = 1)$ and a function of the variables in x_i. (Wooldridge, 2007) The IPTW model increases the weighting when y_1 is observed in the sample, and its predicted probability of being treated is low. It is desirable as treatments are observed in successive periods.

Austin (2012) found that IPTW results in a lower mean squared error than standard propensity score matching. Additionally, the use of propensity score-based models minimizes confounding (conditional-independence). It reduces the effect of variables on dependent and independent variables in the model. Further, research by Kenward and Molenberghs (2007) and Wooldridge (2007) explored how IPTW largely accounts for missing data biases, thereby supporting the robustness of our analysis.

Linear, Logit, and Probit are the three possible estimation techniques available for the treatment model. Smith (1997), Rosenbaum (1986), and Caliendo and Kopeinig (2008) explored issues with the linear model when the response variables are highly skewed as the results are outside the bounds for the probabilities. Instead, we focus on the probit and logit models, which are expected to yield similar results for a binary treatment. (Caliendo & Kopeinig, 2008) Smith (1997) and Rosenbaum (1986) (1996) show that logit models produce greater sensitivity and specificity, which makes it the desirable estimation technique.

The inverse probability of treatment weighted model allows for a choice between robust, clustered robust, bootstrap, and jackknife standard error types. Feldman et al. (2004) suggest that a robust, sandwich-type variance estimator should be used to adjust for estimated weights. One such estimator is clustered standard errors, which are desirable to use as we have a panel data setup. (Abadie, Athey, Imbens, & Wooldridge, 2017) Therefore, the observation for each company is expected to be clustered across time. Rosenbaum (1996) showed that treatment status is independent of measured baseline covariates conditional on the propensity score. As a result, the propensity score has a balancing effect.

4.3.0 Outliers and Data Biases

We then calculate our dependent variables. It leads to considerable deviations between the values. When retained in the data, extreme observations can lead to biased estimates (Adams, Hayunga, Mansi, Reeb, & Verardi, 2019). Therefore, some modifications are necessary to limit the impact caused by outliers. The model variables undergo winsorization to cope with extreme values. It eliminates outliers by rescaling the data points within an upper and lower percentile. Each outlying observation will take on a new value equivalent to the mean of the percentile. 2,5% and 97,5% are the constraints for all variables, except for the EBITDA margin, which uses 10,0% as the lower limit. As we decide the percentiles, the results are partly arbitrary. It is not optimal as the factors are skewed, and data points are adjusted to inexact values.

Adams et al. (2014) ask whether it is justifiable to replace an observed value with another given that the original value is correct yet extreme. Heckman (1979) also states

that the alterations may create a sample selection problem. However, without the adjustments, outliers in our data dominate the mean values and reduce our ability to analyze the remaining changes. Our data may additionally suffer from some survivorship bias as one may expect that successful companies are retained in the sample over time.

5.0.0 Empirical Results

Research has been conducted on incentives and drivers for firms to delist. However, testing the post-delisting impact is not explored to the same extent. Lack of private data has made it difficult to follow trends for firms. However, the transparency in Norway with public data for all limited companies allows for time trend evaluations to assess firms' development after the shares are taken private. It will enable us to test the legitimacy of the incentives as the actual performance after the delisting can be evaluated. The usage of a treatment-effects estimation makes it possible to observe trends across the dataset. Assessment based on inverse probability weighting creates specified control groups and allows for multiple treatment periods. As a result, we can evaluate the impact of the delisting on each dependent variable for the first five years after the privatization.

The underlying hypothesis expects that a voluntarily delisted firm will experience an improvement in its financial performance. Therefore, we focus on whether active owners can realize the financial improvements which incentivize public to private transactions. We seek to test it based on the three sub-hypotheses founded on prior literature. Namely, reduced agency cost (a), increased tax shield (b), and fewer regulatory expenses (c). The incentives will be assessed using multiple variables, each with different hypotheses tests. A two-sided test is used, which ultimately rejects the null hypothesis of no impact from the treatment. The following hypothesis test will be set up for each model variable, represented by *x*. ATT: H_0: $\Delta x_{i,0} = 0,\ H_1$: $\Delta x_{i,0} \neq 0$. A rejection of the null hypothesis results in a statistical significance of a delisting. The model will also generate an underlying mean for each control group. It varies depending on the treatment independent variables as it is generated based on the best match for firms within our scope. The resultant expectation for each outcome variable will be the control mean adjusted for the treatment effect. All treatment effects are tested up to five years after privatization.

5.1.0 Treatment Models

To include independent treatment variables in the model is essential as it improved the matched control groups. The impact caused by differences in firm characteristics is reduced, which allows for isolation of the treatment effects. Three layers of matching are used with an increasing number of variables. The first model (1) only matches the observations by year. It allows for time trend evaluation to consider how firms develop over time and adjust based on time-specific changes across the dataset. As displayed in Table A.IV in the Appendix, there are considerable differences in the variables caused by the yearly trends. The annual means are tested based on the total mean to evaluate if there are significant deviations. A two-sided t-test shows that all variables, except for assets, have years with a mean significantly different from the remaining periods.

In the second model (2), operating revenue and asset value are included as independent treatment factors. These factors are tightly related to several output variables with a high correlation coefficient. Interest-bearing debt and assets are the most similar, with a correlation of 0,93. The model variables' correlation coefficients are displayed in Table A.V. Several other model variables are also highly correlated with operating revenue and total assets. It is necessary to match firms based on the firms' financial factors to isolate the treatment effect.

The third IPTW model (3) includes industry as an independent treatment factor. The model operates similarly to the yearly aspect by matching firms based on the adjusted industry group. It allows for further matching of companies with similar business models. Firms within the same industry are expected to have shared characteristics, for example, related to profitability. The differences are displayed in Table A.VI in the Appendix. All the model variables have industries with deviation from the remaining observations at a 1% significance level. Adjustments for industries will then improve the matched control groups even further.

