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The effect of IFRS 16 on key financial ratios and financing decisions


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Master Thesis

# The effect of IFRS 16 on key financial ratios and financing decisions

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# Contents

## Abstract

The objective of this paper is to determine the impact of IFRS 16 (the new accounting standard for leases) on both selected financial ratios and on the use of lease financing. The analysis is performed using data disclosed in annual reports for the 66 firms listed on the Oslo Stock Exchange Benchmark Index. The constructive capitalization method is applied to capitalize the operating leases. The capitalization leads to an increase in both assets and liabilities recognized on the balance sheet. The analysis finds that financial ratios are impacted when capitalizing operating leases, most significantly so, Debt/Assets and Debt/Equity. Finally, no significant decreases in lease financing are found from 2015 to 2019.

# 1.0 Introduction

From 1980 to 2007, the use of operating leases increased with 745% (Cornaggia, Franzen & Simin, 2013). The old accounting standard for leases (International Accounting Standards (IAS) 17) allowed firms to hide large amounts of operating leases from their balance sheet with only footnote disclosures signifying the existence of the obligation (Duke, Hsieh & Su, 2009). Followingly, the financial statements fail to provide transparent, consistent, and complete information with regards to lease contracts (Duke et al., 2009). Therefore, a new accounting standard for leases was necessary. The final version of International Financial Reporting Standards (IFRS) 16 was announced in 2016 but did not go into effect before 01. January 2019. For this reason, the annual reports of 2019 are the first annual reports to include the impact of the new standard.

From 1984 until the implementation of IFRS 16, IAS 17 was the accounting standard providing the principles for recognizing lease contracts. The wording of the standard allows for different interpretations in order to structure the lease contract in the most beneficial way for the firm in question. With the implementation of IFRS 16, operating leases will be capitalized on the balance sheet together with finance leases. Consequently, both assets and liabilities will increase, with Right of Use (RoU) asset and lease liability, respectively. At the income statement, IFRS 16 will remove the rental expense associated with operating leases and divide it into depreciation and interest expense.

In this paper, the impact of the new accounting standard is studied through the constructive capitalization method. The method is applied on the 66 companies listed on the Oslo Benchmark Index as of 01. January 2020. By doing so, the picture of what happens with the implementation of IFRS 16 in the Norwegian context will, hopefully, become clear. The two research questions this paper seeks to address is

1. Is there an impact of IFRS 16 on chosen financial ratios?
2. Does the use of lease financing decline from 2015 to 2019?

The research questions will be readdressed more formally in subchapter 4.1. It should also be noted that this is the first year where IFRS 16 has been in effect, giving the topic increased relevancy.

The academic literature has made attempts at capitalizing operating leases in earlier papers. When doing so, the focus is usually on the impact of capitalizing operating leases on financial ratios. Financial ratios are both able to show differences between companies on metrics deemed important by investors and can be used to track management's performance. Researchers have found that there is a significant impact from the capitalization of operating leases on the balance sheet. The implication is that ratios and benchmarks related to ratios may mislead investors after the implementation of IFRS 16 as more debt is included on the balance sheet. Changing ratios may also affect other stakeholders; lenders are highly relevant as it may lead to debt covenants being violated. Management may also face issues, since ratios previously used to track performance change. The ratios included in the analysis reflect these considerations, and the full list of ratios with definitions will be discussed in chapter 5.0. As ratios may be altered due to the implementation of IFRS 16, it is of interest for investors to know if firms change behavior. If firms were to reduce the use of lease financing as a result of IFRS 16, this could suggest that the extensive use was a result of the favorable off-balance sheet treatment.

We were able to prove a significant change in some of the financial ratios studied. The change in ratios implies that investors should adjust their interpretation of these ratios post-IFRS 16. If pre-IFRS 16 benchmarks are used, the analysis performed may end up being suboptimal. Furthermore, a significant reduction in lease intensity could not be proven. The implication would be that firms were not likely to change financing decisions based on how the financing is presented on its balance sheet.

### *1.1 Scope of our research*

We have limited our sample to the Oslo Stock Exchange Benchmark Index (OSEBX). The reason being that we wanted to look into the effect of the implementation of IFRS 16 on Norwegian companies. Since Norwegian listed

companies has to follow IFRS, the choice was between using the entire Oslo Stock Exchange or OSEBX. The OSEBX is an index consisting of the most traded shares listed on the Oslo Stock Exchange, which at 1. December 2019 (the last revision date of the index) consisted of 66 companies. We needed to limit the number of companies chosen because the annual reports for 2019 were not expected to be available until April 2020. These reports were critical for the research and needed to be included. By expanding the sample further (using the entire Oslo Stock Exchange), we ran the risk of not being able to finish on time.

## 2.0 Background on IFRS

The objective of financial reports, hereunder financial statements, is to provide useful information to stakeholders with the intent of making them able to make sound economic decisions (IAS 1.9). As of 1. January 2005, all listed companies on the Oslo Stock Exchange are required to follow IFRS when presenting their consolidated financial statements, cf. section 3-9 of the Norwegian Accounting Act (1998) which refers to Regulation (EC) No 1606/2002 of The European Parliament and of The Council. Followingly, IFRS provides the relevant accounting framework when assessing the accounting treatment of leases for Norwegian listed companies. Until 2001, the International Accounting Standards Committee (IASC) issued the International Accounting Standards (IAS). As a result of a restructuring, the International Accounting Standards Board (IASB) became responsible for developing new accounting standards, which were named International Financial Reporting Standards (IFRS). Hence, all standards issued before 2001 bear the name IAS while subsequent standards are named IFRS.

IAS 17 has been the accounting standard providing the principles for the recognition of lease contracts. The definition of a lease is: "an agreement whereby the lessor conveys to the lessee in return for a payment or series of payments the right to use an asset for an agreed period of time" (IAS 17.4). Furthermore, IAS 17 defines two types of leases; finance and operating lease; "A lease is classified as a finance lease if it transfers substantially all the risks and rewards incident to ownership" (IAS 17.8). If these criteria are not met, the lease is classified as an

operating lease. While finance leases are required to be capitalized, operating leases surpass the balance sheet and are only recognized as an expense with accompanying information provided in the notes of the financial statement. Followingly, whether lease contracts meet the definition of a finance lease or not can have a substantial effect on the balance sheet of companies.

The critique against IAS 17 arises from the separation of finance and operating lease. Since IAS 17 allowed operating leases to be kept off the balance sheet, the financial statements fail to provide transparent, consistent, and complete information with regards to lease contracts (Duke et al., 2009). This is not in accordance with IAS 1, which states that financial statements are supposed to give useful information with the intent of making users able to make economic decisions. Therefore, in 2006 the development of a new accounting standard for the recognition of leases was put at the agenda of IASB. Illustrated by the quote from Sir David Tweedie in 2008, the chairman of the IASB from 2001 to 2011, it became a priority: "one of my great ambitions before I die is to fly in an aircraft that is on an airline's balance sheet" (Deloitte, 2017). In January 2016 the standard was issued but did not go into effect before January 1. 2019.

IFRS 16 aims at giving useful information to its users, namely through presenting lease contracts in a consistent way across firms. The separation of operating and finance lease disappears for lessees with the implementation of IFRS 16. From 1. January 2019, all leases should be capitalized on the balance sheet with an exception for leases of low value (less than $5 000) and where the lease term is less than twelve months. The amount being capitalized is the lease liability and corresponds to the discounted value of lease payments. RoU is the amount recognized on the asset side of the balance sheet, consisting of the discounted value of lease payments plus any initial direct costs. In subsequent periods the liability both accrues interest and is reduced through the payment of lease while the RoU is reduced through depreciation. The impact on the income statement is that the rental expense associated with operating leases is split up into interest expense and depreciation. Overall, the balance sheet is expected to increase following the recognition of lease contracts, while the income statement will be unaffected when considering the total lifetime of the lease contract. However,

there will be a front-load of costs compared to IAS 17, with lower costs later in the lifetime of the lease contract.

## 3.0 Literature Review

The issue with off-balance sheet (OBS) leases is relatively old, Nelson (1963) showed that capitalizing operating leases have an adverse effect on most of the financial ratios examined. Several years later, Imhoff Jr, Lipe & Wright (1991), devised an approach aiming at determining the effect of capitalizing operating leases on the balance sheet. This approach, referred to as constructive capitalization, has been the framework for more or less all subsequent studies studying lease contracts. In the methodology chapter, the approach and necessary assumptions will be discussed. However, one of the assumptions made by Imhoff Jr et al. (1991), namely that the impact of capitalization on net income would be zero, was in a later paper relaxed (Imhoff Jr, Lipe & Wright, 1997). In the 1997 article, the authors criticize their paper from 1991 since ignoring the effect on net income can lead to materially misleading results (Imhoff Jr et al., 1997). The paper from 1991 used a sample of fourteen firms, and one may, therefore, question the representativeness of their results. Nevertheless, their findings suggest that capitalizing operating leases can substantially affect the income statement and associated profitability ratios, but direction and size are uncertain as the sample size is relatively small.

Using the approach of Imhoff Jr et al. (1991, 1997), many studies have further elaborated on the impact of capitalizing operating leases. Most studies found a significant effect on the balance sheet when capitalizing operating leases. Beattie, Edwards & Goodacre (1998) found that the average unreported lease liability represented 39% of reported total debt, while the unrecorded asset was 6% of total assets when considering a sample of 232 listed UK companies for the fiscal year 1994. Fülbier, Silva & Pferdehirt (2008) studied 90 listed German companies in 2003 and 2004, finding support for a significant capitalization effect on assets and liabilities. Duke et al. (2009) used a sample of 366 firms on the S&P 500 Index in 2003. They found that firms avoid reporting 11% of total liabilities and 4% of

total assets when not reporting operating leases on their balance sheet. Cornaggia et al. (2013) studied the US market using a sample period from 1980 to 2007 containing 23 962 firm years. They found an increase of 745% in the use of operating leases as a proportion of total debt over a period from 1980 to 2007, while the size of finance leases fell by half in the same period. Although parts of the approach differ from author to author, the main framework has stayed the same since the development of the approach by Imhoff Jr et al. (1991).

Moving to the impact on measures of risk and performance, capitalizing operating leases are shown to have a significant effect. The size and sign depend on the specific measure. Beattie et al. (1998) found the profit margin (earnings before interest and taxes (EBIT)/Sales) to increase with 12.1%, while interest coverage ratio faced a sharp decline of 25.9% (where EBIT is used as the numerator in their interest coverage calculations and interest expense as the denominator). Fülbier et al. (2008) support the findings of Beattie et al. (1998), although showing a lower impact, i.e., profit margin increasing 6.8% and interest coverage decreasing 17.2% (where EBIT is used in the numerator). Furthermore, Fülbier et al. (2008) found an increase in Debt/Equity (D/E) of 13.5%. Duke et al. (2009) divided the sample into positive and negative income firms. The D/E ratio showed quite similar impact on the two groups, namely an increase of 12.2% for the positive income group and an increase of 13.4% for the negative income group. However, the interest coverage ratio showed a different impact between the two groups, an increase of 1.4% for the positive income group and a decline of 1.2% for the negative income group. Building on the findings of the mentioned studies, similar impact is expected to be seen in the Norwegian context.

Firm size is expected to be of importance. Graham, Lemmon and Schallheim (1998) claimed an inverse relationship between firm size, measured as market capitalization, and the use of leases. This was explained by smaller firms often being less stable than larger firms and can face higher costs when obtaining external financing. Fito, Moya & Orgaz (2013) performed a regression where size was among the independent variables. The ordinary least square regression, which will be further elaborated later, aimed at measuring whether larger firms, measured in total assets, had a more substantial effect on their financial ratios

from capitalizing operating leases than smaller firms. The results suggested that firm size did not have a significant impact on financial ratios. Although it might seem like the two studies offer different results, this is not necessarily the case. Graham et al. (1998) studied the relationship between size and use of leases, without considering the expected effect of capitalizing operating leases. Fito et al. (2013), on the other hand, did study whether larger firms would experience a larger effect when implementing IFRS 16 than smaller firms. Consequently, the differing results may be caused by measuring different relationships.

Differences among sectors have been pointed out by several authors. Fito et al. (2013) found that the retail sector, including hotels and airlines, is most affected by IFRS 16, while the real estate sector is the least impacted sector when considering ratios such as Debt/Assets (D/A) and return on assets (ROA). Beattie et al. (1998) showed that among the sectors examined, mineral extraction was seemingly the least affected and services the most heavily impacted in terms of the effect on ratios such as ROA, D/E, and interest coverage. Findings of Morales-Díaz & Zamora-Ramírez (2018) suggest that there are large differences both across and within sectors when assessing the effect from the implementation of IFRS 16. Transportation, airlines, hotels, and services are the industries most affected due to the high use of lease financing.

From a valuation perspective and particularly in relative valuation, the ranking of firms before and after the implementation of IFRS 16 will be of interest. The Spearman's rank correlation coefficient, which will be further explained later, can be used to determine whether the ranking of firms in a sample is equal before and after an event, in this case, the capitalization of leases. Using the mentioned measure, Fülbier et al. (2008) pointed out that the companies' rankings in terms of ratios stay about the same. This suggests that an analyst using relative valuation would invest in the same companies before and after the implementation of IFRS 16. The conclusion, ranking among firms is relatively unaffected by IFRS 16, is also supported by Durocher (2008). Cornaggia et al. (2013), on the other hand, found evidence of the opposite, namely that the relative ranking of firms is affected. One explanation provided for the different results is that the use of OBS

lease financing varies between firms, with some firms barely using operational leases.

The issue of how stakeholders treat the difference in accounting method between finance leases and operating leases have been studied for a long time. Early studies suggest that stakeholders do not account for operating leases when making financial decisions. Hartmann & Sami (1989) found that loan officers assigned higher interest rates to firms that capitalized lease contracts as opposed to firms that did not capitalize lease contracts. The same applies for credit ratings. The consequence would be that there are incentives for firms to have lease contracts written in such a way that it qualifies for an operating lease since it would make credit less costly. Furthermore, Braund (1989) found that half of the sample, consisting of bankers and financial analysts, were unable to correctly account for non-capitalized leases in their calculations when assessing financial statements.

More recent studies, however, suggest otherwise. Imhoff Jr, Lipe & Wright (1993) studied how shareholders handled the issue of formal recognition versus footnote disclosure concerning lease contracts. Their findings implied that shareholders do adjust the balance sheet to account for operating leases. Both Ely (1995) and Altamuro, Johnston, Pandit & Zhang (2014) supports the findings of Imhoff Jr et al. (1993). Since investors and creditors are aware of the operating lease commitments affecting a company, they incorporate available information about OBS leases to assess equity risk and credit ratings of firms accurately. Furthermore, findings of Lim, Mann & Mihov (2003) suggest that structuring a lease contract as an operating lease does not fool the market as bond yields recognize debt obligations regardless of whether it is capitalized or not. The mentioned studies show that the evidence is divided with regards to the treatment of finance leases versus operating leases. However, the time perspective could imply that stakeholders have learned that they should make adjustments to accurately assess two firms with different accounting methods for lease contracts. Consequently, the comparability across firms should be high even though some firms might choose to capitalize lease contracts while others do not.

Imhoff Jr & Thomas (1988) investigated whether Statement of Financial Accounting Standards (SFAS) No.13 Accounting for Leases, issued in 1976, made firms change their capital structure. The American accounting standard required firms to capitalize finance leases, which previously had not been recognized on the balance sheet. Operating leases, however, were still allowed to be kept off the balance sheet. The standard would change the balance sheet of firms, thereby potentially affecting firms' debt covenants and managerial compensation agreements. According to the authors, some of the results could be violation of debt covenants and entering into technical default. Furthermore, renegotiation of the lease contract to meet the definition of operating leases was expected, and so were performing capital structure changes to offset the impact on the financial statements. The authors' findings suggest that many firms decided to structure lease contracts as operating leases instead of finance leases. Further, some firms changed their capital structure by substitution from finance leases and conventional debt into equity and other forms of OBS financing such as operating leases. For our research, IFRS 16 has the same characteristics as the SFAS No. 13, namely a change in the requirements regarding recognition of operating leases in the case of IFRS 16 and finance leases in the case of SFAS No 13. The paper can thus provide guidance on expectations regarding whether firms choose to shift from operating leases to other sources of equity and OBS financing, or not.

Beattie, Goodacre & Thomson (2006) surveyed both preparers and users of accounting standards regarding the expected effect of the newly proposed accounting standard (IFRS 16), which would capitalize operating leases. Reduction in credit ratings and improved transparency among firms were listed as possible outcomes. Furthermore, firms' expected actions were renegotiation of debt covenants and shortening of lease terms to minimize balance sheet obligations. On the other hand, leasing volume was not expected to change, at least not in the short-term. The consensus among the respondents was that transactions could be intentionally structured in a way in which they could be kept off the balance sheet.

# 4.0 Methodology

The main framework used to determine the impact of IFRS 16 is called the constructive capitalization method. It was first devised by Imhoff Jr et al. (1991) and has been used in subsequent studies aiming at determining the effect capitalizing operating leases will have on various financial measures. In the following chapter, the method will be explained, including assumptions and components needed to perform the approach. Subsequent studies have built on Imhoff Jr et al. (1991) but made adjustments. These will be highlighted and discussed to arrive at the approach that seems the most reasonable given the different procedures and information available at the time of our thesis.

## *4.1 Hypothesis*

The methodology that is explained throughout the remainder of the chapter will make it possible to test our two hypothesizes. The process outlined in chapter 4.2-4.10 is performed for all companies in the sample (66 companies), and for each of the annual reports 2015, 2016, 2017, and 2018. Followingly, we are able to simulate the financial statements with operating leases being capitalized for the years 2015 to 2018, an example of the model can be seen in appendix 10.2. In addition, using the recently published annual reports of 2019 (where operating leases are included), the financial statements of 2019 without operating leases can be simulated, allowing comparison previously challenging to perform. The constructive capitalization method allows us to observe the financial ratios with and without the effect of operating leases, and thereby our first hypothesis can be tested:

$H_0^1$: The implementation of IFRS 16 will not significantly impact selected financial ratios of Norwegian listed companies.
$H_1^1$: The implementation of IFRS 16 will significantly impact selected financial ratios of Norwegian listed companies.