5.2.0 Fundamental Factors

The first part of the analysis revolves around changes in firms' characteristics. A fundamental change will not influence a firm's performance, but the sub-hypotheses are dependent on some characteristic developments. The agency cost hypothesis (a)

expects an improved interest alignment due to increased ownership concentration and higher debt, while the tax shield hypothesis (b) is based on higher debt only. For these incentives to be valid, changes to the fundamental factors need to be present after going private.

5.2.1 Herfindahl-Hirschman Index

The agency cost hypothesis (a) is an incentive partly based on the consequences of an expected increased ownership concentration, measured using the Herfindahl-Hirschman Index. It is calculated as the sum of the squared ownership ratios of each shareholder. HHI can reach a maximum of 1,00 if only one owner exists, while the minimum limit approaches 0,00 for firms with numerous owners. The IPTW model must prove an increase in HHI for sub-hypothesis (a) to be viable.

– Table V –

Herfindahl-Hirschman Index Treatment Model

Treatment Level	(1)	(2)	(3)
No Treatment	0,1484***	0,1347***	0,1347***
	(0,0079)	(0,0086)	(0,0087)
1 vs 0	0,4592***	0,4504***	0,4503***
	(0,0397)	(0,0428)	(0,0429)
2 vs 0	0,4859***	0,4975***	0,5082***
	(0,041)	(0,0452)	(0,0448)
3 vs 0	0,4753***	0,5042***	0,5087***
	(0,0411)	(0,0438)	(0,044)
4 vs 0	0,4743***	0,4888***	0,4862***
	(0,0446)	(0,0482)	(0,0486)
5 vs 0	0,4825***	0,5036***	0,5085***
	(0,0461)	(0,0492)	(0,0501)

This table shows the results of three inverse probability of treatment weighting models that test for difference-in-differences effects. The model uses the Herfindahl-Hirschman Index, which is calculated as the sum of all squared ownership ratios for a firm, as the outcome variable. Model (1) includes year as the only independent treatment variable. Model (2) incorporates revenue and assets, while model (3) also includes industry. The treatment effect is based on the average treatment effect on the treated, which adjusts for

firm-specific trends. “No Treatment” represents the matched control groups’ average value. “t vs. 0” is the treatment effect compared to the untreated mean. t is the number of years after firms delisted, ranging from one to five. All calculations are conducted after adjusting the model variables according to Table II. Standard errors are in parentheses. ***, **, and * represents coefficients’ significance at a 1%, 5%, and 10% level, respectively.

All three models display an increase in HHI at a 1% significance level. The coefficient ranges from 45,03% to 50,87%. With the untreated control groups having a mean between 13,47% and 14,84%, the expected value for delisted firms is approximately 60%. It is only attainable for a firm with a majority owner with between 70% and 80% of the share value. For a firm to have an HHI of 15% or less, the largest owner can have a 40% ownership stake. It leads to a large discrepancy between the listed and delisted firms. The model proves an increase in HHI, which supports the agency cost hypothesis.

5.2.2 Interest-Bearing Debt

While increased ownership concentration is only fundamental for the agency cost hypothesis, increased debt is also a requirement for sub-hypothesis (b). A higher debt burden is expected to reduce the free cash flow problem while limiting the tax obligations. Thus, it would facilitate additional financial improvements through both incentives. Interest-bearing debt is calculated as the sum of long-term liabilities and short-term liabilities to financial institutions. The values are transformed into logarithmic values to concentrate the distribution and allow the model to estimate the treatment effects.

– Table VI –

Interest-Bearing Debt Treatment Model

Treatment Level	(1)	(2)	(3)
No Treatment	20,5178***	19,6593***	19,6516***
	(0,1442)	(0,201)	(0,199)
1 vs 0	-0,7443***	0,1553*	0,163*
	(0,2283)	(0,0902)	(0,0903)
2 vs 0	-0,7311***	0,2617**	0,2603**
	(0,241)	(0,1069)	(0,1133)
3 vs 0	-0,706***	0,2574**	0,2718**
	(0,2444)	(0,1263)	(0,1273)
4 vs 0	-0,8696***	0,3194**	0,3287**
	(0,2726)	(0,1464)	(0,1549)
5 vs 0	-0,8707***	0,2171	0,2231
	(0,2841)	(0,1493)	(0,1579)

This table shows the results of three inverse probability of treatment weighting models that test for difference-in-differences effects. The model uses the interest-bearing debt, which is calculated as the logarithmic value of outstanding debt to financial institutions, as the outcome variable. Model (1) includes year as the only independent treatment variable. Model (2) incorporates revenue and assets, while model (3) also includes industry. The treatment effect is based on the average treatment effect on the treated, which adjusts for firm-specific trends. "No Treatment" represents the matched control groups' average value. "t vs. 0" is the treatment effect compared to the untreated mean. t is the number of years after firms delisted, ranging from one to five. All calculations are conducted after adjusting the model variables according to Table II. Standard errors are in parentheses. ***, **, and * represents coefficients' significance at a 1%, 5%, and 10% level, respectively.

The model partly confirms the hypothesis of an increase in interest-bearing debt in model (2) and (3). These models are positive at a 5% significance level in each period from two to four years after the delisting occurs. The third model's coefficient is positive during the first year of treatment, but only at a 10% significance level. The upward shift is not significantly different from the control group for the fifth period. As a result, it is possible to conclude that firms experience some increase in the debt level before reverting towards the mean in year five. The standard errors also increase

in the last treatment years. Model (1) has a higher untreated mean. It is mainly a result of the delisted firm being smaller in revenue, which is highly correlated to interest-bearing debt. As a result, the coefficients turn negative in model (1).

5.3.0 Performance Measures

The next part of the analysis can be initiated as the fundamental factors mostly experience the change necessary for each incentive to be valid. It focuses on the core scope of the thesis regarding the actual performance caused by the active ownership after the delisting. A statistically significant change in the performance measures is required for the incentives to be fulfilled. Financial performance will then be tested to evaluate if it is possible to reject the null hypothesis of no change after the treatment. The financial performance is based on the EBITDA margin, asset turnover, return on capital employed, return on assets, and return on equity.

5.3.1 EBITDA Margin

The first financial metric is the EBITDA margin. EBITDA is calculated by adding depreciation and amortization to the operating profit. For the ratio, EBITDA is divided by the operating revenue. It is an essential profitability measure that describes firms' ability to charge fair prices and minimizing costs. Improved interest alignment is expected to cause the firm to decrease expenses associated with the products or services delivered. As a result, the EBITDA margin should increase. A similar change is expected if the indirect and direct regulatory cost decreases based on sub-hypothesis (c).

– Table VII –

EBITDA Margin Treatment Model

Treatment Level	(1)	(2)	(3)
No Treatment	0,0929***	-0,0395	-0,044
	(0,0197)	(0,0373)	(0,0371)
1 vs 0	-0,0821*	0,0474	0,0519
	(0,0494)	(0,0395)	(0,0397)
2 vs 0	-0,0055	0,1243***	0,1243***
	(0,0419)	(0,0465)	(0,0459)
3 vs 0	0,0004	0,1306**	0,1373**
	(0,0495)	(0,0569)	(0,0565)
4 vs 0	0,0418	0,1784***	0,1792***
	(0,0568)	(0,0591)	(0,0604)
5 vs 0	0,0783	0,2201***	0,2199***
	(0,0532)	(0,0609)	(0,0629)

This table shows the results of three inverse probability of treatment weighting models that test for difference-in-differences effects. The model uses the EBITDA Margin as the outcome variable. Model (1) includes year as the only independent treatment variable. Model (2) incorporates revenue and assets, while model (3) also includes industry. The treatment effect is based on the average treatment effect on the treated, which adjusts for firm-specific trends. "No Treatment" represents the matched control groups' average value. "t vs. 0" is the treatment effect compared to the untreated mean. t is the number of years after firms delisted, ranging from one to five. All calculations are conducted after adjusting the model variables according to Table II. Standard errors are in parentheses. ***, **, and * represents coefficients' significance at a 1%, 5%, and 10% level, respectively.

The model is unable to prove any significant improvements during the first year after firms go private. However, model (3) rejects the null hypothesis from year two to year five at a 1% and 5% significance level. The coefficients increase substantially, which indicates an improvement of the EBITDA margin of between 12,43% and 17,92%. The lowered untreated mean causes a significant portion of the effect. The matched control group in model (3) has an EBITDA margin of only -4,40% compared to 9,29% when

only matched by year. As a result, the active ownership and decrease in regulatory cost increase the EBITDA margin, but the impact lags one period.

5.3.2 Asset Turnover

The ability to generate sales based on the underlying assets is an essential operating measure that describes a firm's efficiency. It is calculated as the ratio of operating revenue to the average total assets. A firm experiencing an improved interest alignment is expected to strive towards increased efficiency. Thus, utilize their asset base better. The factor is linked to the agency cost incentive as an improved interest alignment should lead to more effective allocation and utilization of a firm's assets.

– Table VIII –

Asset Turnover Treatment Model

Treatment Level	(1)	(2)	(3)
No Treatment	0,6679***	0,6412***	0,6414***
	(0,0378)	(0,0601)	(0,0605)
1 vs 0	-0,0381	0,055	0,0547
	(0,076)	(0,053)	(0,053)
2 vs 0	-0,1012	-0,0118	-0,0048
	(0,0748)	(0,0502)	(0,0516)
3 vs 0	-0,0561	0,0264	0,0408
	(0,083)	(0,0623)	(0,0666)
4 vs 0	-0,0694	0,0404	0,0463
	(0,0894)	(0,0704)	(0,0746)
5 vs 0	-0,0793	0,0405	0,0534
	(0,0973)	(0,0792)	(0,0848)

This table shows the results of three inverse probability of treatment weighting models that test for difference-in-differences effects. The model uses asset turnover as the outcome variable. Model (1) includes year as the only independent treatment variable. Model (2) incorporates revenue and assets, while model (3) also includes industry. The treatment effect is based on the average treatment effect on the treated, which adjusts for firm-specific trends. "No Treatment" represents the matched control groups' average value. "t vs. 0" is the treatment effect compared to the untreated mean. t is the number of years after the firms delisted, ranging from one to five. All calculations are conducted

after adjusting the model variables according to Table II. Standard errors are in parentheses. ***, **, and * represents coefficients' significance at a 1%, 5%, and 10% level, respectively.

The IPTW models are unable to reject the null hypotheses in all three models across all treatment periods. Most of the standard errors are higher than the coefficients, suggesting a low dependency on the treatment. Simultaneously, the untreated mean is relatively stable at approximately 65%. The models indicate a low to non-existing benefit from including additional matching variables due to the insignificant coefficients. As a result, our analysis finds that firms that delist do not improve the asset turnover as the models cannot reject any null hypotheses.

5.3.3 Return on Capital Employed

Return on capital employed is a measure that describes the firm's ability to generate operating profit based on capital allocated to the operations. It is calculated as the annual operating profit divided by the average assets adjusted for current liabilities. An increase in the metric indicates a more efficient usage of the funds in the firm. It is especially relevant for the owners as they might be incentivized to allocate their capital elsewhere if they cannot generate sufficient return over time.