Furthermore, with the financial statements being reconstructed, we can assess the use of lease financing throughout the period. This is of interest as changing

behavior could be attributed to the new accounting standard. We do, therefore propose a second hypothesis, where lease intensity is measured as Leases/Debt:
$H_0^2$: The lease intensity did not decrease in the period 2015 and 2019.
$H_1^2$: The lease intensity did decrease in the period 2015 to 2019.

### *4.2 Capitalization*

The constructive capitalization method is a method in which the present value of lease liabilities is determined. The starting point is the future minimum noncancelable lease payments provided in the notes to the financial statements. IAS 17.35 required these payments to be divided into certain time intervals, more precise: not later than one year, later than one year and not later than five years, and later than five years. Building on this information, Imhoff Jr et al. (1991) made some assumptions that allowed them to make a realistic approximation of the present value of lease liabilities. The assumptions being an interest rate of 10%, average remaining life of the operating lease of fifteen years, all cash flows occurring at year end, unrecorded asset equals 70% of the unrecorded debt, effective tax rate is 40% and the effect on the current period's net income is zero. The assumption of zero impact on net income was later removed as it could provide misleading results (Imhoff Jr et al., 1997). Imhoff Jr et al. (1991) apply these assumptions uniformly to their sample, however, as we will see later, this is done differently by other researchers. With the assumptions stated, the formula below can be used to calculate the size of the operating leases that should be capitalized on the balance sheet.

$$PV(L) = \sum_{i=1}^{t} \left( \frac{MLP_i}{(1+r)^i} \right)$$

*PV = Present value*
*L = Lease*
*$MLP_i$ = Minimum lease payment in year i*
*r = Discount rate*

When discounting cash flows, the best approach is to discount the cash flows to the middle of the year if the payments are believed to be made smoothly throughout the year (Benninga, 2008). The effect of assuming end of year payments compared with mid-year payments are minimal, with the leasing

payment in total being undervalued by a factor of $(1+r)^{0,5}$. However, discounting from the end of the period is the norm in previous research (Imhoff Jr et al., 1991; Pérez, Inchausti & Ortega, 2014; Wong & Joshi, 2015; Pardo & Giner, 2018). In addition, due to no specific information being provided in the annual reports regarding when payments occur, we found the most sensible method to be to discount from the end of year.

The factor method, another method used to capitalize operating leases, is used to some degree, but mainly by rating agencies (Morales-Díaz & Zamora-Ramírez, 2018). The method's purpose is to calculate a proxy (the factor), which can be used to measure the lease liability by multiplying the factor with the minimum lease payment within one year. Moody's approach to measuring this proxy is outlined in Dillow & Berckman (2016). The paper calculates the present value of the leasing liability and divides it with the noncancelable leasing payment in the next year, which is disclosed in the notes to the annual reports. Furthermore, by doing this for a large sample of companies and grouping the companies into sectors, Moody's are able to calculate the median for each sector. The calculated median, ranging from three to six in 2016, is the factor used to approximate the leasing liability for companies in the sector. Koller, Goedhart & Wessels (2010) have a different approach for determining which factor to apply, as seen in the formula below. Assuming an asset life of fifteen years and a discount rate of 6% ($K_d$) over the whole sample, the formula below produces a factor between asset value and rental expense of eight.

$$Asset\ value_{t-1} = \frac{(Rental\ expense_t)}{K_d + \left(\frac{1}{Asset\ life}\right)}$$

The authors claim that many in the investment banking community use this approach, but at the same time it is only an estimate and should be treated with care. If asset life or discount rate differ from the assumed levels, incorrect conclusions can be drawn (Koller et al. 2010). The factor method, mostly used as a proxy for rating agencies and investment bankers, oversimplifies the capitalization procedure. Besides, the factor method does not allow for differences within sectors, meaning it is not suitable for our research. However, one could do as Imhoff Jr et al. (1993) and Bennett & Bradbury (2003), which used the factor method for comparison. Both studies find that the factor method overstates the

lease liability compared with the constructive capitalization method. In the following subchapters, we focus on the constructive capitalization method.

### *4.3 Allocation first five years*

According to IAS 17.35, lessees are required to report operating lease payments in the following format: not later than one year, later than one year and not later than five years, and later than five years. In table 4.3.1, an example of how this can be done is provided by the financial statements of Tomra.

| ***Minimum lease payments under operating lease*** | ***2018*** |
|---|---|
| ***Not later than one year*** | *421.8* |
| ***Between one and five years*** | *522.8* |
| ***More than five years*** | *242.4* |

*Table 4.3.1: As seen in Tomra's annual report 2018. Numbers presented in NOK Millions.*

However, the method requires the reported payments to be divided into yearly payments; thus, an approach allowing us to do this is required. For some companies, as exemplified by Kongsberg Automotive in table 4.3.2, the payments are already divided into yearly payments and can be used directly.

| **M EUR** | **2019** | **2020** | **2021** | **2022** | **2023** | **Thereafter** | **Total** |
|---|---|---|---|---|---|---|---|
| **Operational lease commitment** | 17 | 15.2 | 12 | 10.8 | 8.9 | 55.7 | 119.7 |

*Table 4.3.2: As seen in Kongsberg Automotive's annual report 2018. Numbers presented in millions of Euro.*

Returning to the companies following the minimum requirement of IAS 17.35, several approaches have been developed to distribute the payments into yearly payments. Imhoff Jr et al. (1991) distributes the payment in the cluster named later than one year and not later than five years evenly across those years.

The approach we have decided to use is the one seen in Fülbier et al. (2008), which was later adopted by Fito et al. (2013). Each company is provided with an individual degression factor. The lease payments in years two to five are equal to the one in the previous year multiplied with the degression factor, as seen below. This formula allows the degression factor for each company in each year to be found, using the Solver function in Excel.

$$L_{(2\ 5)} = \sum_{i=2}^{5} MLP_2 * (1-d)^{i-2}$$

$L_{(2\ 5)}$ = *Undiscounted aggregated lease payments in year two to five*

*d = Degression factor*

After obtaining the degression factor, the minimum lease payments in each year from year two to five can be found, using the following formula:

$$MLP_i = MLP_1 * d^{(i-1)}$$

The intuition of this operation is reasonable, and companies are expected to have a portfolio of leases, where the contracts mature at different periods. The effect is that the size of noncancelable lease payments will decline the further into the future we get. However, for some companies, among others Norwegian Air Shuttle in 2015 and 2016, the opposite happens, i.e. a degression factor above 1 for certain periods. The inference of a degression factor greater than one is that the lease payments are expected to increase exponentially during year two to year five. The norm is, however, a degression factor of less than one.

In addition, we experience that certain companies disclose the information in different formats than the two main ones seen in table 4.3.1 and 4.3.2. Some companies opted to disclose the noncancelable lease payments for beyond year four instead of the usual beyond year five. In this case, the degression factor was only based on the first four years, and period five was equal to four. A few companies, however, disclosed payments in year two and three combined as well as year four and five combined. For these cases, the payment for year two and year three was set to be half of year two and three combined, similarly, for year four and year five.

### *4.4 Allocation beyond year five*

Imhoff Jr et al. (1991) divided the payment cluster called later than five years with the average remaining lifetime of the lease contracts, which is assumed to be ten years from year five, to measure the yearly payments after year five. Another approach commonly used is to set the payments in each year beyond year five to be approximately equal to that of period five (see Imhoff Jr et al., 1991; Durocher, 2008; Fülbier et al., 2008; Duke et al., 2009; Fito et al. 2013). One may question why researchers have not used a degression factor to determine the payments each

year after five years in the same way as the payments in clusters later than one year and not later than five years. The explanation could be that despite a degression factor would allocate payments in a more likely manner with higher payments in earlier periods than in later periods, the payments would converge to zero. Therefore, hindering balance between the cash flows and the minimum lease payments disclosed in the financial statements.

Looking into this ourselves, the sample for the year 2015 saw that 17 out of the 66 companies in the sample would not have met their leasing obligations after 100 years, with the majority of the companies having leasing payments too low to make an impact. The question would then be when to cut the degression factor, cutting it after five years does not necessarily make any more sense than cutting it after year three or seven. If, for instance, one cut the degression after seven years, then the payments would decline until year seven and stay constant until there is a balance between payments beyond year five stated in annual reports and the allocation. Cutting the degression factor after year five is likely done because of the distinction between the payments that stem from the grouping made by IAS 17. When we decided to use this approach to allocate payments each year between years two and five, it was not based on the belief that this method was far superior. It was rather that the use of a constant leasing payment does not even pay tribute to the effect. We stop the degression after five years as is customary (see Fülbier et al., 2008; Fito et al., 2013) and choose to set payments beyond year five equal to the payment in year five.

### *4.5 Number of periods beyond year five*

It is necessary to determine how many years the payments beyond year five should be spread out to calculate the present value of the lease payments. One approach assumes that the remaining lifetime of the lease contracts is equal to a predefined number of years. Imhoff Jr et al. (1991), Duke et al. (2009), and Wong & Joshi (2015) used fifteen years for all companies in their sample. When handling several years from each company, the most common approach is to attribute each year its own allocation.

Using the approach outlined in subchapter 4.4 with setting payments beyond year five equal to the payments in period five, means that in some cases, the time it takes until the lease liability has been paid is larger than realistic. Also, the allocation between periods from the model may differ dramatically from year to year. One example of the mentioned issue is Bonheur. Using numbers from the financial statements of Bonheur for 2015, the future lease payments would continue for 99 years (the limit we set for our model), 66 years using the financial statements of 2016, and only three years for the financial statements of both 2017 and 2018. While some companies have large differences internally, as Bonheur mentioned above, most of the companies have a relatively equal level across the periods. There are a few cases where large deviations across years could create some slight measurement errors. Nevertheless, the approach described would, in total, give a realistic and even distribution of future lease payments across the different years.

### *4.6 Elapsed time*

The elapsed time of the lease contracts is of interest. The main reason being the difference between the value of the Right of Use (RoU) asset and the lease liability, which will be explored further in the next subchapter. The RoU is being depreciated at a higher rate than the corresponding liability is reduced through the lease expense. Therefore, at the time of capitalization, there will be a gap between the RoU and the lease liability. The initial approach used by Imhoff Jr et al. (1991) assumed a fixed remaining lifetime and a fixed elapsed lifetime for all companies. The most common approach, based on Imhoff Jr et al. (1991), is to set the elapsed lifetime as a percentage of remaining lifetime. While Imhoff Jr et al. (1991) used 60% elapsed time, Duke et al. (2009) assumed 50% elapsed lifetime. Durocher (2008), on the other hand, used the proportion of amortization on the company's assets as an indicator of the percentage amortized. The resulting ratio was extrapolated to the company's operating leases.

The approach we decided to use was first devised by Fülbier et al. (2008). The approach divides the payments into five "baskets", all with different elapsed and remaining lifetimes. Basket one for an isolated asset and its corresponding liability, maturing after one year. Basket two was created similarly with an

isolated asset maturing after two years and its corresponding liability. Basket five is the final basket and is initially calculated as the asset maturing in period five. Basket fives maturity is, however, calculated as seen in the formula below.

$$Maturity\ basket\ 5 = \frac{Payments\ beyond\ year\ five}{Payment\ year\ five} + 5$$

There is a calculation that needs to be done in order to determine the annuities related to the baskets, seen in the formula below. The calculations are based on the allocation the first five years. The annuity of basket five is the payment in year five. The annuity of basket four is the difference between the payment in year four and five. Basket three is the difference between payment in year three and four and so on until basket one.

$$Basket_i = MLP_i - MLP_{(i+1)}$$

The elapsed lifetime for each basket is then set to be equal to the remaining lifetime. Assuming that half of the lifetime of the asset has elapsed is done among other authors, and the basket-method with 50% elapsed lifetime is used by both Fülbier et al. (2008) and Fito et al. (2013). This procedure is somewhat sophisticated and able to differentiate the leasing assets in a seemingly sensible manner. However, several researchers have pointed out that the elapsed time is of relatively low importance and does not have a substantial impact on the financial statements (Fülbier et al., 2008; Fito et al., 2013; Pardo & Giner, 2018).

### *4.7 Relationship between asset and liability*

Operating leases have up to 1. January 2019 been kept off the balance sheet and the actual capitalization of the asset is not as straightforward as if the asset would have been kept on the balance sheet all along. The main effect stems from the assumption made by most researchers that the depreciation of the underlying assets is to be made linearly. IFRS 16 requires the RoU to be depreciated according to the requirements in IAS 16 Property, Plant and Equipment (IFRS 16.31). According to IAS 16, the depreciation method for the RoU, in this case, should match the pattern of the future benefits an entity would expect to consume from the RoU asset (IAS 16.60). Other methods, such as double declining balance and units of production, might better reflect the actual pattern of future benefits consumed. However, studying the information provided in the financial

statements suggests that the most common approach is to use straight-line depreciation for the RoU assets. Consequently, we follow the approach of other researchers (see Imhoff et al., 1991; Cornaggia et al., 2013; Fito et al., 2013; Wong & Joshi, 2015) and apply straight-line depreciation of the RoU asset. The lease liability, on the other hand, is affected through lease payments and interest expense, which combined do not equal the depreciation each year (IFRS 16.36). This will result in the following relation between RoU and lease liability:

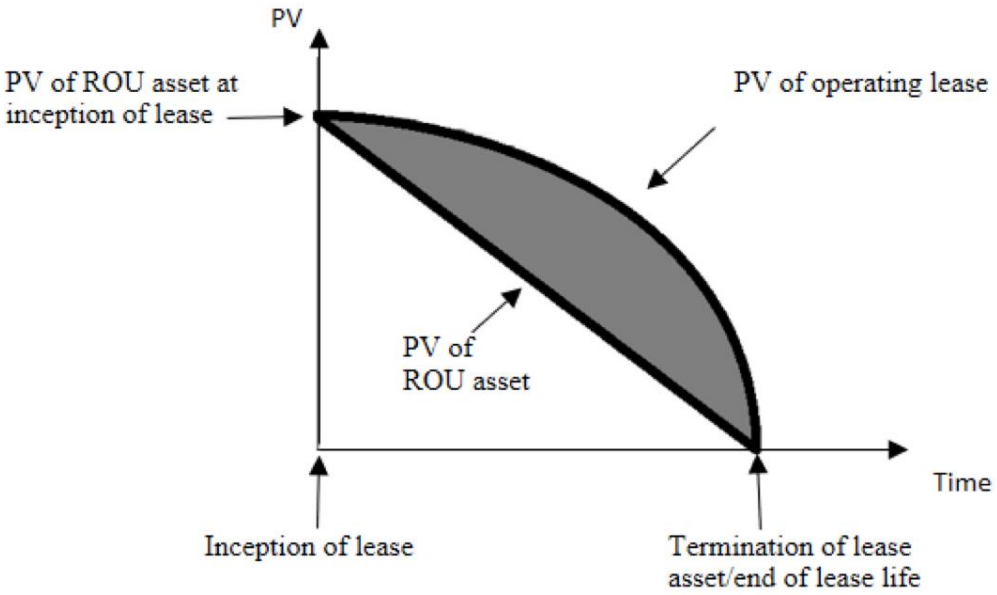


*Figure 1: Relationship between RoU and lease liability. Inspired by Imhoff Jr et al. (1991).*

The previous steps, i.e., remaining lifetime and elapsed time, were necessary to determine where in figure 1 the asset is located at the time of the capitalization. Several approaches are possible to determine the relationship between the asset and the liability. Some authors use the assumption that the asset to liability ratio is constant. Wong & Joshi (2015) assumed that the RoU is 75% of the lease liability, while Duke et al. (2009) assumed 70%, both studies applied the same ratio uniformly. Bennett & Bradbury (2003) did through assumptions regarding elapsed and remaining time end up with an estimate of asset/liability ratio of 81%, which was then used in the entire sample.

In our research, we have applied the following formula, as seen in Fülbier et al. (2008), to determine the ratio between asset and liability.

$$\frac{Asset}{Liability} = \frac{RL}{TL} * \frac{1-(1+i)^{-TL}}{1-(1+i)^{-RL}}$$

*RL = Remaining life*

*TL = Total life*

*i = Discount rate*

The relationship between RoU and lease liability will, according to the formula, depend on the remaining lifetime of the lease contracts and the total life. This is reasonable as the ratio between the asset and liability will not be constant during the lifetime of the lease contract. Some possible reasons are differing interest expenses and, depending on the lease contract, different lease payments throughout the lifetime of the lease, which is also the relation illustrated in figure 1.

### *4.8 Discount rate*

The future minimum noncancelable lease payments need to be discounted to arrive at the present value of the lease liability. According to IFRS 16, the discounting of lease payments should be done using the interest rate implicit in the lease, given that it can be readily determined. If not, the incremental borrowing rate of the lessee should be applied. The incremental borrowing rate is defined as the rate "that a lessee would have to pay to borrow over a similar term, and with a similar security, the funds necessary to obtain an asset of a similar value to the RoU asset in a similar economic environment" (IFRS 16.26). However, this rate has not previously been easily observable for researchers. Consequently, different approaches have been devised to obtain an appropriate discount rate, which will be further discussed below. Finally, at the end of this subchapter, our chosen methodology will be presented.

The first method is using the interest rate on long term debt as the discount rate of lease payments and apply it uniformly across the entire sample. Imhoff Jr et al. (1991) found McDonalds' (the example used by the authors) average historical interest rate to be approximately 9%. To provide a conservative estimate when discounting, a discount rate of 10% was applied to the whole sample. Sensitivity tests showed that the uniform assumption was robust with regards to the results of the constructive capitalization method. Many subsequent papers, i.e., Ely (1995),

Beattie et al. (1998), Duke et al. (2009), Cornaggia et al. (2013) and Wong & Joshi (2015), applied the same discount rate of 10% as it turns out to be approximately equal to the information provided about interest on long term debt in the notes of financial statements. In addition, with the same reasoning as Imhoff Jr et al. (1991), a higher discount rate would yield a more conservative estimate.

The second approach is to use the interest rate for pensions and provisions to discount the future minimum lease payments, used by both Fülbier et al. (2008) and Pardo & Giner (2018). The rate was found in the notes to the financial statements. In the case of missing observations, the median of the sample was inserted. IAS 19 Employee Benefits requires the discount rate on pensions and provisions to be equal to the yield on high-quality corporate bonds or government bonds with a matching maturity profile as the pension liability. Compared to using 10%, as seen above, low discount rates would be obtained. For instance, the yield on a ten-year Norwegian government bond was 1.48% as of 02. January 2020 (Norges Bank, 2020). However, there are two potential issues when using the yield of the ten-year Norwegian government bond. Firstly, pension liabilities are likely to have a longer perspective than ten years. Therefore, it should be matched with a longer maturity, i.e., 30 years, but ten-year government bonds are the longest maturity offered by Norges Bank. Secondly, government bonds do not account for any company-specific risk. Still, it is believed that using the discount rate applicable for pensions and provisions is a reasonable approximation, although one risks overstating the lease liability.

A third alternative is the one where the interest rates are determined by the risk-free rate plus a spread associated with the riskiness of the firm. The approach is similar to that of Durocher (2008), where the credit ratings of companies was used to determine the riskiness, and these were combined with corresponding spreads. The spreads that Durocher (2008) used were a flat increase of 0.2% for each incremental downgrade (A+ to A is one incremental downgrade), and the risk-free rate used was the average Canadian prime rate since the initiation of the lease. Mulford & Gram (2007) applied an approach using interest rates stated in the financial reports. When these were not available, they found the companies' credit rating and applied relevant spreads to determine their interest rates. These spreads

were derived from the knowledge of eight experienced evaluators and were by industry and maturity. Fito et al. (2013), used the same approach but retrieved spreads from Damodaran's spread/rating table. The approach is sensible as it does not treat all intervals equally, however, differences among sectors are not considered. Morales-Diaz & Zamora Ramirez (2018) outlined a modified version, although comprehensive, the method was challenging to replicate. In their paper, they used the credit ratings of the companies and combined these with yield of bonds per sector and rating from Bloomberg. The initial plan was to use credit ratings and associated risk spreads to determine the firms' discount rates. Only eight firms (12%) in the sample had credit ratings. The approach outlined by Damodaran (2012) to determine riskiness through EBIT/Interest left large deviations between estimated ranking and the actual ratings of firms. As too few firms had credit ratings and the EBIT/Interest proved difficult to use, we deviated from the initial plan.

The methodology we chose for our research is to use the discount rate disclosed in the notes to the financial statements. This rate would be the incremental borrowing rate for a company. According to IFRS 16, it is, as mentioned, the appropriate discount rate to use when the rate implicit in the lease contract is not available. If the discount rate was not provided in the notes, the payment allocation outlined in the previous subchapter 4.1 to 4.7 was used to obtain the discount rate. This was done by first setting the allocations derived from the annual report of 2018, i.e., the situation 31. December 2018, equal to the lease liability as of 01. January 2019. Secondly, using the Solver function in Excel, we were able to estimate the interest rate the company itself had used to discount the future noncancelable lease payments, i.e., the lease liability provided at the balance sheet. Because of the change in accounting principles, the effect of IFRS 16 is disclosed separately in the annual report and makes this approach possible. In some cases, the rates found through the Solver function were not applicable. Either because the resulting interest rates were outside the observed range (2.2% to 10%) or because there were no possible solutions. In these cases, the average rate across the sample was imputed; this rate was 4.6%. If the company disclose the discount rate they have used, then that is the most precise discount rate to be used. When missing, then the outlined approach seems to be the most sensible. By

doing so, we are able to approximate the appropriate discount rate given our limited information.

The approach used is not able to adjust the leasing liabilities for changes in the firm's riskiness over time. We do not believe this issue should be adjusted for even if possible. The reason is that the size of the leasing liabilities is compared through periods. If adjusting these figures for a sudden decrease in riskiness, the comparability would be distorted. Adjusting the risk-free component of the discount rate is not complicated but is believed to distort the data more than it illuminates it.

### *4.9 Tax rate*

There are mainly two approaches to use when determining tax rate, namely, a uniform tax rate or a firm-specific tax rate. An example of a uniform rate is Fito et al. (2013). The approach they utilized was to find the average effective tax rate of all firms in the sample and apply it to the whole sample. The most common approach is, however, using the statutory rate for the entire sample. The use of statutory rate is applied by Ely (1995), Imhoff Jr et al. (1991, 1997), Bennett & Bradbury (2003), and Wong & Joshi (2015). Damodaran (2006) pointed out several reasons why using a marginal tax rate may lead to incorrect estimates:

1. Income reported for financial purposes and tax purposes may vary.
2. The use of tax credits may reduce the effective tax rate below that of the marginal tax rate.
3. Taxes may be deferred to a later period, resulting in a lower or higher tax rate.
4. Taxes may follow a tiered system, leading to a difference between the marginal and average tax rates.

Additionally, in the Norwegian context, there is an extraordinary tax rate ("særskattesats") for companies operating in the oil industry (Norsk Petroleum, 2019). Hence, the marginal tax rate is even less applicable in the Norwegian context. Using a marginal tax rate may seem sensible as it is not as sensitive to noise as the effective tax rate. However, the uniform use is oversimplifying, and may, therefore, lead to misleading conclusions.

The other alternative is to use firm-specific tax rates, which are commonly applied. Beattie et al. (1998) calculated the average firm-specific tax rate over fourteen years and used the median as the tax rate for the companies. The same goes for Fülbier et al. (2008), although the calculations were done over ten years instead. Durocher (2008) went through the notes in the financial statements of the firms to get a more precise estimate of the tax rates. The reason is that permanent differences, changes in the tax rate, and tax loss carryforward may produce an apparent tax rate that is different from the basic tax rate. Duke et al. (2009) used the effective tax rate calculated as tax expense divided by pre-tax income. If the tax rate exceeded 35%, it was capped at 35%, and if negative, 35% was inserted instead. The reason for using 35% is that it was the relevant statutory tax rate at the time. Cornaggia et al. (2013) got their tax estimates from John Graham, who created sophisticated corporate tax estimates for US firms by forecasting taxable income (Graham, 1996). Perez et al. (2014) used company-specific and year-specific effective tax rates. If the tax rate or pre-tax income is below zero, the authors applied the tax rates found in the notes to the financial statements. When extracting effective tax rates from the Bloomberg terminal, the tax rates were floored at zero, meaning that any effective tax rate below zero would yield a rate of zero.

The literature is divided on the treatment of tax, and no clear methodology is apparent. An issue that arises when deferred tax is involved is that the impact of deferred tax has a much larger impact when the income before tax is close to zero. This issue can be circumvented by using the approach we have chosen. Aggregating both earnings before tax and tax expense for each company for a period, the deferred tax in a single year will have a smaller impact. By using this methodology, the impact of deferred tax on low pre-tax income is reduced. In our research, this was done for the sample period 2015-2019. Dividing the aggregated tax expense by the aggregated earnings before tax, the approximation of the tax rate is expected to be better. We reduce noise by using multiple periods and reducing the distortions that arise from deferred tax. This method is not perfect, either. The tax rates were winsorized at 80% (i.e., capped at the 90th percentile and floored at the 10th percentile), this resulted in a floor of -1.9% and a cap of 48.5%. This was done since, even though the earnings before tax and tax expense

were aggregated for five years, there were still companies with either very high or very low tax rates.

### *4.10 Impact on income statement and balance sheet*

Finally, with all the necessary components needed to arrive at the present value of the noncancelable lease payments and additionally, the tax rate, the impact of the capitalization on both income statement and balance sheet can be estimated. On the income statement, the operating expenses will be reduced by the leasing payment in that year. Interest expense is adjusted with the size of the leasing liability multiplied with the interest rate. Adjusted depreciation is equal to the depreciation of the RoU. On the balance sheet, we find leasing liabilities by discounting the lease payments, as outlined in the subchapters above. The RoU is derived by using the ratio outlined in subchapter 4.7 and multiply it with the capitalized liability.

The difference between the lease liability and RoU will manifest itself in terms of a reduction in equity and a deferred tax adjustment. The effect was explored by Imhoff Jr et al. (1997), and the difference in RoU and lease liability stems from the assumption of linear depreciation and interest expense being calculated based on the present value of the leasing liability. This difference has since been addressed by, among others, Bennett & Bradbury (2003), Durocher (2008), and Fülbier et al. (2008). All suggested that the value of the RoU assets and lease liability were not equal at the time of capitalization. The difference between these two balance sheet figures should be adjusted by changing retained earnings (thereby changing equity) and deferred tax. The following formula was utilized.

$$E' = (L' - RoU') * (1 - Tax)$$

*E'= Equity adjustment*
*L'= Liability adjustment*
*RoU'= Right of use adjustment*

The equity effect is, as seen in the formula, reduced by the tax rate. The deferred tax adjustment is equal to the difference in liabilities and assets multiplied with the tax rate.

### *4.11 Critique*

The constructive capitalization method allows us to value the lease liability and thereafter, the RoU asset. In general, the method is believed to give a good approximation of the lease liability, given the limited information that was available before IFRS 16. Even though this is the best general approach to estimate the balance sheet figures, it should be noted that there is uncertainty linked to these figures. In this thesis, steps have been taken to make firm-specific approximations, as these are believed to be the most correct. One should, however, consider that there are upsides to using uniform assumptions as these often produce estimates with less noise. The use of firm-specific assumptions may include unnecessary noise, and the implications should be considered when making approximations. The chosen methodology stems from an extensive literature review of which the best approaches from several authors have been compiled into the chosen methodology.

## 5.0 Financial ratios

With the implementation of IFRS 16, the balance sheet is expected to be inflated and a redistribution of expenses on the income statement is expected. The ratios we have chosen to focus on are ratios that other researchers have investigated and that we believe are of interest to investors and other stakeholders seeking to acquire information about a company.

### *5.1 Measures of financial and operational risks*

Fülbier et al. (2008) referenced several authors when claiming that equity to assets (E/A), and debt to equity (D/E) are structural risk measures for evaluating a company's operating and financial risk. Wong & Joshi (2015) examined debt to capital ratio (D/A) and debt to equity (D/E) as these ratios are indicative of a company's financial strength. So did Duke et al. (2009), the ratios were chosen as an indicator of the firms' ability to pay off their debt and the company's state of solvency. Durocher (2008) used the D/A-ratio and did so to assess the impact on leverage. The ratios D/A and D/E are chosen as these ratios are prevalent in

previous research. Alternatively, E/A could be used instead of D/A as they are two of a kind, i.e., D/A is one minus E/A.

### *5.2 Profitability and expense structure*

Return on assets (ROA) and interest coverage ratio (also known as times interest earned) describe profitability and the expense structure of a firm. These ratios could alter management behavior as they are, at times, linked to contractual clauses or compensation plans (Fülbier et al., 2008). Other authors also researched similar ratios and the impact of capitalization of operating leases on the mentioned ratios. Wong & Joshi (2015) did in their research look into return on equity (ROE) and ROA. They did so as these are measures of management performance and investment returns. Duke et al. (2009) examined ROA as it is a measure of performance. The authors also looked into the interest coverage ratio, which was used to assess the company's ability to service short term debt. Durocher (2008) did, in his research, examine the impact of capitalization on ROA as the ratio was used to measure management performance. ROA is a prevalent ratio in the literature and is, therefore, included in our research. While the denominator in the interest coverage ratio is the interest expense, the literature varies between using earnings before interest and tax (EBIT) or earnings before interest, tax, depreciation and amortization (EBITDA) as the numerator. We have opted to look into the EBITDA ratio because EBITDA is expected to be impacted more than EBIT.

### *5.3 Common valuation multiples*

The Price/Earnings (P/E) ratio will be analyzed since the ratio is subject to scrutiny by external investors, and managers' behavior is expected to be altered by changes in this ratio (Fülbier et al. 2008). Damodaran (2009) pointed to the impact on ratios using enterprise value (EV). Ratios such as EV/EBITDA, EV/Sales, and EV/Invested Capital were impacted. We have decided to look into the impact on the EV/EBITDA ratio because the EBITDA figure is expected to be impacted by the capitalization of OBS leases.

### *5.4 Lease intensity*

Additionally, we want to examine the lease intensity, using the ratio Leases/Debt. This is done to assess whether or not the use of leases has increased or decreased

from 2015 to 2019. The ratio is not a conventional financial ratio but is included as it is what we considered the best way to assess leasing as a way of financing. If we were to use a ratio such as Leases/Assets, an increase in leverage would seemingly increase the use of leases. In contrast, it was, in fact, an increase in debt and not lease financing specifically. Other ratios may also be able to illuminate the problem, but Leases/Debt is the one that is believed to be the best.

### *5.5 Selected ratios*

Table 5.5 presents the ratios we have decided to analyze. In the sector Financials, where companies such as DNB and Gjensidige Forsikring are located, EBITDA provides an incorrect view of the profitability. The reason is that interest income is part of operating income and should therefore not be excluded from operating income when calculating EBITDA. Thus, Financials is not included in measures that require the use of EBITDA, namely interest coverage and EV/EBITDA.

| Ratio | Formula |
|---|---|
| **D/A** | $\frac{Debt}{Assets}$ |
| **D/E** | $\frac{Debt}{Equity}$ |
| **EV/EBITDA** | $\frac{Enterprise\ Value}{EBITDA}$ |
| **ROA** | $\frac{Earnings\ before\ interest\ and\ taxes * (1 - tax)}{Average\ Assets}$ |
| **Interest Coverage** | $\frac{EBITDA}{Interest\ Expense}$ |
| **Price/Earnings** | $\frac{Market\ Capitalization}{Net\ Income}$ |
| **Lease Intensity** | $\frac{Leases}{Debt}$ |

*Table 5.5: The selected ratios, where the column Formula refers to the chosen definition for our analysis.*

# 6.0 Statistical framework

Parametric techniques employed to analyze statistical results, such as the t-test, require that the sample distribution approximately resemble the normal distribution. Meaning the distribution should have a mean equal to the expected value of the sample and a variance equal to the sample variance (Løvås, 2013; Corder & Foreman, 2014). Previous research suggests that financial ratios, in general, are not normally distributed (Deakin, 1976). In the following subchapter, a test to check for normality will be presented. Furthermore, other tests and procedures that we employ to measure any significant results from our study will be highlighted.

## *6.1 Jarque-Bera test*

Whether our sample is normally distributed or not can be determined by studying the skewness and kurtosis of the distribution. Skewness measures the symmetry of the distribution, while kurtosis measures the fatness of the tails (Jondeau, Rockinger & Poon, 2007). Our sample should have a skewness close to zero and a kurtosis not larger than three in order to approximately resemble the normal distribution (Stock & Watson, 2015). One test for this purpose is the Jarque-Bera test, which uses the fact that skewness and excess kurtosis, defined as kurtosis minus three, is jointly equal to zero under normality (Jondeau et al., 2007). The Jarque-Bera test statistic is computed as follows

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right]$$

*n = Number of observations*

*S = Skewness*

*K = Kurtosis*

## *6.2 Spearman rank correlation*

If the variables in our sample are not normally distributed, the Pearson correlation can provide misleading estimates (Hauke & Kossowski, 2011). Instead the Spearman rank correlation coefficient should be used since it is a nonparametric procedure that measures the association between two variables. It estimates the correlation between variables stated at an ordinal scale, meaning the variable only says something about its relative position in the sample but nothing about the

strength among the variables (Stevens, 1946). The Spearman rank correlation would be useful in determining whether the relative ranking of firms change following the implementation of IFRS 16. It would imply that investors following a relative valuation approach might invest differently.

### *6.3 Wilcoxon signed-rank test*

If the sample is not approximately normally distributed, parametric tests are not suited. Instead, a nonparametric test, such as the Wilcoxon test, is preferred (Corder & Foreman, 2014). The Wilcoxon signed-rank test is used to test two paired samples, which in our case would be the sample of ratios before and after the implementation of IFRS 16. The interpretation of the null hypothesis of the test is that there is no difference between the median of the ratios before and after IFRS 16, while the alternative hypothesis states that there is an effect of IFRS 16.

### *6.4 Comparability index*

Constructing a comparability index, as done by Fito et al. (2013), one can circumvent the issue of the original sample not being normally distributed. The new sample obtained from the comparability index will be normalized and thus normally distributed, allowing parametric tests to be used to test the significance of the results (Fito et al. 2013). Also, by normalizing the ratios, one would expect higher robustness of the sample as the value of potential extreme outliers are reduced (Løvås, 2013). The approach compares the financial ratios before capitalization with the ratios after capitalization. The difference is then divided by the initial ratio for comparability.

$$C_i = \frac{R_i' - R_i}{R_i}$$

$R_i$ = *Ratios without the effect from capitalization*

$R_i'$ = *Ratios with the effect of capitalization*

$C_i$ = *Comparability index*

### *6.5 Regression model*

The comparability index allows us to perform an ordinary least square regression where we control for size, sector and year. As some sectors are expected to face a

more substantial impact from IFRS 16 than others, quantifying this potential impact would be valuable instead of educated guessing.
The formal regression model is as follows:

$$CI_i = \beta_0 + \beta_i SIZE_i + \beta_i SECTOR_i + \beta_i Year_i + \varepsilon_i$$

For the lease intensity ratio, 63% of the ratios without the effect from capitalization was zero. Thus, the comparability index does not work properly for the ratio. For that reason, lease intensity has one regression model without capitalization (lease intensity) and one model with capitalization (lease intensity').
The lease intensity the regression model is as follows:

$$Lease\ intensity_i = \beta_0 + \beta_i SIZE_i + \beta_i SECTOR_i + \beta_i Year_i + \varepsilon_i$$
$$Lease\ intensity'_i = \beta_0 + \beta_i SIZE_i + \beta_i SECTOR_i + \beta_i Year_i + \varepsilon_i$$

The sectors employed are the sectors defined by Global Industry Classification Standard (GICS): 1) Communication Services, 2) Consumer Discretionary, 3) Consumer Staples, 4) Energy, 5) Financials, 6) Health Care, 7) Industrials, 8) Information Technology, 9) Materials, 10) Real Estate, 11) Utilities. In the regression model, Sector are eleven different dummy variables, which take the value of 1 if the company is in that sector and 0 otherwise. Size is the natural logarithm of the firm's market capitalization (mCap). There are five dummy variables that represent the years 2015 to 2019. The dummy variables are 1 if the ratio is from the year in question and 0 otherwise. To avoid the dummy variable trap, one source of perfect multicollinearity, the dummy variable of 2019 and Industrials is included in the intercept.