– Table IX –

Return on Capital Employed Treatment Model

Treatment Level	(1)	(2)	(3)
No Treatment	-0,0252***	-0,0567***	-0,0584***
	(0,008)	(0,0138)	(0,0136)
1 vs 0	0,0128	0,0445**	0,0462**
	(0,0183)	(0,0215)	(0,0211)
2 vs 0	0,039**	0,0708***	0,0735***
	(0,0162)	(0,0203)	(0,0205)
3 vs 0	0,0286	0,0596***	0,0646***
	(0,018)	(0,0228)	(0,0225)
4 vs 0	0,0588***	0,0958***	0,1001***
	(0,0197)	(0,0236)	(0,0233)
5 vs 0	0,0647***	0,1043***	0,1095***
	(0,0192)	(0,0233)	(0,023)

This table shows the results of three inverse probability of treatment weighting models that test for difference-in-differences effects. The model uses the return on capital employed as the outcome variable. Model (1) includes year as the only independent treatment variable. Model (2) incorporates revenue and assets, while model (3) also includes industry. The treatment effect is based on the average treatment effect on the treated, which adjusts for firm-specific trends. "No Treatment" represents the matched control groups' average value. "t vs. 0" is the treatment effect compared to the untreated mean. t is the number of years after the firms delisted, ranging from one to five. All calculations are conducted after adjusting the model variables according to Table II. Standard errors are in parentheses. ***, **, and * represents coefficients' significance at a 1%, 5%, and 10% level, respectively.

All three models show a similar impact. The effect is instantaneous in model (2) and (3), with significant positive coefficients. The coefficients are increasing over time, which indicates continuous improvements after going private. The impact is also positive in mode (1) at a 1% and 5% significance level in the second, fourth and fifth periods. However, the models indicate a low ROCE for the control groups. Model (3) has an untreated mean of -5,84%. It makes it an undesirable investment for the investor. Simultaneously, the coefficient for the first treatment is below the initial average value,

meaning that a delisted firm is expected to have a negative return after one year. The predicted positive ROCE will only be achieved two years after going private.

5.3.4 Return on Assets

Return on assets is a vital variable describing a firm's financial performance. It is calculated as the ratio of net income to the average of total assets. ROA is linked to all three sub-hypotheses. The agency cost incentive expects an increase in efficiency due to the interest alignment of increased ownership concentration. As measured by net income, the return is expected to be improved according to the regulatory cost hypothesis as operating costs decrease. The tax shield incentive should have the opposite effect on ROA as interest increases and net income decreases. As a result, an isolated growth in the tax shield is expected to harm a firm's return on assets.

– Table X –

Return on Assets Treatment Model

Treatment Level	(1)	(2)	(3)
No Treatment	-0,0416***	-0,0993***	-0,0995***
	(0,0107)	(0,0221)	(0,0219)
1 vs 0	0,0402*	0,0939***	0,094***
	(0,0219)	(0,0262)	(0,0261)
2 vs 0	0,0644***	0,123***	0,1246***
	(0,0172)	(0,0269)	(0,0267)
3 vs 0	0,0793***	0,1364***	0,138***
	(0,0193)	(0,0278)	(0,0278)
4 vs 0	0,0691***	0,1338***	0,1344***
	(0,0174)	(0,0248)	(0,0249)
5 vs 0	0,0587**	0,1197***	0,1167***
	(0,0258)	(0,03)	(0,0311)

This table shows the results of three inverse probability of treatment weighting models that test for difference-in-differences effects. The model uses the return on assets as the outcome variable. Model (1) includes year as the only independent treatment variable. Model (2) incorporates revenue and assets, while model (3) also includes industry. The treatment effect is based on the average treatment effect on the treated, which adjusts for firm-specific trends. "No Treatment" represents the matched control groups' average

value. “t vs. 0” is the treatment effect compared to the untreated mean. t is the number of years after the firms delisted, ranging from one to five. All calculations are conducted after adjusting the model variables according to Table II. Standard errors are in parentheses. ***, **, and * represents coefficients’ significance at a 1%, 5%, and 10% level, respectively.

The firms’ ROA after delisting improves drastically after the first year the firm goes private. The impact is most is significant at a 1% level for all treatment periods for model (2) and (3), which removes the impact caused by the firms’ size and industry. The first year’s impact represents an improved ROA of 9,40% from the control group. It increased further to a maximum DiD effect of 13,44%. The control group’s mean decreases substantially in the latter two models. It is partly due to delisted firms’ inability to generate similar revenue streams, which is correlated to ROA. When adjusting for the independent variables, the control group will have a lower ROA than the total population. As a result of the outcomes, one can conclude that the delisted firms increase their ROA substantially after going private, which is also in line with the overall hypotheses of improved financial performance. The increase is not entirely dependent on control groups as model (1) rejects the null hypothesis with a 5% significance level from year two and onwards.

5.3.5 Return on Equity

The return on equity is calculated as the yearly net income divided by the average total equity of each firm. As with ROA, the net income is expected to increase due to the regulatory cost and agency cost incentives. The tax shield hypothesis is expected to decrease the net income, but the equity should also decrease due to the recapitalization. Therefore, the ratio between the variables is expected to increase to improve the firm's financial performance. It would yield a higher return based on the shareholders’ equity.

– Table XI –

Return on Equity Treatment Model

Treatment Level	(1)	(2)	(3)
No Treatment	-0,0212 (0,0141)	-0,0953*** (0,027)	-0,0969*** (0,0269)
1 vs 0	0,0806** (0,0373)	0,1549*** (0,0418)	0,1564*** (0,0418)
2 vs 0	0,0499 (0,0401)	0,1317*** (0,0489)	0,1367*** (0,0482)
3 vs 0	0,1262*** (0,0428)	0,2142*** (0,0495)	0,2187*** (0,0501)
4 vs 0	0,0667* (0,0386)	0,1619*** (0,0424)	0,1615*** (0,0439)
5 vs 0	0,0751 (0,0501)	0,1568*** (0,0544)	0,1591*** (0,0543)

This table shows the results of three inverse probability of treatment weighting models that test for difference-in-differences effects. The model uses the return on equity as the outcome variable. Model (1) includes year as the only independent treatment variable. Model (2) incorporates revenue and assets, while model (3) also includes industry. The treatment effect is based on the average treatment effect on the treated, which adjusts for firm-specific trends. "No Treatment" represents the matched control groups' average value. "t vs. 0" is the treatment effect compared to the untreated mean. t is the number of years after the firms delisted, ranging from one to five. All calculations are conducted after adjusting the model variables according to Table II. Standard errors are in parentheses. ***, **, and * represents coefficients' significance at a 1%, 5%, and 10% level, respectively.

ROE experiences a significant improvement across all treatments in model (2) and (3). Each coefficient is positive at a 1% significance level. A lower mean causes these changes in comparison to model (1). The mean value for the untreated control group changes from -2,12%, which is not significantly different to zero, to -9,69%. The difference displays the low return on equity for the matched firms. Treatment coefficients range from 13,67% to 21,87% in model (3). It indicates a considerable improvement, which results in an expected positive ROE after the treatment. The model supports the three sub-hypotheses.

5.4.0 Discussion

5.4.1 Agency Cost Incentive (a)

The agency cost hypothesis predicts increased financial performance of firms after a delisting. It is founded on the expectation of improved interest alignment between the shareholders and internal stakeholders. The shareholders are assumed to have a more active impact on the firms' operations and development due to a more concentrated ownership structure. An owner's incentive to monitor the management is also increased, which further improves efficiency. For the hypothesis to be valid, it is required that firms experience an increase in ownership concentration after undergoing a delisting. The IPTW models reject the null hypothesis at all significance levels for the variable. In addition, increased debt obligations require the management to operate efficiently to cover interest payments. Interest-bearing debt is tested, and the model rejects the null hypotheses for treatment two to four. As a result, sub-hypothesis (a) has some support based on changes in the firms' characteristics. Thus, allowing for the realization of expected financial improvements.

The incentive should then positively impact the EBITDA margin, asset turnover, ROCE, ROA, and ROE. Asset turnover is the only variable that should only be affected by the agency cost hypothesis and not the other sub-hypotheses. The models are unable to reject the null hypotheses at each treatment level. As a result, companies are unable to improve the utilization of the underlying assets. EBITDA margin, ROCE, ROA, and ROE are the remaining variables impacted by the reduced agency cost. A significant positive change occurs for the EBITDA margin from year two until year five of the treatment. ROCE, ROA, and ROE experience a substantial change at each treatment level. It supports the agency cost hypothesis related to profitability and financial improvements. As a result, it seems like the reduced agency cost results from an increased debt burden rather than interest alignment based on increased monitoring. The increased debt requires the management to prioritize their funds and improve the efficiency of the business model. The required change is supported by the model, which means that agency cost seems to be a valid incentive.

5.4.2 Tax Shield Incentive (b)

The tax shield hypothesis is narrower than the agency cost hypothesis. It expects that a firm recapitalizes by raising new debt. As a result, it leads to increased interest payments, which are tax-deductible. A sub-hypothesis (b) requirement is that the owners raise new debt after delisting or as part of the acquisition. The treatment model proves a particular increase in the treatment periods, two to four, after going private. However, it seems to be a lagged impact as the first year's treatment is only significant at a 10% level. Due to the increased debt burden, firms will get increased interest payments. It is expected to lower net income and total equity. As a result, ROA should decrease, and ROE should increase due to the benefits from the tax shield. The model rejects the null hypothesis for ROE and supports the expected increase. However, ROA also increases after the treatment. It is confirmed based on a 1% significant level, which contradicts the tax shield hypothesis. As a result, we cannot prove sub-hypothesis (b) when evaluating the total treatment effects.

5.4.3 Regulatory Cost Incentive (c)

For the regulatory cost hypothesis, it is expected that the operating cost decrease after a firm goes private. It is a result of fewer regulatory obligations in terms of reporting and external communication. If the reduction is present, it should lead to an improved EBITDA margin. Consequently, it would increase net income, which is expected to strengthen ROCE, ROA, and ROE. The IPTW models show significant changes to the performance measures at every treatment level, except for the first-year impact on the EBITDA margin. An acquirer that delists the target firm is expected to benefit from increased returns and profitability based on the cost reduction. As a result, the regulatory cost hypothesis is supported as an incentive to take a firm private.

5.4.4 Cross-dependency

The three hypotheses are all dependent on changes in several of the model variables. Asset turnover is the only variable where the model was unable to reject any null hypotheses. Changes in interest-bearing debt and EBITDA margin were only partly confirmed as the differences were not significant for all treatment levels. The tests of ROCE, ROA and ROE rejected all the null hypotheses in the third model with matching

based on year, assets, revenue, and industry. Each of the variables' conclusions is summarized in Table XII.

– Table XII –

Hypothesis Confirmation

	Model Variable	(a) Agency Cost	(b) Tax Shield	(c) Regulatory Cost
Fundamental	Herfindahl-Hirschman Index	Confirmed	N.A.	N.A.
Fundamental	Interest-Bearing Debt	Partly Confirmed	Partly Confirmed	N.A.
Fundamental	EBITDA Margin	Partly Confirmed	N.A.	Partly Confirmed
Performance	Asset Turnover	Not Confirmed	N.A.	N.A.
Performance	ROCE	Confirmed	N.A.	Confirmed
Performance	ROA	Confirmed	Unknown	Confirmed
Performance	ROE	Confirmed	Confirmed	Confirmed

This table shows how each incentive impacts a firm's financial statements after undergoing a public to private transaction. The changes are based on seven model variables, which are separated from fundamental factors and performance measures. Each conclusion is based on the IPTW models' ability to reject the null hypotheses and prove a significant change due to the treatment. "Confirmed" requires all treatments to be significant at a 1% or 5% level in model (2) and (3). "Partly Confirmed" only requires one treatment to experience a significant change in the same models. The remaining variables were expected to be changed, but the models could not prove any significant differences are marked "Not Confirmed". "N.A." is used for model variables that were not expected to be impacted by the underlying hypotheses.