# 7.0 Analysis

The methodology, combined with the test procedures, will allow us to study the impact of IFRS 16 on the chosen ratios. The methodology gives a framework that is used to present one financial statement without operating leases at the balance sheet for the period 2015-2019 and one financial statement with operating leases over the same time period. With these two separate financial statements, one can isolate the effect of capitalizing operating leases and thereby examine the impact of IFRS 16. In the following chapter, a short description of the data will be

provided together with a preliminary analysis where the impact on the balance sheet and the income statement and thereby the effect on chosen ratios are studied. Further, keeping the ratios in focus, statistical tests are used to describe the characteristics of the sample of ratios. The regression model, a tool used to estimate the effect of IFRS 16, allows us to check whether sector, size or year explains the impact of recognizing operating leases on the balance sheet. Because assumptions might be partly incorrect, a sensitivity analysis is performed. Finally, some proposed weaknesses of the model will be highlighted.

### *7.1 Data*

For our research, the Bloomberg terminal was used to gather data. Using the Bloomberg terminal, it was possible to extract data from the financial statements of the companies in our sample. The data from Bloomberg was collected in two waves, one initial wave before the annual reports of 2019 was published, and then a second wave after the publication. Additionally, the notes related to leases in the financial reports for 2015 to 2018 was withdrawn manually from the annual reports in one wave. The notes related to leases in the financial reports of 2019 were withdrawn gradually as the companies published their annual reports during the spring of 2020.

As mentioned, GICS is the framework used for sector specification. The sector a company is located in is specified by Bloomberg. In table 7.1.1, the number of firms in each sector is presented, while in appendix 10.1.1 and 10.1.2 the full list of which sector each company in our sample belongs to is presented. In the sectors where there are only two or three companies, one should be careful when analyzing the impact of IFRS 16. This is because there might be an issue of representativeness in the sense that deviations will have a more substantial effect than if assessing a larger sample.

| Sector | Number of firms |
|---|---|
| **Communication Services** | 3 |
| **Consumer Discretionary** | 4 |
| **Consumer Staples** | 7 |
| **Energy** | 11 |
| **Financials** | 8 |
| **Health Care** | 4 |
| **Industrials** | 15 |
| **Information Technology** | 7 |
| **Materials** | 3 |
| **Real Estate** | 2 |
| **Utilities** | 2 |

*Table 7.1.1: The column Sector specifies the predefined GICS sectors. Number of firms specifies the number of firms in each sector as defined by Bloomberg.*

## *7.2 Preliminary analysis*

### *7.2.1 Impact on balance sheet*

The first step towards properly understanding the impact of IFRS 16 is to examine the effect on the balance sheet. In table 7.2.1.1 and 7.2.1.2, descriptive statistics for the impact on the balance sheet is presented. As expected, both assets and liabilities increase with IFRS 16. When recognizing lease contracts on the balance sheet that previously had not been capitalized, the balance sheet should increase, given that the company is involved in leasing activities. Before the implementation of IFRS 16, our sample had, on average, 94 062 million in assets and 73 529 million in liabilities. After IFRS 16, the same numbers are 96 946 million in assets and 77 055 million in liabilities. This represents an average nominal change of 2 885 million for the assets and 3 526 million for the liabilities. In percentage terms, assets increase on average with 3.1% while the liabilities increase on average with 4.8%. Looking at the median, it changes from assets of 18 779 million and liabilities of 10 254 million to assets of 19 603 million and liabilities of 11 784 million. The difference between the average assets and liabilities and the median assets and liabilities are quite large. One reason is that the average is exposed to large impacts from few companies, while the median only considers the observation that is the most in the middle of the sample. One example is Equinor, the largest company in the sample measured in market capitalization. Equinor faces an increase in its liabilities of 678 872 million, clearly a material impact on the average of the whole sample. The lower quartile goes from 2 574 million to 3 020 million for the liabilities. The interpretation of

the lower quartile is that before IFRS 16, 25% of the companies had liabilities of size lower than 2 574 million, while after IFRS 16, the same threshold is at 3 020 million. The interpretation of the upper quartile is that 75% of the companies have liabilities below 22 077 million before IFRS 16, while after the threshold is 24 589 million.

Comparing the results with those of other researchers, our estimated impact on assets and liabilities are lower. In general, other studies estimate the impact on liabilities to be much larger while the increase in assets is closer to our estimates, although still different. For example, Durocher (2008) estimated the assets to increase with 5.6% and the liabilities with 11.5%; Fülbier et al. (2008) estimated the assets to increase with 8.5% and the liabilities with 17.3%; Fito et al. (2013) estimated the assets to increase with 19.0% and the liabilities with 18.3%; and Morales-Díaz & Zamora-Ramírez (2018) estimated the assets to increase with 10.0% and the liabilities with 21.4%. Still, there are also studies where the estimated impact is more in line with our estimates. For instance, Wong & Joshi (2015), where the estimated impact on assets is 3.6% and on liabilities is 4.5%, and Pardo & Giner (2018), where the estimated impact on assets is 3.5% and on liabilities are 7.0%. One explanation for the varying changes could be that different countries are being studied, and the use of leases could vary across countries. Another possibility is the timespan considered. Our study looks at the impact over five years, while most other studies consider one or two years. Thus, a period of five years might diminish the effect of year-specific exceptions.

The difference between the sectors is displayed in table 7.2.1.1 and 7.2.1.2. Consumer Discretionary experiences the largest gain in assets and liabilities, 26.5% and 47.9%, respectively. Examples of firms inside the sector are Europris and XXL, where leasing of warehouse buildings represents a material amount. In fact, XXL is the company with the most substantial increase in liabilities, with 102.4%. Other industries that face a large increase in their liabilities are Industrials (e.g., Kongsberg Gruppen and Norwegian Air Shuttle), Materials (e.g., Norsk Hydro and Elkem), and Information Technology (e.g., ATEA and TietoEvry). The mentioned industries are characterized as being capital intensive where leasing of vessels, machines, and buildings are common; therefore, a

material impact from IFRS 16 is reasonable. On the other hand are industries where the need for tangible assets is lower. This is illustrated by the smaller increase in the liabilities for the sectors, Financials (e.g., DNB and Sparebank 1 SR-Bank), Health Care (e.g., PCI Biotech and Photocure) and Utilities (e.g., Fjordkraft Holding and Scatec Solar).

| Assets | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 94 062 | 96 946 | 2 885 | 3.1 % |
| **Q1** | 5 018 | 6 013 | 995 | 19.8 % |
| **Median** | 18 779 | 19 603 | 824 | 4.4 % |
| **Q3** | 41 736 | 43 104 | 1 368 | 3.3 % |
| **Sectors** | | | | |
| **Communication Services** | 79 937 | 87 687 | 7 750 | 9.7 % |
| **Consumer Discretionary** | 5 062 | 6 406 | 1 344 | 26.5 % |
| **Consumer Staples** | 27 049 | 28 069 | 1 020 | 3.8 % |
| **Energy** | 114 949 | 121 397 | 6 449 | 5.6 % |
| **Financials** | 469 063 | 470 279 | 1 215 | 0.3 % |
| **Health Care** | 345 | 348 | 3 | 0.9 % |
| **Industrials** | 19 420 | 22 658 | 3 238 | 16.7 % |
| **Information Technology** | 5 067 | 5 625 | 558 | 11.0 % |
| **Materials** | 100 650 | 107 662 | 7 013 | 7.0 % |
| **Real Estate** | 48 644 | 48 736 | 92 | 0.2 % |
| **Utilities** | 7 173 | 7 300 | 127 | 1.8 % |

*Table 7.2.1.1: Before and After refers to the level of assets without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average assets for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated. Numbers presented in NOK Millions.*

| Liabilities | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 73 529 | 77 055 | 3 526 | 4.8 % |
| **Q1** | 2 574 | 3 020 | 446 | 17.3 % |
| **Median** | 10 254 | 11 784 | 1 530 | 14.9 % |
| **Q3** | 22 077 | 24 589 | 2 511 | 11.4 % |
| **Sectors** | | | | |
| **Communication Services** | 54 707 | 61 903 | 7 196 | 13.2 % |
| **Consumer Discretionary** | 3 011 | 4 452 | 1 441 | 47.9 % |
| **Consumer Staples** | 11 599 | 12 753 | 1 154 | 9.9 % |
| **Energy** | 70 984 | 79 492 | 8 508 | 12.0 % |
| **Financials** | 426 919 | 427 927 | 1 008 | 0.2 % |
| **Health Care** | 46 | 49 | 3 | 6.9 % |
| **Industrials** | 12 516 | 16 291 | 3 775 | 30.2 % |
| **Information Technology** | 3 163 | 3 837 | 675 | 21.3 % |
| **Materials** | 42 719 | 52 286 | 9 566 | 22.4 % |
| **Real Estate** | 24 805 | 27 455 | 2 650 | 10.7 % |
| **Utilities** | 5 779 | 5 926 | 147 | 2.5 % |

*Table 7.2.1.2: Before and After refers to the level of liabilities without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average liabilities for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated. Numbers presented in NOK Millions.*

### *7.2.2 Impact on income statement*

Moving to the effect on the income statement, table 7.2.2.1 and 7.2.2.2 presents effects from the analysis performed. EBITDA increases with 15.3% (table 7.2.2.1). However, the percentage change in the median is a reduction of 4.2%. Comparing the average and the median, there are in-sample differences, and while some companies experience substantial gains, it is not the case for the whole sample. This is supported by the information provided by the lower and upper quartile, where the lower quartile drops after capitalization of operating leases, while the upper quartile increases.

Looking at the effects on sector level (table 7.2.2.1), the impact is mixed with both positive and negative changes. It is still Consumer Discretionary that sees the largest increase in EBITDA with 38.2%, while Materials and Energy also face a gain of 22.3% and 20.0%, respectively. Some sectors actually face a decrease in their EBITDA. Utilities, Health Care, and Consumer Staples are such examples where Utilities have the most substantial decline with 11.4%. Since rental expenses will disappear with IFRS 16, the depreciation and amortization expenses

caused by the new standard should be smaller than the rental expense if EBITDA increases. Hence, the results presented suggest that overall, most firms are in a situation where the removal of rental expenses is larger than the depreciation and amortization expenses added from IFRS 16.

| EBITDA | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 5 000 | 5 763 | 763 | 15.3 % |
| **Q1** | 72 | 67 | -5 | -7.0 % |
| **Median** | 1 401 | 1 343 | -59 | -4.2 % |
| **Q3** | 3 420 | 3 598 | 178 | 5.2 % |
| **Sector** | | | | |
| **Communication Services** | 16 463 | 17 609 | 1 146 | 7.0 % |
| **Consumer Discretionary** | 578 | 799 | 221 | 38.2 % |
| **Consumer Staples** | 4 162 | 4 113 | -49 | -1.2 % |
| **Energy** | 16 449 | 19 736 | 3 287 | 20.0 % |
| **Health Care** | -122 | -126 | -3 | -2.6 % |
| **Industrials** | 1 726 | 1 961 | 235 | 13.6 % |
| **Information Technology** | 624 | 634 | 10 | 1.5 % |
| **Materials** | 10 140 | 12 402 | 2 262 | 22.3 % |
| **Real Estate** | 3 239 | 3 245 | 6 | 0.2 % |
| **Utilities** | 783 | 694 | -90 | -11.4 % |

*Table 7.2.2.1: Before and After refers to the EBITDA without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average EBITDA for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated. Financials is excluded from this measure, further explanation provided in subchapter 5.5. Numbers presented in NOK Millions.*

Earnings before taxes barely increase, only 0.2%, when assessing the whole sample, as seen in table 7.2.2.2. The lower quartile improves materially, 223.2%, although this should be seen in connection with the relative closeness to zero compared with the other measures. When closer to zero, even small changes could have a large percentage change. The median shows that half of the companies have earnings before tax below 750 million before IFRS 16, while after IFRS 16, half of the sample have earnings before tax of 648 million, a major reduction. The upper quartile faces a similar reduction from 2 620 million to 2 343 million.

The majority of the sectors have a pre-tax income that declines (table 7.2.2.2); however, for Energy and Materials, the gain is so material that it outweighs the decline in the other sectors, 29.8% and 24.4% respectively. Consumer

Discretionary also contributes with a positive change from IFRS 16, however, not as material as the two mentioned, only 5.0%. The reason why earnings before tax would increase is that when combining interest expense with depreciation and amortization expenses, they are larger than the rental expense paid under IAS 17. In line with the results seen in connection with the impact on the balance sheet, it is the same sectors that are most affected.

| EBT | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 3 071 | 3 076 | 5 | 0.2 % |
| **Q1** | 4 | 13 | 9 | 223.2 % |
| **Median** | 750 | 648 | -103 | -13.7 % |
| **Q3** | 2 620 | 2 343 | -277 | -10.6 % |
| **Sectors** | | | | |
| **Communication Services** | 7 439 | 7 312 | -126 | -1.7 % |
| **Consumer Discretionary** | 247 | 260 | 12 | 5.0 % |
| **Consumer Staples** | 3 390 | 3 097 | -293 | -8.6 % |
| **Energy** | 5 974 | 7 753 | 1 779 | 29.8 % |
| **Financials** | 7 023 | 5 183 | -1 840 | -26.2 % |
| **Health Care** | -121 | -126 | -5 | -3.8 % |
| **Industrials** | 687 | 402 | -286 | -41.6 % |
| **Information Technology** | 423 | 316 | -107 | -25.2 % |
| **Materials** | 4 289 | 5 334 | 1 045 | 24.4 % |
| **Real Estate** | 3 655 | 3 651 | -4 | -0.1 % |
| **Utilities** | 385 | 279 | -106 | -27.6 % |

*Table 7.2.2.2: Before and After refers to the EBT without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average EBT for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated. Numbers presented in NOK Millions.*

### *7.2.3 Impact on ratios*

The next paragraph presents some descriptive statistics for the ratios analyzed as well as the differences between sectors. Some outliers had to be removed. These observations were far larger or far smaller than the remainder of the sample. Most ratios had outliers that were removed, with interest coverage ratio especially affected. If the interest expense was close to zero one year, it would provide a large outlier and was therefore excluded.

Starting with the risk measures for financial and operational risks, namely, D/A and D/E, the average D/A increases with 6.2% (table 7.2.3.1), implying that the

debt increases more than the assets. In line with the impact seen on the balance sheet where the effect on liabilities is larger than the effect on assets. On a sector level, Consumer Discretionary faces the most substantial increase, with 15.7%, thus supporting the large impact on the balance sheet seen for this sector. Financials and Utilities have a small increase in the D/A ratio, 0.7%, and 0.9%, respectively, as explained by the relatively little use of leases compared with the total size of their assets. Durocher (2008), Fito et al. (2013), and Wong & Joshi (2015), all find a positive impact on the D/A ratio, 2.7%, 3.5%, and 10.1%, respectively. Moving to D/E (table 7.2.3.2), the average declines with 14.1%, however, the quartiles, which show an increase in debt relative to equity, suggest that there are considerable differences between firms. This is supported by the results from sector level, showing a material drop for the Industrials of 87.3%, while all other sectors see their D/E increase. The major drop in Industrials is caused by Norwegian Air Shuttle, which has negative book equity in our model. The explanation is the substantial difference between the RoU, and the lease liability capitalized for Norwegian Air Shuttle in connection with IFRS 16. The difference is mostly recorded in book equity while a small part is in connection with deferred taxes. Investigating the importance of Norwegian Air Shuttle on the estimated D/E ratio, the company were removed from the D/E calculation. Then, the whole sample sees an increase of 9.0% (-14.1% with Norwegian Air Shuttle included) while Industrials face an increase of 18.5% (-87.3% when including Norwegian Air Shuttle). By removing Norwegian Air Shuttle, our estimated D/E ratio is more in line with expected results. Since debt was expected to increase and equity would stay relative unchanged, the D/E ratio would likely increase. This is seen in other studies, i.e., Fülbier et al. (2008), who found an increase of 13.5% while Wong & Joshi (2015) obtained an increase of 31.7%.

| D/A | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 0.54 | 0.57 | 0.034 | 6.2 % |
| **Q1** | 0.39 | 0.43 | 0.037 | 9.4 % |
| **Median** | 0.56 | 0.59 | 0.036 | 6.5 % |
| **Q3** | 0.70 | 0.73 | 0.033 | 4.7 % |
| **Sectors** | | | | |
| **Communication Services** | 0.52 | 0.55 | 0.025 | 4.8 % |
| **Consumer Discretionary** | 0.56 | 0.65 | 0.088 | 15.7 % |
| **Consumer Staples** | 0.44 | 0.46 | 0.023 | 5.2 % |
| **Energy** | 0.52 | 0.56 | 0.035 | 6.7 % |
| **Financials** | 0.78 | 0.79 | 0.006 | 0.7 % |
| **Health Care** | 0.17 | 0.18 | 0.009 | 5.4 % |
| **Industrials** | 0.58 | 0.62 | 0.040 | 6.8 % |
| **Information Technology** | 0.46 | 0.50 | 0.043 | 9.3 % |
| **Materials** | 0.46 | 0.51 | 0.047 | 10.2 % |
| **Real Estate** | 0.52 | 0.57 | 0.044 | 8.4 % |
| **Utilities** | 0.75 | 0.76 | 0.007 | 0.9 % |