An issue with the underlying model is that the cross-sectional relationship between the incentives. Agency cost, increased tax shield, and reduced regulatory cost are all expected to improve ROA. The models support all sub-hypothesis as the factors

experience a significant positive change after a firm decide to go private. However, the issue occurs as the different incentives impact the same variables. It is challenging to distinguish between each sub-hypothesis' treatment effect. When a performance variable experiences a significant increase, it could be caused by the fulfillment of a single incentive or the combination of several sub-hypotheses.

In addition, the tax shield hypothesis is partly contradicting sub-hypothesis (a) and (c). If a firm's interest expenses increase, the net income should decrease. Thus, the firm would experience a decrease in return on assets instead of the increase predicted due to reduced agency and regulatory costs. A decline of ROA is not observed, which in isolation indicates that the tax shield hypothesis should be rejected. However, contrary to return on assets, return on equity should increase if the tax shield is a valid incentive. When comparing the treatment coefficients, ROE increases by more than ROA every year after the firms go private. Thus, the estimated differences indicate support for the tax shield hypothesis.

A similar cross-dependency is present for the EBITDA margin. It should be positively impacted by sub-hypothesis (a) and (c) as regulatory- and agency costs are both expected to reduce a firms' operating costs after going private. The profit ratio coefficients are only significantly positive for treatment two and onwards. It partly confirms the two sub-hypotheses but without distinguishing between each incentive's impact. The expected changes are based on two different aspects. First, reduced regulatory constraints should immediately affect a firm's compliance costs as reporting requirements are removed. Second, the agency cost incentive is based on improved efficiency to handle increased debt obligations. More debt was raised, but not until treatment period two. It matches the change in EBITDA margin, indicating higher dependency on sub-hypothesis (a) than (c).

The main issue is then the fact that the models only measure the total effect on each variable. A proxy for each hypothesis should be used to isolate the impact caused by each incentive. The factors should be included as independent treatment variables in the model. However, the sub-hypotheses are not easily quantifiable. For example, the agency cost is a concept based on consequences due to human behavior. There are no

commonly recognized models that measure the degree of agency cost. Therefore, it is not feasible to isolate the impact and conclude based on each hypothesis using the IPTW model.

6.0.0 Conclusion

Our thesis explores the post-delisting effect after firms have voluntarily delisted from Oslo Stock Exchange. Based on agency costs, regulatory costs, and tax shield developments, we expected firms within the scope to experience an improved efficiency after going private. The inverse probability of treatment weighted model showed an increase in our fundamental variables, including ownership concentration and outstanding debt. In addition, our sample firms improved their financial state significantly after undergoing the treatment. ROCE, ROA, and ROE all shifted upward the following year.

The analysis evaluates PTPs from the Oslo Stock Exchange. We sought to explore how active owners could improve a firm's financial performance after taking it private. Out of the 232 delisted firms in Norway, 109 were voluntarily privatized and had post-treatment data available. It allowed for testing the treatment effect to see how the financial performance changed for companies after going private. The impact up to five years after the delisting was considered.

Based on prior literature, three main incentives were explored and used as sub-hypotheses. The first one expected reduced agency costs. It required an increase in ownership concentration and outstanding debt, which would facilitate financial improvements. (Bøhren & Ødegaard, 2001) The raised debt should lead to more efficient operations as the management is required to cover interest payments. (Lehn & Poulsen, 1989) The ownership concentration would incentivize the owners to closely monitor the firm for the interest alignment to improve (Demsetz & Lehn, 1985). An increase in the tax shield was our second sub-hypothesis that encourages active owners to delist a company. It required a fundamental increase in the outstanding debt burden, but it should reduce the tax payments and increase shareholder value. (Kaplan, 1989) The third incentive expected a reduction in operating costs due to reduce regulatory constraints, primarily through less reporting. (Marosi & Massoud, 2007) A combination of the three sub-hypotheses was expected to improve the financial

performance, which would outweigh the benefits of remaining listed for some companies.

To test the post-delisting performance, an IPTW model was used. It allows for isolation of the treatment to explore the difference-in-differences effect for delisted firms. The model was set up using year, revenue, assets, and industry as independent matching variables. It made it possible to test any changes on each specified outcome variable. Herfindahl-Hirschman Index and interest-bearing debt were used as fundamental factors that described characteristic changes to the privatized firms. It was tested to explore if the sub-hypothesis were feasible incentives. EBITDA margin, asset turnover, ROCE, ROA, and ROE were our performance measures that describe any expected improvements caused by the sub-hypotheses. Combining the outcomes allowed us to understand the owners' ability to improve the overall financial state after delisting a firm.

Tests of the fundamental variables are partly in line with the expectations. The Herfindahl-Hirschman Index is significantly positive at all treatment levels. It leads to a high upward shift of the ownership concentration for firms after going private. The change supports sub-hypothesis (a), which facilitates an improved interest alignment. Sub-hypotheses (a) and (b) are both dependent on increased interest-bearing debt. Our expectation is partly supported as the voluntarily delisted firms experience a significant increase after the first treatment period. It indicates a lagged effect as the recapitalization does not necessarily occur during the first year after the treatment.

For the financial performance, the delisted firms experienced a significant improvement of several key financial measures. The model rejected the null hypotheses of no change for all treatment periods when evaluating ROCE, ROA, and ROE as outcome variables. EBITDA margin had a less distinct impact as the change lagged one period compared to the other variables. The last performance measure, asset turnover, did not change significantly in any direction for our firms after going private. With an improvement of four out of the five performance measures, our overall hypothesis of enhanced financial performance is fulfilled.