*Table 7.2.3.1: Before and After refers to the D/A without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average D/A for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated.*

| D/E | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 2.33 | 2.00 | -0.329 | -14.1 % |
| **Q1** | 0.64 | 0.70 | 0.059 | 9.1 % |
| **Median** | 1.25 | 1.38 | 0.133 | 10.7 % |
| **Q3** | 2.31 | 2.58 | 0.272 | 11.8 % |
| **Sectors** | | | | |
| **Communication Services** | 1.58 | 1.60 | 0.023 | 1.4 % |
| **Consumer Discretionary** | 1.63 | 2.24 | 0.609 | 37.3 % |
| **Consumer Staples** | 0.81 | 0.89 | 0.083 | 10.3 % |
| **Energy** | 1.63 | 1.89 | 0.254 | 15.6 % |
| **Financials** | 7.07 | 7.04 | -0.023 | -0.3 % |
| **Health Care** | 0.22 | 0.23 | 0.016 | 7.6 % |
| **Industrials** | 2.62 | 0.33 | -2.283 | -87.3 % |
| **Information Technology** | 1.30 | 1.47 | 0.176 | 13.6 % |
| **Materials** | 0.92 | 1.07 | 0.150 | 16.3 % |
| **Real Estate** | 1.21 | 1.32 | 0.107 | 8.8 % |
| **Utilities** | 3.41 | 3.56 | 0.143 | 4.2 % |

*Table 7.2.3.2: Before and After refers to the D/E without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average D/E for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated.*

The ratios used to get an overview of profitability and expense structure of firms is the ROA and the interest coverage ratio. The ROA declines by 26.8%, mostly explained by an increase in the assets (table 7.2.3.3). The earnings before interest but after taxes, the numerator in ROA, decreases 5.9% (not presented in a table), also contributing to the total effect on ROA. Looking at sector level, the nominal changes are small, which leads to material percentage changes for some sectors. The general findings of other researchers are that the ROA decreased, for instance, Fito et al. (2013), where the ratio decreased with 7.4% and Wong & Joshi (2015), where the ratio decreased with 15.35%. The average interest coverage ratio decreases by 46.2% (table 7.2.3.4), and at sector level, there are large differences ranging from Information Technology with the largest decline to Consumer Staples with the biggest gain. Although the average is almost halved, Fülbier et al. (2008) and Morales-Díaz & Zamora-Ramírez (2018) also found a material negative impact on the interest coverage ratio, negative 17.2% and negative 12.2%, respectively.

| ROA | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 0.02 | 0.02 | -0.006 | -26.8 % |
| **Q1** | 0.01 | 0.01 | 0.001 | 14.3 % |
| **Median** | 0.04 | 0.04 | -0.005 | -10.8 % |
| **Q3** | 0.09 | 0.08 | -0.010 | -11.7 % |
| **Sectors** | | | | |
| **Communication Services** | 0,05 | 0.05 | -0.004 | -7.1 % |
| **Consumer Discretionary** | 0,01 | 0.02 | 0.005 | 40.0 % |
| **Consumer Staples** | 0.12 | 0.11 | -0.012 | -10.0 % |
| **Energy** | 0.03 | 0.03 | 0.003 | 13.2 % |
| **Financials** | 0.02 | 0.02 | -0.002 | -8.1 % |
| **Health Care** | -0.40 | -0.41 | -0.010 | -2.6 % |
| **Industrials** | 0.05 | 0.04 | -0.014 | -27.1 % |
| **Information Technology** | -0.01 | -0.02 | -0.012 | -125.4 % |
| **Materials** | 0.05 | 0.06 | 0.010 | 22.0 % |
| **Real Estate** | 0.06 | 0.06 | 0.000 | 0.05 % |
| **Utilities** | 0.12 | 0.11 | -0.015 | -12.1 % |

*Table 7.2.3.3: Before and After refers to the ROA without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average ROA for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated.*

| Interest Coverage | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 7.21 | 3.88 | -3.327 | -46.2 % |
| **Q1** | -2.97 | -1.08 | 1.894 | 63.7 % |
| **Median** | 3.55 | 4.03 | 0.478 | 13.5 % |
| **Q3** | 13.61 | 12.07 | -1.534 | -11.3 % |
| **Sectors** | | | | |
| **Communication Services** | 15.91 | 9.64 | -6.274 | -39.4 % |
| **Consumer Discretionary** | 6.37 | 8.36 | 1.994 | 31.3 % |
| **Consumer Staples** | 1.02 | 4.23 | 3.213 | 315.6 % |
| **Energy** | 5.06 | 6.17 | 1.119 | 21.9 % |
| **Health Care** | 38.10 | 41.11 | 3.012 | 7.9 % |
| **Industrials** | 7.79 | -0.18 | -7.979 | -102.3 % |
| **Information Technology** | 5.22 | -13.19 | -18.410 | -352.8 % |
| **Materials** | 10.90 | 19.82 | 8.921 | 81.9 % |
| **Real Estate** | 9.47 | 9.33 | -0.158 | -1.6 % |
| **Utilities** | -35.83 | -38.82 | -2.984 | -8.3 % |

*Table 7.2.3.4: Before and After refers to the interest coverage without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average interest coverage for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated. Financials is excluded from this measure, further explanation provided in subchapter 5.5.*

The common valuation multiples included in this analysis are P/E and EV/EBITDA. The P/E ratio increases on average, with 15.4% (table 7.2.3.5). Health Care is the sector with the largest gain, 223.1%, while Consumer Staples faces the largest decline of 46.9%. Fülbier et al. (2008) found a slightly negative impact on P/E of 0.2%, however, only one year was considered versus five years in our study. The EV/EBITDA, on the other hand, declines on average with 14.7% (table 7.2.3.6). The impact varies among the sectors, with six sectors experiencing an improved ratio while four face a ratio that declines. Damodaran (2009) found that EV/EBITDA decrease 1.5%. Although the size differs from the estimate obtained here, the sign is the same. It provides an overview of the impact one can expect when considering the effect on EV/EBITDA of the implementation of IFRS 16.

| P/E | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 27.50 | 31.72 | 4.222 | 15.4 % |
| **Q1** | 8.14 | 10.44 | 2.303 | 28.3 % |
| **Median** | 14.48 | 17.36 | 2.883 | 19.9 % |
| **Q3** | 23.00 | 28.98 | 5.981 | 26.0 % |
| **Sectors** | | | | |
| **Communication Services** | 47.11 | 62.41 | 15.294 | 32.5 % |
| **Consumer Discretionary** | 54.12 | 134.56 | 80.447 | 148.6 % |
| **Consumer Staples** | 36.37 | 19.31 | -17.062 | -46.9 % |
| **Energy** | 20.01 | 21.18 | 1.177 | 5.8 % |
| **Financials** | 24.71 | 41.76 | 17.056 | 69.0 % |
| **Health Care** | 20.68 | 66.82 | 46.141 | 223.1 % |
| **Industrials** | 26.01 | 23.72 | -2.291 | -8.8 % |
| **Information Technology** | 27.60 | 43.10 | 15.503 | 56.2 % |
| **Materials** | 16.84 | 22.51 | 5.677 | 33.6 % |
| **Real Estate** | 6.00 | 6.21 | 0.213 | 3.5 % |
| **Utilities** | 20.75 | 28.91 | 8.166 | 39.3 % |

*Table 7.2.3.5: Before and After refers to the P/E without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average P/E for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated. If the P/E is negative, it is removed due to the issue of interpretation of negative earnings.*

| EV/EBITDA | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 6.56 | 5.60 | -0.962 | -14.7 % |
| **Q1** | 3.75 | 4.19 | 0.436 | 11.6 % |
| **Median** | 7.91 | 7.35 | -0.568 | -7.2 % |
| **Q3** | 12.66 | 12.49 | -0.173 | -1.4 % |
| **Sectors** | | | | |
| **Communication Services** | 16.28 | 19.75 | 3.475 | 21.3 % |
| **Consumer Discretionary** | 15.01 | 12.47 | -2.544 | -16.9 % |
| **Consumer Staples** | 10.04 | 9.33 | -0.714 | -7.1 % |
| **Energy** | 2.13 | -3.64 | -5.777 | -270.5 % |
| **Health Care** | -11.77 | -8.00 | 3.777 | 32.0 % |
| **Industrials** | 8.52 | 6.70 | -1.829 | -21.3 % |
| **Information Technology** | 6.28 | 7.98 | 1.717 | 27.2 % |
| **Materials** | 2.66 | 6.22 | 3.569 | 133.9 % |
| **Real Estate** | 13.46 | 13.96 | 0.503 | 3.7 % |
| **Utilities** | 9.21 | 9.71 | 0.508 | 5.4 % |

*Table 7.2.3.6: Before and After refers to the EV/EBITDA without and with the operating leases capitalized on the balance sheet. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole sample. The different sectors are calculated as the average EV/EBITDA for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated. Financials is excluded from this measure, further explanation provided in subchapter 5.5.*

Lease intensity is a measure used to address our second hypothesis, how the lease financing has changed over the period studied. Table 7.2.3.7 provides some preliminary results. After IFRS 16, when operating leases are reported on the balance sheet, a material increase can be seen for all sectors either because zero operating leases before capitalization or since the amount of finance leases were small relative to total liabilities. The same reasoning applies when looking at the average in percentage terms, which increases with 226.0%, while the nominal change is only 0.085. The same goes for the sectors, where all have large percentage increases, given that they had leasing in the column Before, however, the nominal changes are small. The sectors that do not have any leases reported on the balance sheet before IFRS 16 are Health Care, Real Estate, and Utilities. It could also be interesting to look at the difference between sectors after IFRS 16. Real Estate has the lowest use of leases relative to the size of its liabilities (0.5%), while Consumer Discretionary has the highest use of leases relative to the size of its liabilities (26.7%), followed by Information Technology and Industrials, (14.8% and 14.7%). These results support the ones seen earlier regarding the impact on the balance sheet, where the same sectors are the ones most affected.

| Lease Intensity | Before | After | Change | Change in % |
|---|---|---|---|---|
| **Combined** | | | | |
| **Mean** | 0.04 | 0.12 | 0.085 | 226.0 % |
| **Q1** | 0.00 | 0.02 | 0.012 | 276.3 % |
| **Median** | 0.01 | 0.08 | 0.064 | 497.8 % |
| **Q3** | 0.01 | 0.16 | 0.155 | 2872.6 % |
| **Sectors** | | | | |
| **Communication Services** | 0.01 | 0.12 | 0.108 | 1230.5 % |
| **Consumer Discretionary** | 0.00 | 0.27 | 0.263 | 7643.3 % |
| **Consumer Staples** | 0.06 | 0.10 | 0.047 | 85.8 % |
| **Energy** | 0.02 | 0.10 | 0.083 | 385.9 % |
| **Financials** | 0.00 | 0.03 | 0.022 | 613.8 % |
| **Health Care** | - | 0.06 | - | - |
| **Industrials** | 0.07 | 0.15 | 0.081 | 122.1 % |
| **Information Technology** | 0.03 | 0.15 | 0.119 | 409.9 % |
| **Materials** | 0.01 | 0.08 | 0.076 | 1441.8 % |
| **Real Estate** | - | 0.01 | - | - |
| **Utilities** | - | 0.03 | - | - |

*Table 7.2.3.7: The column Before address the lease intensity without any operating leases reported on the balance sheet so it only measures the finance leases. The column After measures when the operating leases are reported at the balance sheet in addition to the previous finance lease, both being combined into leases post-IFRS 16. Change measures the change in nominal value between After and Before. Change in % is the percentage change calculated as Change/Before. Combined refers to the descriptive statistics for the whole*

*sample. The different sectors are calculated as the average lease intensity for each company in the period 2015 to 2019, thereafter the companies are grouped in sectors where the average of the sector is calculated. Cells with – refers to sectors where none companies had leases before IFRS 16.*

## *7.3 Main Analysis*

### *7.3.1 Jarque-Bera test*

The Jarque-Bera test is used to check whether the ratios are normally distributed. Based on the test statistic calculated, and a significance level of 5%, the null hypothesis that the ratios are normally distributed can be rejected. The implication is that the distribution of ratios before IFRS 16 and the distribution of ratios after IFRS 16 do not closely resemble a normal distribution. Thus, non-parametric test procedures are used as parametric ones can provide misleading estimates.

### *7.3.2 Spearman*

The Spearman correlations range from 0.970 to 0.263, where a coefficient of 1 means that the relative ranking is equal before and after IFRS 16. The lowest correlation is for lease intensity. The resulting low ranking is due to the number of observations that are zero when operating leases are kept off the balance sheet. Therefore, it is not necessarily comparable to measure the lease intensity before and after IFRS 16. The D/A ratio is the one with the highest correlation coefficient, implying that the variables' rankings have stayed about the same for the ratio. D/E (0.906), ROA (0.903) and interest coverage (0.827) have correlation coefficients that suggest a small difference in ranking with and without capitalization. P/E and EV/EBITDA have correlation coefficients of 0.847 and 0.798. Since many investors use these measures to perform relative valuation, the results suggest that investors may change investing decisions if these ratios are relied heavily on in investing decisions.

| Spearman | D/A | D/E | Lase Intensity | ROA | Interest Coverage | P/E | EV/EBITDA |
|---|---|---|---|---|---|---|---|
| **D/A'** | 0.970*** | | | | | | |
| **D/E'** | | 0.906*** | | | | | |
| **Lease Intensity'** | | | 0.263*** | | | | |
| **ROA'** | | | | 0.903*** | | | |
| **Interest Coverage'** | | | | | 0.827*** | | |
| **P/E'** | | | | | | 0.847*** | |
| **EV/EBITDA'** | | | | | | | 0.798*** |

*Table 7.3.2: The table displays the Spearman correlation between the ratios with and without operating leases. 'Represents ratios with operating leases capitalized. * represents the variable being significant on a 10% significance level, ** a significance level of 5% and *** a significance level of 1%.*

### *7.3.3 Wilcoxon signed-rank test*

Due to the non-normality of the sample of ratios, as reported by the Jarque-Bera test, the Wilcoxon signed-rank test is used. The downside of the Wilcoxon test is that it only tells whether the median is different before and after IFRS 16, it does not tell the sign and size of the change. Table 7.3.3.1 shows that the median has changed for all ratios in the table except ROA when the whole sample is considered, and a 5% significance level is used. Our null hypothesis is therefore rejected for the ratios presented in table 7.3.3.1, except ROA. Consequently, we can say that interest coverage, P/E, and EV/EBITDA are changed significantly when operating leases are included on the balance sheet. On a sector level, interest coverage is the ratio with most sectors having a significantly changed median, eight out of the eleven sectors when using a 5% significance level. For P/E, the median has changed significantly for three of the sectors, while for EV/EBITDA, only two sectors have had a significant impact. Consumer Staples is the sector in which the most ratios have been impacted on a 5% significance level. Materials and Consumer Discretionary have fewest ratios with zero significant ratios.

| Wilcoxon | ROA | Interest Coverage | P/E | EV/EBITDA | 10% | 5% | 1% |
|---|---|---|---|---|---|---|---|
| **Communication Services** | 0.295 | 0.006 | 0.764 | 0.965 | 1 | 1 | 1 |
| **Consumer Discretionary** | 0.822 | 0.218 | 0.277 | 0.420 | 0 | 0 | 0 |
| **Consumer Staples** | 0.002 | 0.040 | 0.973 | 0.047 | 3 | 3 | 1 |
| **Energy** | 0.028 | 0.001 | 0.403 | 0.106 | 2 | 2 | 1 |
| **Financials** | 0.981 | NaN | 0.025 | NaN | 1 | 1 | 0 |
| **Health Care** | 0.078 | 0.000 | 0.500 | 0.286 | 2 | 1 | 1 |
| **Industrials** | 0.883 | 0.044 | 0.311 | 0.864 | 1 | 1 | 0 |
| **IT** | 0.304 | 0.023 | 0.043 | 0.831 | 2 | 2 | 0 |
| **Materials** | 0.252 | 0.890 | 0.240 | 0.898 | 0 | 0 | 0 |
| **Real Estate** | 0.296 | 0.015 | 0.322 | 0.570 | 1 | 1 | 0 |
| **Utilities** | 0.496 | 0.128 | 0.812 | 1.000 | 0 | 0 | 0 |
| **Combined** | 0.999 | 0.000 | 0.001 | 0.049 | 3 | 3 | 2 |
| **10%** | 3 | 8 | 3 | 2 | **16** | | |
| **5%** | 2 | 8 | 3 | 2 | | **15** | |
| **1%** | 1 | 4 | 1 | 0 | | | **6** |

*Table 7.3.3.1: Wilcoxon test for ROA, interest coverage, P/E and EV/EBITDA. The table displays the p-values related to the likelihood that the median is different for the ratio with and without operating leases. This is done both for each individual sector and for the whole sample where Combined represents the whole sample. Financials is omitted from ratios that include EBITDA, further explanation provided in subchapter 5.5. This is the reason for the NaNs. The number of significant test results are displayed both per column and*

*per row. The sum of significant observations is displayed in the bottom right corner.*

Table 7.3.3.2 shows that when the whole sample is considered, the test suggests that the median has significantly changed for the ratios in the table. Therefore, the null hypothesis is rejected for all ratios in the table. Consequently, for these ratios as well, we can say that the capitalization of operating leases has significantly impacted the ratios. The numbers in the table show a significant impact across most sectors as well.

| Wilcoxon | D/A | D/E | Lease Intensity | 10% | 5% | 1% |
|---|---|---|---|---|---|---|
| **Communication Services** | 0.004 | 0.013 | 0.000 | 3 | 3 | 2 |
| **Consumer Discretionary** | 0.000 | 0.000 | 0.000 | 3 | 3 | 3 |
| **Consumer Staples** | 0.000 | 0.000 | 0.000 | 3 | 3 | 3 |
| **Energy** | 0.000 | 0.000 | 0.000 | 3 | 3 | 3 |
| **Financials** | 0.036 | 0.187 | 0.000 | 2 | 2 | 1 |
| **Health Care** | 0.001 | 0.001 | 0.000 | 3 | 3 | 3 |
| **Industrials** | 0.000 | 0.000 | 0.000 | 3 | 3 | 3 |
| **IT** | 0.000 | 0.000 | 0.000 | 3 | 3 | 3 |
| **Materials** | 0.000 | 0.000 | 0.000 | 3 | 3 | 3 |
| **Real Estate** | 0.016 | 0.016 | 0.008 | 3 | 3 | 1 |
| **Utilities** | 0.004 | 0.004 | 0.004 | 3 | 3 | 3 |
| **Combined** | 0.000 | 0.000 | 0.000 | 3 | 3 | 3 |
| **10%** | 12 | 11 | 12 | **35** | | |
| **5%** | 12 | 11 | 12 | | **35** | |
| **1%** | 10 | 9 | 12 | | | **31** |

*Table 7.3.3.2: Wilcoxon test for D/A, D/E and lease intensity. The table displays the p-values related to the likelihood that the median is different for the ratio with and without operating leases. This is done for both each individual sector and the whole sample where Combined represents the whole sample. The number of significant test results are displayed both per column and per row. The sum of significant observations is displayed in the bottom right corner.*

### *7.3.4 Regression*

The comparability index is used for the regression. For lease intensity the regression formula is as seen in the following formula:

$$Lease\ intensity_i = \beta_0 + \beta_i SIZE_i + \beta_i SECTOR_i + \beta_i Year_i + \varepsilon_i$$

$$Lease\ intensity'_i = \beta_0 + \beta_i SIZE_i + \beta_i SECTOR_i + \beta_i Year_i + \varepsilon_i$$

For all other regressions, the following regression model is being used:

$$CI_i = \beta_0 + \beta_i SIZE_i + \beta_i SECTOR_i + \beta_i Year_i + \varepsilon_i$$

The first field of inquiry is whether or not the lease intensity declined throughout the period. The conclusions drawn here would provide an answer to our second hypothesis related to the use of lease intensity from 2015 to 2019. Looking at table 7.3.4.1, the coefficients for the 2015 to 2018 dummies are negative in the regression without operating leases. For the regression without operating leases on the balance sheet, 2015 was the year with the least financial leases, and then it increases until 2017 before it dips slightly and then increases again for 2019. The regression suggests that financial leases were seemingly increasing in the period. In the model with operating leases, the dummy variables for 2015 to 2018 were positive, the inference being that the use of leases was lowest in 2019. The coefficients of the dummies do also decrease from 2015 to 2018, which may infer that the change away from leases may be gradual. It should be noted that none of the p-values related to the year-dummies in the model without capitalization are significant at a 10% significance level. Additionally, with standard errors larger than the coefficients, these numbers are unlikely to be precise, and the inferences drawn from the coefficients wrong or misleading. The range of the impact from sectors in the regression without operating leases is 0.047. Consumer Staples is the dummy with the highest coefficient and real estate having the lowest coefficient. For the regression with operating leases, the range is 0.268, Consumer Discretionary having the highest coefficient, and Real Estate with the lowest.

| Lease Intensity Without OL | Estimate | SE | P Value | Lease Intensity With OL | Estimate | SE | P Value |
|---|---|---|---|---|---|---|---|
| **Constant** | 0.025 | 0.015 | 0.086* | **Constant** | 0.070 | 0.034 | 0.038** |
| **2018** | -0.005 | 0.008 | 0.558 | **2018** | 0.001 | 0.018 | 0.955 |
| **2017** | -0.004 | 0.008 | 0.610 | **2017** | 0.003 | 0.018 | 0.862 |
| **2016** | -0.006 | 0.008 | 0.462 | **2016** | 0.009 | 0.018 | 0.603 |
| **2015** | -0.006 | 0.008 | 0.420 | **2015** | 0.016 | 0.018 | 0.386 |
| **log(mCap)** | 0.000 | 0.001 | 0.910 | **log(mCap)** | 0.004 | 0.002 | 0.020** |
| **Communication Services** | -0.020 | 0.013 | 0.130 | **Communication Services** | -0.017 | 0.029 | 0.564 |
| **Consumer Discretionary** | -0.021 | 0.011 | 0.062* | **Consumer Discretionary** | 0.126 | 0.025 | 0.000*** |
| **Consumer Staples** | 0.024 | 0.009 | 0.008*** | **Consumer Staples** | -0.047 | 0.021 | 0.027** |
| **Energy** | -0.017 | 0.008 | 0.036** | **Energy** | -0.041 | 0.018 | 0.027** |
| **Financials** | -0.022 | 0.009 | 0.013** | **Financials** | -0.122 | 0.020 | 0.000*** |
| **Health Care** | -0.022 | 0.011 | 0.050** | **Health Care** | -0.067 | 0.026 | 0.011** |
| **Information Technology** | -0.006 | 0.009 | 0.505 | **Information Technology** | 0.007 | 0.021 | 0.718 |
| **Materials** | -0.017 | 0.013 | 0.169 | **Materials** | -0.056 | 0.029 | 0.051 |
| **Real Estate** | -0.023 | 0.015 | 0.128 | **Real Estate** | -0.142 | 0.034 | 0.000 |
| **Utilities** | -0.023 | 0.016 | 0.154 | **Utilities** | -0.099 | 0.036 | 0.006 |
| **n** | 325 | | | **n** | 325 | | |
| **rmse** | 0.044 | | | **rmse** | 0.101 | | |
| **$R^2$** | 0.104 | | | **$R^2$** | 0.275 | | |
| **Adj. $R^2$** | 0.605 | | | **Adj. $R^2$** | 0.240 | | |
| **f-stat(p-value)** | 0.003 | | | **f-stat(p-value)** | 0.000 | | |

*Table 7.3.4.1: The table displays the ordinary least squares linear regression of two different regressions; one with the dependent variable being lease intensity without capitalization of operating leases and one with capitalization of operating leases. Lease intensity is not analyzed with the comparability index as too many companies had zero leases if not operating leases was included. 63% of the observations had to be removed if the comparability index was to be used. 2015, 2016, 2017 and 2018 represents dummy variables for the years 2015 to 2018. Log(mCap) is the natural logarithm of market capitalization at the end of the year. The sectors are all dummy variables. 2019 and Industrials are omitted as the inclusion would lead to perfect multicollinearity. * represents the variable being significant on a 10% significance level, ** a significance level of 5% and *** a significance level of 1%.*

The second field of inquiry is the impact of capitalization on selected financial ratios. The results from the regressions are in table 7.3.4.2-7.3.4.4. The $R^2$ for the regression models range from 0.035 to 0.173 (adjusted $R^2$ ranging from -0.016 to 0.116). Few of the independent variables are significant for most of the regression models. The year-dummies for ROA and P/E are all significant at a 1% significance level, while for EV/EBITDA, all year dummies are significant at a 10% significance level. The coefficients associated with the dummies are large, suggesting a significant difference for the ratios between 2019 and the other years. Log(mCap) is not significant for any of the comparability index regression models. Very few of the sectors' variables are significant, the impact of IFRS 16

on specific sectors in terms of ratios are therefore uncertain. The regression yielded few conclusive results towards the impact on ratios of capitalizing operating leases even when controlling for size, sector, and year.

| D/A | Estimate | SE | P Value | D/E | Estimate | SE | P Value |
|---|---|---|---|---|---|---|---|
| **Constant** | 0.065 | 0.081 | 0.425 | **Constant** | 0.039 | 0.220 | 0.860 |
| **2018** | -0.029 | 0.042 | 0.498 | **2018** | -0.110 | 0.115 | 0.339 |
| **2017** | -0.036 | 0.042 | 0.400 | **2017** | -0.112 | 0.115 | 0.330 |
| **2016** | -0.021 | 0.043 | 0.625 | **2016** | -0.061 | 0.117 | 0.604 |
| **2015** | -0.015 | 0.043 | 0.721 | **2015** | -0.141 | 0.118 | 0.231 |
| **log(mCap)** | 0.002 | 0.004 | 0.692 | **log(mCap)** | 0.004 | 0.012 | 0.740 |
| **Communication Services** | 0.016 | 0.071 | 0.823 | **Communication Services** | 0.090 | 0.193 | 0.641 |
| **Consumer Discretionary** | 0.109 | 0.061 | 0.077* | **Consumer Discretionary** | 0.520 | 0.166 | 0.002*** |
| **Consumer Staples** | -0.024 | 0.051 | 0.639 | **Consumer Staples** | 0.073 | 0.137 | 0.594 |
| **Energy** | 0.005 | 0.044 | 0.906 | **Energy** | 0.141 | 0.119 | 0.240 |
| **Financials** | -0.056 | 0.048 | 0.249 | **Financials** | 0.005 | 0.131 | 0.969 |
| **Health Care** | -0.007 | 0.062 | 0.911 | **Health Care** | 0.069 | 0.170 | 0.684 |
| **Information Technology** | 0.041 | 0.050 | 0.417 | **Information Technology** | 0.198 | 0.136 | 0.144 |
| **Materials** | 0.054 | 0.069 | 0.436 | **Materials** | 0.225 | 0.187 | 0.230 |
| **Real Estate** | 0.337 | 0.082 | 0.000*** | **Real Estate** | 0.864 | 0.223 | 0.000*** |
| **Utilities** | -0.056 | 0.087 | 0.517 | **Utilities** | 0.031 | 0.236 | 0.897 |
| **n** | 325 | | | **n** | 325 | | |
| **rmse** | 0.243 | | | **rmse** | 0.659 | | |
| **$R^2$** | 0.083 | | | **$R^2$** | 0.081 | | |
| **Adj. $R^2$** | 0.039 | | | **Adj. $R^2$** | 0.036 | | |
| **f-stat(p-value)** | 0.026 | | | **f-stat(p-value)** | 0.033 | | |

*Table 7.3.4.2: The tables display the ordinary least squares linear regressions performed on D/A and D/E. The dependent variables are the ratios that have been transformed with the comparability index as outlined in subchapter 6.5 Comparability index. An estimate of 1 will therefore signify an increase of 100%, and an estimate of -1 would signify a decrease of 100%. 2015, 2016, 2017 and 2018 represents dummy variables for the years 2015 to 2018. Log(mCap) is the natural logarithm of market capitalization at the end of the year. The sectors are all dummy variables. 2019 and Industrials are omitted as the inclusion would lead to perfect multicollinearity. * represents the variable being significant on a 10% significance level, ** a significance level of 5% and *** a significance level of 1%.*

| ROA | Estimate | SE | P Value | P/E | Estimate | SE | P Value |
|---|---|---|---|---|---|---|---|
| **Constant** | -0.486 | 0.469 | 0.302 | **Constant** | 5.052 | 2.694 | 0.062* |
| **2018** | 0.904 | 0.241 | 0.000*** | **2018** | -2.353 | 0.478 | 0.000*** |
| **2017** | 0.901 | 0.243 | 0.000*** | **2017** | -2.286 | 0.482 | 0.000*** |
| **2016** | 0.887 | 0.245 | 0.000*** | **2016** | -2.427 | 0.486 | 0.000*** |
| **2015** | 1.170 | 0.247 | 0.000*** | **2015** | -2.621 | 0.514 | 0.000*** |
| **log(mCap)** | -0.014 | 0.026 | 0.581 | **log(mCap)** | -0.156 | 0.165 | 0.345 |
| **Communication Services** | -0.108 | 0.401 | 0.788 | **Communication Services** | -0.315 | 0.897 | 0.726 |
| **Consumer Discretionary** | -0.195 | 0.347 | 0.575 | **Consumer Discretionary** | -0.304 | 0.746 | 0.684 |
| **Consumer Staples** | -0.108 | 0.287 | 0.707 | **Consumer Staples** | -0.385 | 0.558 | 0.491 |
| **Energy** | -0.512 | 0.249 | 0.041** | **Energy** | 0.240 | 0.561 | 0.669 |
| **Financials** | -0.184 | 0.273 | 0.502 | **Financials** | 0.221 | 0.544 | 0.685 |
| **Health Care** | -0.141 | 0.366 | 0.700 | **Health Care** | 0.585 | 1.756 | 0.739 |
| **Information Technology** | -0.205 | 0.286 | 0.473 | **Information Technology** | -0.082 | 0.572 | 0.886 |
| **Materials** | -0.248 | 0.390 | 0.525 | **Materials** | -0.004 | 0.902 | 0.997 |
| **Real Estate** | -0.050 | 0.464 | 0.915 | **Real Estate** | -0.477 | 0.833 | 0.567 |
| **Utilities** | -0.169 | 0.493 | 0.731 | **Utilities** | -0.498 | 0.964 | 0.606 |
| **n** | 321 | | | **n** | 235 | | |
| **rmse** | 1.370 | | | **rmse** | 2.390 | | |
| **$R^2$** | 0.099 | | | **$R^2$** | 0.173 | | |
| **Adj. $R^2$** | 0.054 | | | **Adj. $R^2$** | 0.116 | | |
| **f-stat(p-value)** | 0.006 | | | **f-stat(p-value)** | 0.000 | | |

*Table 7.3.4.3: The tables display the ordinary least squares linear regressions performed on ROA and P/E. The dependent variables are the ratios that have been transformed with the comparability index as outlined in subchapter 6.5 Comparability index. An estimate of 1 will therefore signify an increase of 100%, and an estimate of -1 would signify a decrease of 100%. One outlier of 66 was removed from ROA. 2015, 2016, 2017 and 2018 represents dummy variables for the years 2015 to 2018. Log(mCap) is the natural logarithm of market capitalization at the end of the year. The sectors are all dummy variables. 2019 and Industrials are omitted as the inclusion would lead to perfect multicollinearity. * represents the variable being significant on a 10% significance level, ** a significance level of 5% and *** a significance level of 1%.*

| Interest Coverage | Estimate | SE | P Value | EV/EBITDA | Estimate | SE | P Value |
|---|---|---|---|---|---|---|---|
| **Constant** | -0.540 | 0.518 | 0.298 | **Constant** | -0.380 | 0.938 | 0.686 |
| **2018** | 0.764 | 0.279 | 0.007*** | **2018** | -0.323 | 0.172 | 0.061* |
| **2017** | 0.319 | 0.283 | 0.260 | **2017** | -0.495 | 0.174 | 0.005*** |
| **2016** | 0.389 | 0.289 | 0.180 | **2016** | -0.506 | 0.175 | 0.004*** |
| **2015** | 0.650 | 0.287 | 0.024** | **2015** | -0.371 | 0.180 | 0.040** |
| **log(mCap)** | 0.000 | 0.028 | 0.995 | **log(mCap)** | 0.052 | 0.058 | 0.375 |
| **Communication Services** | -0.049 | 0.444 | 0.912 | **Communication Services** | -0.265 | 0.336 | 0.430 |
| **Consumer Discretionary** | -0.124 | 0.379 | 0.744 | **Consumer Discretionary** | -0.242 | 0.239 | 0.313 |
| **Consumer Staples** | 0.046 | 0.311 | 0.881 | **Consumer Staples** | -0.240 | 0.206 | 0.245 |
| **Energy** | 0.035 | 0.272 | 0.899 | **Energy** | -0.277 | 0.175 | 0.115 |
| **Health Care** | 0.090 | 0.388 | 0.818 | **Health Care** | -0.124 | 0.270 | 0.648 |
| **Information Technology** | 0.051 | 0.309 | 0.869 | **Information Technology** | 0.159 | 0.195 | 0.416 |
| **Materials** | -0.089 | 0.429 | 0.836 | **Materials** | -0.428 | 0.326 | 0.190 |
| **Real Estate** | 0.113 | 0.497 | 0.820 | **Real Estate** | -0.177 | 0.327 | 0.589 |
| **Utilities** | 0.158 | 0.528 | 0.765 | **Utilities** | -0.041 | 0.388 | 0.917 |
| **n** | 273 | | | **n** | 263 | | |
| **rmse** | 1.470 | | | **rmse** | 0.910 | | |
| **$R^2$** | 0.036 | | | **$R^2$** | 0.068 | | |
| **Adj. $R^2$** | -0.016 | | | **Adj. $R^2$** | 0.016 | | |
| **f-stat(p-value)** | 0.787 | | | **f-stat(p-value)** | 0.210 | | |

*Table 7.3.4.4: The tables display the ordinary least squares linear regressions performed on interest coverage and EV/EBITDA. The dependent variables are interest coverage and EV/EBITDA that have been transformed with the comparability index as outlined in subchapter 6.5 Comparability index. An estimate of 1 will therefore signify an increase of 100%, and an estimate of -1 would signify a decrease of 100%. One outlier of -420 was removed from interest coverage. 2015, 2016, 2017 and 2018 represents dummy variables for the years 2015 to 2018. Log(mCap) is the natural logarithm of market capitalization at the end of the year. The sectors are all dummy variables. 2019 and Industrials are omitted as the inclusion would lead to perfect multicollinearity. Financials is omitted as the EBITDA, further explanation provided in subchapter 5.5. * represents the variable being significant on a 10% significance level, ** a significance level of 5% and *** a significance level of 1%.*

### *7.3.5 Sensitivity analysis*

Parameters believed to be of interest in the sensitivity analysis are the interest rate and tax rate. Interest rate is used to discount both the cash flows associated with bringing operating leases onto the balance sheet and determine the interest expense that stems from operating leases. The interest expense calculations are only done for the years 2015 to 2018, and there is no discounting for the 2019 model. For this reason, only numbers from 2015 to 2018 after capitalization are sensitive to interest rates. The sensitivity analysis on the interest rate is presented in appendix 10.3.1-10.3.7. When grouping the companies by sector and looking into the impact of changes in interest rate, it was clear that Industrials was the

most heavily impacted. The reason is that Norwegian Air Shuttle is included in Industrials. When the interest rate is reduced, the company changes from being a negative equity company to a positive equity company. The ratio being most sensitive to changes in interest rate is interest coverage. A change of 2% leads to material impacts across most of the sectors. The biggest impact is on the Energy sector, due to one company obtaining an interest expense close to zero. The P/E ratio is also sensitive to changes in the interest rate, though not to such a large degree as the interest coverage ratio. The remaining ratios are relatively resilient to changes in the interest rate.