All model variables were expected to be impacted by more than one underlying sub-hypothesis, except for asset turnover. Our overall expectation was supported as the IPTW model rejected most null hypotheses. We believe that the agency cost hypothesis (a) is a valid incentive despite the inability to confirm changed asset turnover. The improved interest alignment seems to be a consequence of a higher debt burden instead of ownership concentration as IBD and the EBITDA margin develop similarly. An increased tax shield (b) is also believed to be a legitimate incentive as ROE experiences a substantial upward shift. There is also support for the regulatory cost hypothesis (c), but we cannot establish if the improved performance is caused by sub-hypothesis (a) or (c). The cross-sectional impacts reduce our opportunity to conclude with certainty for all three sub-hypotheses. Future researchers are recommended to create a proxy for each incentive to allow for differentiation between the impacts. Thus, direct active owners to focus on the motivations that drive the financial improvements.

A shared tendency of the IPTW models is the reduced untreated mean when increasing the matching variables. It makes us believe that the delisted firms consistently underperformed compared to publicly traded companies in general. The incentives can then support all firms after going private, but it seems that the most significant improvement is present for firms with the same characteristics. Lower operating revenue and total asset value seem to be the main drivers that reduced the untreated mean of the performance measures. Therefore, we encourage further research to explore if larger firms with higher profitability experience the same type of development after going private.

Finally, we recommend further research to modify the underlying dataset further. Improvements that adjust for linked organizational IDs and changed corporate structures should be prioritized to improve the model's robustness. The linked organizational IDs could be used to represent post-delisting data. Thus, it allows for more PTPs within the scope. The adjustment could also be supplemented with more data from the other Nordic countries to explore the impact across financial markets. By dividing the sample period into parts, it could also be possible to explore time-specific variation, for example, before and after the financial crisis.

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Appendix

A.I Variable Adjustments

– Table A.I –

Variable Adjustments

Year	Within Scope	Outside Scope	Total
2001	4	11	15
2002	5	6	11
2003	9	11	20
2004	3	8	11
2005	5	6	11
2006	15	5	20
2007	9	11	20
2008	10	13	23
2009	7	7	14
2010	9	3	12
2011	4	4	8
2012	8	8	16
2013	2	6	8
2014	6	7	13
2015	9	12	21
2016	4	5	9
Total	109	123	232

This table shows the distribution of the dataset's public to private transactions. Each delisting is grouped based on being within or outside our selected scope. Observations "Within Scope" are required to be delisted voluntarily and contain post-event data. All remaining treatments are considered "Outside Scope". The table distributes the events based on the year they occurred.

A.II Delisting Industry

– Table A.II –

Delisting Industry

Year	Construction	Financial intermediation	Health, social work and support service activities	Manufacturing	Mining and quarrying	Other	Professional, scientific and technical	Real estate, renting and business	Transport, storage and communication	Wholesale and retail trade, repair of motor	Total
2001	0	0	0	1	0	0	0	0	3	0	4
2002	0	0	0	1	0	1	0	2	0	1	5
2003	0	1	0	1	0	1	0	1	5	0	9
2004	0	0	1	0	0	0	0	2	0	0	3
2005	0	3	0	1	0	0	0	1	0	0	5
2006	0	1	1	3	1	0	0	6	0	3	15
2007	0	0	0	1	1	1	0	4	0	2	9
2008	0	0	0	0	4	0	0	5	1	0	10
2009	0	0	0	4	0	0	0	2	1	0	7
2010	0	1	1	3	0	0	1	1	2	0	9
2011	0	0	0	2	0	0	1	0	0	1	4
2012	1	0	2	2	0	1	0	0	2	0	8
2013	0	1	0	0	0	0	1	0	0	0	2
2014	0	0	0	3	0	0	0	0	3	0	6
2015	0	0	2	3	0	0	1	0	2	1	9
2016	0	0	0	1	0	0	0	0	2	1	4
Total	1	7	7	26	6	4	4	24	21	9	109

This table shows the distribution of the dataset's public to private transactions based on the firms' industry. Each treatment is categorized based on Statistics Norway's primary industry classification. The selected events are only observations within the scope, which requires firms to delist voluntarily and have post-delisting data. The table distributes the events based on the year they occurred.

A.III Treatment Distribution

– Table A.III –

Treatment Distribution

	Model Variable	Treated	Not Treated
Foundation	Herfindahl-Hirschman Index	468	2801
	Interest-Bearing Debt	472	2879
Performance Measures	EBITDA Margin	435	3121
	Asset Turnover	470	2813
	ROCE	482	3009
	ROA	472	2857
	ROE	470	2825
Mathcing	Operating Revenue	435	3117
	Assets Value	472	2878

This table shows the distribution between the number of treated and untreated observations. The number of observations is based on the dataset after undergoing the adjustments presented in Table II. Treated observations include firms that have voluntarily delisted during the past five years. Untreated observations include all firms that are listed at Oslo Stock Exchange. The count of observations is based on the available data for each model variable. The factors are separated into fundamental factors, performance measures, and matching variables.