The tax perspective of the sensitivity analysis (presented in appendix 10.4.1-10.4.3) considers three different scenarios. The two first use the tax method explained in subchapter 4.9 Tax Rate and add 10% or subtract 10% from the obtained tax rate for each company. The third scenario is to use the average of the firm-specific effective tax rates extracted from Bloomberg directly. In terms of sensitivity towards tax, not all ratios are relevant. As the model does not include retained earnings for the equity estimate, the impact on the balance sheet is minimal. Ratios that are impacted with some magnitude are D/E, ROA and P/E (see appendix 10.4.1-10.4.3). The main tendency for ROA is to decline as tax increase. The sector that is most heavily impacted by the change in tax rate is Energy. The 10% increase in tax estimate shows that the ROA is reduced by 25%, while the 10% reduction in tax leads to a 15% increase in ROA. The impact is even more prominent when compared with the Bloomberg effective tax rates. If the Bloomberg tax rates are used, the Energy sector would have a negative ROA instead of the current positive one. The high sensitivity to tax rate is partly because of the low average ROA the Energy sector has in the current sample and partly because the sector includes oil companies. Equinor has a tax rate higher than the cap of 48.5%, which leads to large deviations when comparing the Bloomberg numbers with winsorized numbers. The P/E ratio shows the opposite relation compared with ROA. In general, the P/E increases when increasing the tax rate and decreases when reducing the tax rate. Communication Services are severely impacted, so are Consumer Discretionary. The reason for Consumer Discretionary having such a high increase with Bloomberg tax rate is that there is an outlier with earnings being close to zero.

### *7.4 Weaknesses of the analysis*

The regression analysis suggests a significant difference between 2019 and the other years for some ratios. The cause could be that the model we have constructed cannot accurately determine the correct size of operating leases before the capitalization of operating leases in 2019. The reason for which may be that the information published in the financial reports before 2019 was not representative of the actual lease obligations the company has. The most notable example is Sparebank 1 SR-Bank. As stated in their annual report 2018, the company had no significant operating leases per 31. December 2018, which in the 2019 report turned out to have been 1 billion NOK per 01. January 2019. This did, however, only constitute 0.4% of their total liabilities in 2019. The model may also be at fault as the conversion between having operating leases on the balance sheet and taking the operating leases out demands some assumptions which we had to make in order to get a functioning model.

IFRS 16 allows an exception from the requirement of capitalizing leases if the value of the lease contract is lower than $ 5 000 and where the length of the lease term is less than one year. Our model did not attempt to capture this effect. Consequently, we address balance sheets that could possibly lack a certain amount of leases. Despite this, the exception is not believed to provide a material amount not being capitalized, and the conclusions drawn are unlikely to suffer substantial changes.

# 8.0 Conclusion

Our study sought to determine the effect of IFRS 16 on financial ratios and the use of lease financing in Norwegian listed firms. The way this was done was through the use of the constructive capitalization method. The resulting models were used to illuminate our research questions, whether or not the capitalization of operating leases would impact our selected financial ratios and whether or not IFRS 16 would lead to lower lease intensity.

During the preliminary analysis, a smaller increase on the balance sheet and the income statement was found compared to similar studies. Our average estimated increase was 4.8% for liabilities, whereas other studies have found increases of 5.6% to 21.4%. On the income statement, the increase in EBITDA and the corresponding increase in interest expenses and depreciation and amortization expenses did outweigh each other, leading to a slight increase in earnings before taxes. An increase in D/A was observed in the preliminary part. On the other hand, D/E did decline 14.1%, however, by removing Norwegian Air Shuttle from the calculations, the D/E would increase 9.0% instead. The changes in ROA (-26.8%), interest coverage (+46.2%), P/E (+15.4%), and EV/EBITDA (-14.7%) were all estimated to be impacted more than what was seen in similar studies. The capitalization of operating leases led lease intensity to increase with 0.085 in nominal terms corresponding to an increase of 226%.

The statistical framework provided estimates needed to conclude on the impact of IFRS 16. The Wilcoxon test proved a change in the median for all ratios but ROA. The sector that had most ratios changed significantly was Consumer Staples, while Materials had fewest significant ratios. The regression analysis did suggest a decline in lease intensity from 2015 to 2019. However, the results were in no way significant, and the hypothesis that lease intensity declined could not be confirmed. The implication is that managers do not change financing behavior when the financing decisions become more easily observable by other stakeholders.

Investors looking to compare numbers before and after 2019 should be aware that some ratios change significantly, and the changes are different from sector to sector. D/A increase between 0.7% to 15.7% depending on the sector. IT (+ 9.3%), Materials (+ 10.2%) and Consumer Discretionary (+ 15.7%) are the sectors that have the biggest changes and the changes are significant on a 1% level. When comparing D/A through periods, an increase in this ratio should be considered as the true leverage was higher than observable before IFRS 16. Similarly, for the ratio D/E, where, if ignoring Industrials, the ratio varies between -0.3% to 37.3%. Energy (+ 15.6%), Materials (+ 16.3%) and Consumer Discretionary (+ 37.3%) are all significantly changed at a 1% significance level and are the sectors where the ratio is impacted the most. The impact on D/E is more sector-specific than for the D/A ratio, the general tendency is, however, an increase in the ratio. The direct implication of increases in these ratios could be that companies are not compliant with covenants, and thus would need to renegotiate terms with lenders. With an increase in D/E one would expect an increase in riskiness as well. The firm´s ability to service its financial obligations is, however, not changed directly from the capitalization of operating leases. The perceived riskiness of the firm may change, since an increase in the D/E ratio usually implies an increase in risk associated with the equity.

The ratios used for valuation purposes, P/E and EV/EBITDA, are significantly impacted, suggesting that an investor using these ratios for valuation should show extra care when applying them post-IFRS 16. The reason being that pre-IFRS 16 benchmarks are misleading. The P/E ratio is expected to change, the direction is seemingly dependent on the sector. The ratio ranges from -46.9% (Consumer Staples) to +223.1% (Health Care) though the change was only significant for two sectors, namely, IT (+ 56.2%) and Financials (+ 69%). EV/EBITDA is significantly changed at a 5% significance level when considering the whole sample. At sector level, only Consumer Staples is changed significantly (- 7.1%). An investor considering making investments based on the ratio should treat the investment decision with more care until a clearer picture is made. Interest coverage is impacted, though the direction varies. Among the sectors that are significantly impacted, some see an increase while others see a decrease in the ratio. The meaning of the interest coverage ratio may change. The impact of

capitalizing operating leases differs from sector to sector and the resulting ratio may reflect, in a better manner than earlier, the risks of the company. The exact implications of the changes in the ratio is, however, uncertain and the ratio should be treated with care.

Stakeholders seeking to get an overview of factors affecting the impact of sector, size and how the ratios changed from 2015 to 2019 could use our regression models to get an overview. Some conclusions may be drawn from the model, such as the direction of impact from the variables, although users should be careful when making strong inferences.

For any interested parties, a suggested future research topic is the development of lease intensity in the coming years. While our analysis has tried to determine whether or not the use of leases would decline from the announcement of IFRS 16, no significant impact was determined. A clearer picture may manifest itself in the coming years as the data will be disclosed in a similar format from 2019 onwards. Furthermore, the topic is of interest in other countries and regions, where the findings may differ from the ones found in this paper.

IFRS 16 was implemented to improve comparability across firms by requiring all firms to capitalize all leasing contracts. However, with the exception for leases of low value and where the lease term is less than one year, one only has to hope that companies are not able to use that exception in such a way that lease contracts once again are kept off the balance sheet.

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# 10.0 Appendices

## *10.1 Sectors*

| Communication Services | Consumer Discretionary | Consumer Staples | Energy | Financials | Health Care |
|---|---|---|---|---|---|
| Adevinta | Europris | Austevoll Seafood | Aker BP | Aker | Bergenbio |
| Schibsted | Gaming Innovation Group | Bakkafrost | Aker Solutions | Axactor | Nordic Nanovector |
| Telenor | Kongsberg Automotive | Grieg Seafood | Borr Drilling | B2 Holding | PCI Biotech Holding |
| | XXL | Lerøy Seafood | BW LPG | DNB | Photocure |
| | | Mowi | BW Offshore | Gjensidige Forsikring | |
| | | Orkla | DNO | Norwegian Finance Holding | |
| | | Salmar | Equinor | Sparebank 1 SR-Bank | |
| | | | Frontline | Storebrand | |
| | | | PGS | | |
| | | | Subsea 7 | | |
| | | | TGS | | |

*Appendix 10.1.1: Overview of the firms located in each sector as specified by Bloomberg. GICS is the framework used for definition of sectors.*

| Industrials | Information Technology | Materials | Real Estate | Utilities |
|---|---|---|---|---|
| AF Gruppen | Asetek | Elkem | Entra | Fjordkraft Holding |
| American Shipping Company | Atea | Norsk Hydro | Olav Thon Eiendomsselskap | Scatec Solar |
| Bonheur | Data Respons | Yara | | |
| Fjord1 | Idex Biometrics | | | |
| Golden Ocean Group | Kitron | | | |
| Hexagon Composites | Nordic Semiconductor | | | |
| Kongsberg Gruppen | TioetoEvry | | | |
| MPC Container Ships | | | | |
| Norwegian Air Shuttle | | | | |
| NEL | | | | |
| Stolt-Nielsen | | | | |
| Tomra Systems | | | | |
| Veidekke | | | | |
| Wallenius Wilhelmsen | | | | |
| Wilh Wilhelsem | | | | |

*Appendix 10.1.2: Overview of the firms located in each sector as specified by Bloomberg. GICS is the framework used for definition of sectors.*

## *10.2 Example of allocation*

| 2018 Model | 2019 | 2020 | 2021 | 2022 | 2023 | 2024+ | *Implied degression factor* | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|
| **ADEVINTA ASA** | 142,6 | 136,5 | 130,7 | 125,1 | 119,8 | 291,2 | *0,967* | 119,8 | 119,8 |
| **AF GRUPPEN ASA** | 268,0 | 216,2 | 174,5 | 140,8 | 113,6 | 100,0 | *0,807* | 100,0 | 0,0 |
| **AKER ASA** | 1 122,0 | 1 010,0 | 909,1 | 818,3 | 736,6 | 3 631,0 | *0,900* | 736,6 | 736,6 |
| **AKER BP ASA** | 424,5 | 267,2 | 168,2 | 105,9 | 66,7 | 68,2 | *0,630* | 66,7 | 1,5 |
| **AKER SOLUTIONS ASA** | 663,0 | 621,6 | 582,8 | 546,4 | 512,3 | 2 861,0 | *0,938* | 512,3 | 512,3 |
| **AMERICAN SHIPPING COMPANY AS** | 87,8 | 69,3 | 54,7 | 43,2 | 34,1 | 13,7 | *0,789* | 13,7 | 0,0 |
| **ASETEK A/S** | 0,5 | 0,6 | 0,5 | 0,6 | 0,6 | 0,6 | - | 0,6 | 0,1 |
| **ATEA ASA** | 293,0 | 211,9 | 153,2 | 110,8 | 80,1 | 116,0 | *0,723* | 80,1 | 35,9 |

*Appendix 10.2: The table is an example of how operating leases was allocated between different years for seven companies. The numbers are in millions and in the currency used by the firms in their annual reports 2018. 2019 is what has been disclosed by the company as the payment within one year. 2020 is 2019 multiplied with the degression factor. The payments in the table ends in 2025, however, this is only due to presentation issue. In our models the payments continue at the same level as the year 2025 until it equals the payment in 2024+ (more in depth explanation regarding payments allocation is found in subchapter 4.3-4.5). Asetek has no degression factor as the company discloses all payments for year 2020 to 2023 individually.*

## *10.3 Sensitivity analysis on interest rate*

| D/A | Before | After | After -2% | After +2% | Change -2% | Change +2% |
|---|---|---|---|---|---|---|
| **Communication Services** | 0,52 | 0,55 | 0,55 | 0,55 | 0,04 % | -0,08 % |
| **Consumer Discretionary** | 0,56 | 0,65 | 0,65 | 0,65 | -0,34 % | 0,14 % |
| **Consumer Staples** | 0,44 | 0,46 | 0,46 | 0,46 | 0,08 % | -0,11 % |
| **Energy** | 0,52 | 0,56 | 0,56 | 0,56 | 0,02 % | -0,08 % |
| **Financials** | 0,78 | 0,79 | 0,79 | 0,79 | 0,01 % | -0,02 % |
| **Health Care** | 0,17 | 0,18 | 0,18 | 0,18 | 0,08 % | -0,08 % |
| **Industrials** | 0,58 | 0,62 | 0,62 | 0,62 | -0,28 % | 0,17 % |
| **Information Technology** | 0,46 | 0,50 | 0,50 | 0,50 | 0,02 % | -0,10 % |
| **Materials** | 0,46 | 0,51 | 0,51 | 0,51 | 0,20 % | -0,29 % |
| **Real Estate** | 0,52 | 0,57 | 0,57 | 0,57 | 0,01 % | -0,01 % |
| **Utilities** | 0,75 | 0,76 | 0,76 | 0,76 | -0,04 % | 0,02 % |

*Appendix 10.3.1: The tables display the sensitivities for the different ratios when the interest rate is being changed. Before refers to the ratio without capitalization of operating leases. After refers to the ratios with operating leases capitalized. After -2% refers to a nominal change in the discount rate of -2%, After +2% refers to a nominal change in the discount rate of +2%. Change -2% is calculated as* $\frac{After-2\%}{After} - 1$. *Change +2% is calculated as* $\frac{After+2\%}{After} - 1$. *Before with changed interest rates were omitted as there was no effect of interest rate on the before model.*

| D/E | Before | After | After -2% | After +2% | Change -2% | Change +2% |
|---|---|---|---|---|---|---|
| **Communication Services** | 1,58 | 1,60 | 1,61 | 1,60 | 0,22 % | -0,27 % |
| **Consumer Discretionary** | 1,63 | 2,24 | 2,23 | 2,24 | -0,60 % | 0,10 % |
| **Consumer Staples** | 0,81 | 0,89 | 0,89 | 0,89 | 0,27 % | -0,32 % |
| **Energy** | 1,63 | 1,89 | 1,88 | 1,88 | -0,06 % | -0,14 % |
| **Financials** | 7,07 | 7,04 | 7,04 | 7,04 | -0,02 % | -0,01 % |
| **Health Care** | 0,22 | 0,23 | 0,23 | 0,23 | 0,11 % | -0,10 % |
| **Industrials** | 2,62 | 0,33 | 16,60 | 0,97 | 4930,2% | 193,26 |
| **Information Technology** | 1,30 | 1,47 | 1,47 | 1,47 | 0,01 % | -0,24 % |
| **Materials** | 0,92 | 1,07 | 1,08 | 1,06 | 0,64 % | -0,74 % |
| **Real Estate** | 1,21 | 1,32 | 1,32 | 1,32 | 0,03 % | -0,03 % |
| **Utilities** | 3,41 | 3,56 | 3,55 | 3,56 | -0,16 % | 0,10 % |

*Appendix 10.3.2: The tables display the sensitivities for the different ratios when the interest rate is being changed. Before refers to the ratio without capitalization of operating leases. After refers to the ratios with operating leases capitalized. After -2% refers to a nominal change in the discount rate of -2%, After +2% refers to a nominal change in the discount rate of +2%. Change -2% is calculated as* $\frac{After-2\%}{After} - 1$. *Change +2% is calculated as* $\frac{After+2\%}{After} - 1$. *Before with changed interest rates were omitted as there was no effect of interest rate on the before model.*

| ROA | Before | After | After -2% | After +2% | Change -2% | Change +2% |
|---|---|---|---|---|---|---|
| **Communication Services** | 0,06 | 0,05 | 0,05 | 0,05 | -1,38 % | 1,15 % |
| **Consumer Discretionary** | 0,01 | 0,02 | 0,01 | 0,02 | -17,57 % | 15,30 % |
| **Consumer Staples** | 0,12 | 0,11 | 0,11 | 0,11 | -0,75 % | 0,59 % |
| **Energy** | 0,03 | 0,03 | 0,03 | 0,03 | -2,17 % | 1,80 % |
| **Financials** | 0,02 | 0,02 | 0,02 | 0,02 | -0,40 % | 0,33 % |
| **Health Care** | -0,40 | -0,41 | -0,41 | -0,41 | -0,04 % | 0,03 % |
| **Industrials** | 0,05 | 0,04 | 0,04 | 0,04 | -3,22 % | 2,77 % |
| **Information Technology** | -0,01 | -0,02 | -0,02 | -0,02 | 5,49 % | -4,59 % |
| **Materials** | 0,05 | 0,06 | 0,05 | 0,06 | -1,71 % | 1,34 % |
| **Real Estate** | 0,06 | 0,06 | 0,06 | 0,06 | -0,03 % | 0,02 % |
| **Utilities** | 0,12 | 0,11 | 0,11 | 0,11 | -0,30 % | 0,25 % |

*Appendix 10.3.3: The tables display the sensitivities for the different ratios when the interest rate is being changed. Before refers to the ratio without capitalization of operating leases. After refers to the ratios with operating leases capitalized. After -2% refers to a nominal change in the discount rate of -2%, After +2% refers to a nominal change in the discount rate of +2%. Change -2% is calculated as* $\frac{After-2\%}{After} - 1$. *Change +2% is calculated as* $\frac{After+2\%}{After} - 1$. *Before with changed interest rates were omitted as there was no effect of interest rate on the before model.*

| Interest Coverage | Before | After | After -2% | After +2% | Change -2% | Change +2% |
|---|---|---|---|---|---|---|
| **Communication Services** | 15,91 | 9,64 | 11,19 | 8,83 | 16,10 % | -8,37 % |
| **Consumer Discretionary** | 6,37 | 8,36 | 12,82 | 6,82 | 53,41 % | -18,43 % |
| **Consumer Staples** | 1,02 | 4,23 | 6,99 | 0,51 | 65,29 % | -87,90 % |
| **Energy** | 5,06 | 6,17 | -70,33 | 0,40 | -1240,34 % | -93,43 % |
| **Health Care** | 38,10 | 41,11 | 40,45 | 41,78 | -1,61 % | 1,62 % |
| **Industrials** | 7,79 | -0,18 | 3,77 | -2,13 | -2215,11 % | 1094,19 % |
| **Information Technology** | 5,22 | -13,19 | 0,38 | -3,59 | -102,92 % | -72,78 % |
| **Materials** | 10,90 | 19,82 | 35,98 | 15,82 | 81,53 % | -20,17 % |
| **Real Estate** | 9,47 | 9,33 | 9,34 | 9,32 | 0,13 % | -0,12 % |
| **Utilities** | -35,83 | -38,82 | -35,83 | -42,29 | -7,71 % | 8,94 % |

*Appendix 10.3.4: The tables display the sensitivities for the different ratios when the interest rate is being changed. Before refers to the ratio without capitalization of operating leases. After refers to the ratios with operating leases capitalized. After -2% refers to a nominal change in the discount rate of -2%, After +2% refers to a nominal change in the discount rate of +2%. Change -2% is calculated as* $\frac{After-2\%}{After} - 1$. *Change +2% is calculated as* $\frac{After+2\%}{After} - 1$. *Before with changed interest rates were omitted as there was no effect of interest rate on the before model. Financials is excluded from this measure.*

| P/E | Before | After | After -2% | After +2% | Change -2% | Change +2% |
|---|---|---|---|---|---|---|
| **Communication Services** | 47,11 | 62,41 | 62,33 | 62,49 | -0,13 % | 0,13 % |
| **Consumer Discretionary** | 54,12 | 134,56 | 137,51 | 133,02 | 2,19 % | -1,15 % |
| **Consumer Staples** | 36,37 | 19,31 | 18,99 | 19,63 | -1,68 % | 1,63 % |
| **Energy** | 20,01 | 21,18 | 20,98 | 21,41 | -0,92 % | 1,10 % |
| **Financials** | 24,71 | 41,76 | 40,37 | 45,19 | -3,32 % | 8,23 % |
| **Health Care** | 20,68 | 66,82 | 66,82 | 66,82 | 0,00 % | 0,00 % |
| **Industrials** | 26,01 | 23,72 | 23,15 | 24,46 | -2,41 % | 3,12 % |
| **Information Technology** | 27,60 | 43,10 | 43,09 | 43,13 | -0,03 % | 0,07 % |
| **Materials** | 16,84 | 22,51 | 22,45 | 22,58 | -0,28 % | 0,31 % |
| **Real Estate** | 6,00 | 6,21 | 6,21 | 6,21 | 0,00 % | 0,00 % |
| **Utilities** | 20,75 | 28,91 | 28,82 | 28,99 | -0,30 % | 0,30 % |

*Appendix 10.3.5: The tables display the sensitivities for the different ratios when the interest rate is being changed. Before refers to the ratio without capitalization of operating leases. After refers to the ratios with operating leases capitalized. After -2% refers to a nominal change in the discount rate of -2%, After +2% refers to a nominal change in the discount rate of +2%. Change -2% is calculated as* $\frac{After-2\%}{After} - 1$. *Change +2% is calculated as* $\frac{After+2\%}{After} - 1$. *Before with changed interest rates were omitted as there was no effect of interest rate on the before model.*

| EV/EBITDA | Before | After | After -2% | After +2% | Change -2% | Change +2% |
|---|---|---|---|---|---|---|
| **Communication Services** | 16,28 | 19,75 | 19,77 | 19,73 | 0,10 % | -0,18 % |
| **Consumer Discretionary** | 15,01 | 12,47 | 12,56 | 12,39 | 0,72 % | -1,35 % |
| **Consumer Staples** | 10,04 | 9,33 | 9,34 | 9,32 | 0,10 % | -0,19 % |
| **Energy** | 2,13 | -3,64 | -3,59 | -3,67 | -1,16 % | 2,20 % |
| **Health Care** | -11,77 | -8,00 | -8,00 | -8,00 | 0,01 % | -0,01 % |
| **Industrials** | 8,52 | 6,70 | 6,79 | 6,63 | 1,25 % | -2,31 % |
| **Information Technology** | 6,28 | 7,98 | 8,02 | 7,95 | 0,46 % | -0,85 % |
| **Materials** | 2,66 | 6,22 | 6,24 | 6,20 | 0,30 % | -0,56 % |
| **Real Estate** | 13,46 | 13,96 | 13,97 | 13,95 | 0,08 % | -0,14 % |
| **Utilities** | 9,21 | 9,71 | 9,72 | 9,70 | 0,09 % | -0,18 % |

*Appendix 10.3.6: The tables display the sensitivities for the different ratios when the interest rate is being changed. Before refers to the ratio without capitalization of operating leases. After refers to the ratios with operating leases capitalized. After -2% refers to a nominal change in the discount rate of -2%, After +2% refers to a nominal change in the discount rate of +2%. Change -2% is calculated as* $\frac{After-2\%}{After} - 1$. *Change +2% is calculated as* $\frac{After+2\%}{After} - 1$. *Before with changed interest rates were omitted as there was no effect of interest rate on the before model. Financials is excluded from this measure.*

| Lease Intensity | Before | After | After -2% | After +2% | Change -2% | Change +2% |
|---|---|---|---|---|---|---|
| **Communication Services** | 0,01 | 0,12 | 0,12 | 0,11 | 4,88 % | -4,44 % |
| **Consumer Discretionary** | 0,00 | 0,27 | 0,28 | 0,26 | 3,36 % | -3,20 % |
| **Consumer Staples** | 0,06 | 0,10 | 0,11 | 0,10 | 4,50 % | -3,87 % |
| **Energy** | 0,02 | 0,10 | 0,11 | 0,10 | 4,97 % | -4,50 % |
| **Financials** | 0,00 | 0,03 | 0,03 | 0,02 | 5,01 % | -4,45 % |
| **Health Care** | - | 0,06 | 0,06 | 0,06 | 2,01 % | -1,91 % |
| **Industrials** | 0,07 | 0,15 | 0,15 | 0,14 | 4,28 % | -3,89 % |
| **Information Technology** | 0,03 | 0,15 | 0,15 | 0,14 | 3,95 % | -3,59 % |
| **Materials** | 0,01 | 0,08 | 0,08 | 0,08 | 4,47 % | -3,96 % |
| **Real Estate** | - | 0,00 | 0,01 | 0,00 | 14,15 % | -10,10 % |
| **Utilities** | - | 0,03 | 0,03 | 0,03 | 4,83 % | -4,44 % |

*Appendix 10.3.7: The tables display the sensitivities for the different ratios when the interest rate is being changed. Before refers to the ratio without capitalization of operating leases. After refers to the ratios with operating leases capitalized. After -2% refers to a nominal change in the discount rate of -2%, After +2% refers to a nominal change in the discount rate of +2%. Change -2% is calculated as* $\frac{After-2\%}{After} - 1$. *Change +2% is calculated as* $\frac{After+2\%}{After} - 1$. *Before with changed interest rates were omitted as there was no effect of interest rate on the before model. Cells with - refers to sectors where none companies had leases before IFRS 16.*

## *10.4 Sensitivity analysis on tax rate*

| D/E | Before | After | Before -10% | After -10% | Before +10% | After +10% | Before Bloomberg | After Bloomberg | After -10% | After +10% | After Bloomberg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Communication Services** | 1,582 | 1,604 | 1,582 | 1,608 | 1,582 | 1,601 | 1,582 | 1,605 | 0,21 % | -0,21 % | 0,02 % |
| **Consumer Discretionary** | 1,633 | 2,242 | 1,633 | 2,254 | 1,633 | 2,230 | 1,633 | 2,231 | 0,54 % | -0,53 % | -0,49 % |
| **Consumer Staples** | 0,807 | 0,890 | 0,807 | 0,891 | 0,807 | 0,889 | 0,807 | 0,889 | 0,08 % | -0,08 % | -0,13 % |
| **Energy** | 1,631 | 1,885 | 1,631 | 1,894 | 1,631 | 1,877 | 1,631 | 1,868 | 0,46 % | -0,44 % | -0,91 % |
| **Financials** | 7,067 | 7,044 | 7,067 | 7,045 | 7,067 | 7,042 | 7,067 | 7,044 | 0,02 % | -0,02 % | 0,00 % |
| **Health Care** | 0,216 | 0,232 | 0,216 | 0,232 | 0,216 | 0,232 | 0,216 | 0,232 | 0,01 % | -0,01 % | 0,00 % |
| **Industrials** | 2,616 | 0,333 | 2,616 | 0,804 | 2,616 | -0,736 | 2,616 | 0,617 | 141,47 % | -320,90 % | 85,19 % |
| **Information Technology** | 1,298 | 1,474 | 1,298 | 1,479 | 1,298 | 1,469 | 1,298 | 1,473 | 0,32 % | -0,31 % | -0,08 % |
| **Materials** | 0,921 | 1,072 | 0,921 | 1,074 | 0,921 | 1,070 | 0,921 | 1,072 | 0,20 % | -0,20 % | 0,01 % |
| **Real Estate** | 1,213 | 1,320 | 1,213 | 1,320 | 1,213 | 1,320 | 1,213 | 1,320 | 0,01 % | -0,01 % | 0,00 % |
| **Utilities** | 3,414 | 3,557 | 3,414 | 3,563 | 3,414 | 3,551 | 3,414 | 3,544 | 0,17 % | -0,17 % | -0,37 % |

*Appendix 10.4.1: Before refers to the ratio without operating leases being capitalized. After refers to the ratio with operating leases being capitalized. Before – 10% would then refer to the ratio before IFRS 16 when the tax rate is reduced by 10%. After – 10% refers to the ratio after IFRS 16 when the tax rate is reduced by 10%. Similar interpretation for Before + 10% and After + 10%, only tax rate is increased 10%. Before Bloomberg refers to the ratio before IFRS 16 when tax rates from Bloomberg is applied instead. After Bloomberg follows the same reasoning. The cells where percentage is used considers the change between the ratio before the sensitivity analysis is applied. For instance, After + 10% is calculated as* $\frac{After+10\%}{After} - 1$. *Before change columns removed as only 0% change.*

| ROA | Before | After | Before -10% | After -10% | Before +10% | After +10% | Before Bloomberg | After Bloomberg | Before -10% | After -10% | Before +10% | After +10% | Before Bloomberg | After Bloomberg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Communication Services** | 0,056 | 0,052 | 0,066 | 0,061 | 0,047 | 0,044 | 0,042 | 0,040 | 16,80 % | 16,73 % | -16,80 % | -16,73 % | -25,37 % | -23,15 % |
| **Consumer Discretionary** | 0,012 | 0,017 | 0,015 | 0,020 | 0,009 | 0,013 | 0,018 | 0,020 | 26,55 % | 20,07 % | -26,55 % | -20,07 % | 51,06 % | 21,22 % |
| **Consumer Staples** | 0,123 | 0,111 | 0,139 | 0,125 | 0,108 | 0,097 | 0,064 | 0,058 | 12,50 % | 12,49 % | -12,50 % | -12,49 % | -48,51 % | -47,97 % |
| **Energy** | 0,025 | 0,028 | 0,029 | 0,033 | 0,022 | 0,024 | -0,009 | -0,005 | 14,05 % | 14,60 % | -14,05 % | -14,60 % | -136,60 % | -119,16 % |
| **Financials** | 0,024 | 0,022 | 0,027 | 0,025 | 0,021 | 0,019 | 0,023 | 0,021 | 13,31 % | 13,41 % | -13,31 % | -13,41 % | -6,35 % | -5,29 % |
| **Health Care** | -0,404 | -0,414 | -0,444 | -0,456 | -0,363 | -0,372 | -0,402 | -0,416 | 9,97 % | 10,05 % | -9,97 % | -10,05 % | -0,31 % | 0,47 % |
| **Industrials** | 0,050 | 0,036 | 0,056 | 0,041 | 0,044 | 0,032 | 0,045 | 0,033 | 12,16 % | 12,27 % | -12,16 % | -12,27 % | -10,07 % | -9,40 % |
| **Information Technology** | -0,010 | -0,022 | -0,008 | -0,022 | -0,011 | -0,021 | -0,009 | -0,023 | -13,34 % | 2,39 % | 13,34 % | -2,39 % | -3,21 % | 5,86 % |
| **Materials** | 0,046 | 0,056 | 0,052 | 0,063 | 0,040 | 0,049 | 0,043 | 0,052 | 12,81 % | 12,81 % | -12,81 % | -12,81 % | -5,16 % | -5,92 % |
| **Real Estate** | 0,061 | 0,061 | 0,068 | 0,068 | 0,054 | 0,054 | 0,057 | 0,057 | 11,79 % | 11,79 % | -11,79 % | -11,79 % | -6,17 % | -6,17 % |
| **Utilities** | 0,122 | 0,107 | 0,138 | 0,121 | 0,106 | 0,093 | 0,113 | 0,099 | 13,04 % | 13,03 % | -13,04 % | -13,03 % | -7,55 % | -7,83 % |

*Appendix 10.4.2: Before refers to the ratio without operating leases being capitalized. After refers to the ratio with operating leases being capitalized. Before – 10% would then refer to the ratio before IFRS 16 when the tax rate is reduced by 10%. After – 10% refers to the ratio after IFRS 16 when the tax rate is reduced by 10%. Similar interpretation for Before + 10% and After + 10%, only tax rate is increased 10%. Before Bloomberg refers to the ratio before IFRS 16 when tax rates from Bloomberg is applied instead. After Bloomberg follows the same reasoning. The cells where percentage is used considers the change between the ratio before the sensitivity analysis is applied. For instance, After + 10% is calculated as* $\frac{After+10\%}{After} - 1$.

| P/E | Before | After | Before -10% | After -10% | Before +10% | After +10% | Before Bloomberg | After Bloomberg | Before -10% | After -10% | Before +10% | After +10% | Before Bloomberg | After Bloomberg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Communication Services** | 47,11 | 62,41 | 43,173 | 52,756 | 52,911 | 76,420 | 39,080 | 37,589 | -8,36 % | -15,46 % | 12,31 % | 22,46 % | -17,05 % | -39,77 % |
| **Consumer Discretionary** | 54,12 | 134,56 | 54,008 | 121,209 | 54,278 | 151,528 | 61,738 | 312,803 | -0,21 % | -9,92 % | 0,29 % | 12,61 % | 14,08 % | 132,47 % |
| **Consumer Staples** | 36,37 | 19,31 | 36,078 | 17,148 | 36,753 | 22,099 | 36,669 | 19,171 | -0,81 % | -11,20 % | 1,04 % | 14,44 % | 0,81 % | -0,73 % |
| **Energy** | 20,01 | 21,18 | 19,720 | 18,299 | 20,400 | 25,190 | 22,028 | 27,468 | -1,45 % | -13,58 % | 1,95 % | 18,96 % | 10,09 % | 29,72 % |
| **Financials** | 24,71 | 41,76 | 24,449 | 35,502 | 25,070 | 50,802 | 24,744 | 49,822 | -1,05 % | -14,98 % | 1,46 % | 21,66 % | 0,14 % | 19,32 % |
| **Health Care** | 20,68 | 66,82 | 19,852 | 59,774 | 21,731 | 75,754 | 19,487 | 56,675 | -4,01 % | -10,55 % | 5,08 % | 13,37 % | -5,77 % | -15,19 % |
| **Industrials** | 26,01 | 23,72 | 25,782 | 21,223 | 26,295 | 26,883 | 26,379 | 27,445 | -0,87 % | -10,51 % | 1,11 % | 13,35 % | 1,43 % | 15,72 % |
| **Information Technology** | 27,60 | 43,10 | 27,322 | 38,271 | 27,971 | 49,391 | 27,582 | 47,674 | -1,01 % | -11,21 % | 1,34 % | 14,59 % | -0,07 % | 10,60 % |
| **Materials** | 16,84 | 22,51 | 16,778 | 19,905 | 16,922 | 25,897 | 16,830 | 23,577 | -0,37 % | -11,56 % | 0,48 % | 15,06 % | -0,06 % | 4,75 % |
| **Real Estate** | 6,00 | 6,21 | 5,823 | 5,561 | 6,229 | 7,043 | 6,115 | 6,631 | -2,98 % | -10,52 % | 3,77 % | 13,33 % | 1,88 % | 6,70 % |
| **Utilities** | 20,75 | 28,91 | 20,231 | 25,640 | 21,421 | 33,124 | 21,704 | 37,522 | -2,50 % | -11,30 % | 3,24 % | 14,60 % | 4,60 % | 29,81 % |

*Appendix 10.4.3: Before refers to the ratio without operating leases being capitalized. After refers to the ratio with operating leases being capitalized. Before – 10% would then refer to the ratio before IFRS 16 when the tax rate is reduced by 10%. After – 10% refers to the ratio after IFRS 16 when the tax rate is reduced by 10%. Similar interpretation for Before + 10% and After + 10%, only tax rate is increased 10%. Before Bloomberg refers to the ratio before IFRS 16 when tax rates from Bloomberg is applied instead. After Bloomberg follows the same reasoning. The cells where percentage is used considers the change between the ratio before the sensitivity analysis is applied. For instance, After + 10% is calculated as* $\frac{After+10\%}{After} - 1$.