A.IV Yearly Differences

– Table A.IV –

Yearly Differences

	Fundamental			Performance				Matching	
Year	Herfindahl-Hirschman Index	Interest-Bearing Debt	EBITDA Margin	Asset Turnover	ROCE	ROA	ROE	Operating Revenue	Assets Value
2000	0,1183***	-	0,139	-	-	-	-	19,9246	-
2001	0,1195***	20,426	0,1193	0,7566**	-0,0433*	-0,0665*	-0,081**	20,0218	21,0632
2002	0,149***	20,2906	0,0859	0,749**	-0,0305	-0,0798***	-0,1496***	19,8661	20,9321
2003	0,1483***	20,1977	0,0835	0,7203	-0,0008	-0,024	-0,0208	19,6127	20,903
2004	0,1419***	20,1329	0,1403	0,8372***	-0,0048	-0,0028*	0,0477**	19,8643	20,8381*
2005	0,1608***	20,0938**	0,131	0,7741***	0,0097**	0,0413***	0,1188***	19,7475	20,8777
2006	0,1779**	20,2904	0,1125	0,7374**	-0,0009	0,0328***	0,0997***	19,8403	21,08
2007	0,2059	20,3966	0,0867	0,6183	-0,003	0,0041**	0,0774***	19,7946	21,2149
2008	0,2365	20,5151	0,0407*	0,6268	-0,0345	-0,0534	-0,0658**	20,0184	21,2602
2009	0,2402	20,5572	0,0452*	0,5952	-0,021	-0,0354	-0,004	20,0182	21,2198
2010	0,2432	20,4162	0,0441*	0,6051	-0,029	-0,0464	-0,0373	19,8412	21,1532
2011	0,2054	20,4261	0,07	0,6398	-0,0321	-0,0655*	-0,0524	19,8941	21,0761
2012	0,2879***	20,3868	0,0089***	0,5562**	-0,0382	-0,0655**	-0,0752**	19,5466**	21,0328
2013	0,2657**	20,5413	0,0658	0,5752	-0,032	-0,0306	-0,0025	19,7477	21,1427
2014	0,2951***	20,5882	0,0811	0,5676*	-0,0224	-0,0691**	-0,0308	19,7951	21,1457
2015	0,2936***	20,676	0,1298	0,5562**	-0,0239	-0,0467	-0,0478	20,2595*	21,2261
2016	0,2065	20,6007	0,144*	0,5726	-0,0205	-0,0441	0,0259	20,2574*	21,2057
2017	0,3519***	20,6519	0,1689**	0,6142	-0,022	-0,0326	0,0006	20,5678***	21,2513
Mean	0,2174	20,4265	0,0909	0,6489	-0,0206	-0,0341	-0,0108	19,9127	21,1019

This table shows the average value for each of the nine model variables. The factors are separated into fundamental factors, performance measures, and matching variables. All values are calculated as the average value for each year's observations. The yearly observations are tested against the remaining data for the variable using a two-tailed t-test. ***, **, and *, represent the tests' ability to reject the null-hypothesis of no difference at a 1%, 5%, and 10% significance level, respectively. All calculations are conducted after adjusting the model variables according to Table II.

A.V Correlation Coefficients

– Table A.V –

Correlation Coefficients

	Model Variable	Herfindahl-Hirschman Index	Interest-Bearing Debt	EBITDA Margin	Asset Turnover	ROCE	ROA	ROE	Operating Revenue	Assets Value
Fundamental	Herfindahl-Hirschman Index	1.0000								
	Interest-Bearing Debt	0,0666	1.0000							
	EBITDA Margin	0,0719	0,4595	1.0000						
Performance	Asset Turnover	-0,0994	-0,0884	0,1160	1.0000					
	ROCE	0,1035	0,2385	0,4618	0,1567	1.0000				
	ROA	0,0697	0,3378	0,5415	0,2192	0,5788	1.0000			
	ROE	0,0539	0,2427	0,4515	0,2214	0,5775	0,7610	1.0000		
Matching	Operating Revenue	-0,0359	0,7635	0,5510	0,3877	0,2908	0,4015	0,3169	1.0000	
	Assets Value	0,0481	0,9303	0,3636	-0,1645	0,2316	0,3261	0,2523	0,7070	1.0000

This table shows the correlation coefficients between each of the nine model variables. The factors are separated into fundamental factors, performance measures, and matching variables. All calculations are conducted after adjusting the model variables according to Table II.

A.VI Industry Differences

– Table A.VI –

Industry Differences

	Fundamental			Performance				Matching	
Industry	Herfindahl-Hirschman Index	Interest-Bearing Debt	EBITDA Margin	Asset Turnover	ROCE	ROA	ROE	Operating Revenue	Assets Value
Accommodation and food service	0,786***	20,7543	0,1818	1,669***	0,03	0,1382*	0,357**	21,4329*	21,2659
Construction	0,2522	21,7184***	0,046	1,2775***	0,0473***	0,0566***	0,1931***	21,9377***	22,2783***
Electricity, gas and water supply	0,1987	21,2355**	0,0983	0,3088***	-0,0506	-0,0394	-0,0089	20,444	21,9045***
Financial intermediation	0,2405	22,4502***	0,3834***	0,1266***	0,0924***	0,0109***	0,0891***	19,8882	22,8396***
Health, social work and support	0,4006***	19,6974**	0,1879**	0,5794	0,0428***	-0,0268	0,0329	19,127***	20,2185***
Manufacturing	0,2016*	20,5131	0,0293***	0,9699***	-0,0248	-0,0166**	-0,0036	20,8331***	21,1627
Mining and quarrying	0,1533***	20,6136	-0,0603***	0,2992***	-0,0085	-0,0284	-0,0044	19,6253	21,45*
Other	0,2196	20,2817	0,034	0,4488***	-0,0466	-0,1033**	-0,0945*	19,2614**	20,303***
Professional, scientific and	0,2369	18,4391***	-0,1645***	0,4462***	-0,1372***	-0,2237***	-0,2162***	18,0154***	19,4359***
Real estate, renting and business	0,169***	19,3578***	0,036***	0,6739	-0,0655***	-0,0683***	-0,0907***	19,2111***	20,3473***
Transport, storage and	0,2285	20,2938*	0,11	0,581***	-0,0324**	0,0008***	0,014*	19,8405	20,9697**
Wholesale and retail trade, repair	0,2519**	19,963***	-0,0375***	1,3071***	-0,0378	-0,0444	-0,0218	20,5513***	20,6076***
Mean	0,2174	20,4265	0,0909	0,6489	-0,0206	-0,0341	-0,0108	19,9127	21,1019

This table shows the average value for each of the nine model variables. The factors are separated into fundamental factors, performance measures, and matching variables. All values are calculated as the average value for each industry's observations. The yearly observations are tested against the remaining data for the variable using a two-tailed t-test. ***, **, and *, represent the tests' ability to reject the null-hypothesis of no difference at a 1%, 5%, and 10% significance level, respectively. All calculations are conducted after adjusting the model variables according to Table II.