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# **The Implementation of IFRS 15 Across Europe**

A study on the effect of implementing IFRS 15 on value relevance in  
10 European Countries

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## Abstract

This paper evaluates the effect of International Financial Reporting Standard 15 (IFRS 15) on value relevance. The European Union (EU) required all companies listed in the EU to adopt IFRS 15 for fiscal years starting after 1 January 2018. IFRS 15 is anticipated to result in a closer association among accounting based and market-based performance, also called value relevance. To provide insight into the effects of the change to IFRS 15 on value relevance, this paper reviews literature on the consequences of changing accounting principles and makes an empirical analysis based on 1830 listed firms in 10 countries in the EU. The purpose of the study is to examine whether IFRS 15 provides more value-relevant accounting information compared to previous revenue recognition standards, such as International Accounting Standard 18 (IAS 18) and IAS 11. The differences among the pre-IFRS 15 period and the IFRS 15 period is studied through econometrics analysis. We conduct panel regression analysis to determine the explanatory powers of Book value per share (BVPS) & Earnings per share (EPS) on Share price for the two periods via their  $R^2$ . Using the  $R^2$ , a test of difference using the Cramer z – statistics (Cramer 1987) for the two periods was conducted. The finding for the whole sample revealed that the relation between accounting values and stock prices is stronger for European listed companies after the adaption of IFRS 15. This is caused by a harmonisation between countries, and an increase in the relevance of BVPS. The change, however, is not consistent across European countries. The findings revealed that the predictive power of accounting values on share price have major differences between countries. Within countries there are more decreases than improvements in value relevance.

## Acknowledgment

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## Acronyms and list of tables and figures

**FASB** - Financial Accounting Standards Board (United States)  
**GAAP** - Generally Accepted Accounting Principles  
**IAS** - International Accounting Standards  
**IASB** - International Accounting Standards Board  
**IASC** - International Accounting Standards Committee (predecessor of IASB)  
**IFRS** - International Financial Reporting Standards  
**[N/US]GAAP** – [Norwegian/United States] Generally Accepted Accounting Principles  
**OLS** - Ordinary least squares  
**REM** - Random effects model  
**FEM** - Fixed effects model  
**PRM** - Price regression model  
**LIM** - Linear information model  
**EPS** - Earnings per share  
**BVPS** - Book value per share (when used as a variable book value per share less earnings per share)  
**VIF** - Variation inflation factor

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# 1 Introduction

## 1.1 Background

The value relevance of accounting information is highly discussed among accounting scholars and standard setters. In value relevance research, the relationship between accounting information and market values is studied. The early contributions on the subject can be traced back to the 1960s, where most of them were motivated to analyse the association between market values and financial statements. Beaver (1968) and Ball and Brown (1968) focused, for example, on the reactions of market prices to operating income and studying how these performances influenced investors' choices. In the mid 1990's James A. Ohlson made significant contributions (Feltham & Ohlson, 1995; Ohlson, 1995). Ohlson's models are based on the theoretical association between the market value of firms and the major accounting variables (i.e., operating income or earnings and equity).

In the last decades, value relevance research has focused on empirical studies related to alternative methods of accounting, accounting standards and accounting regimes. Because there is considerable distinctions in accounting quality across countries, international accounting systems can provide an interesting setting to examine the economic consequences of financial reporting on value relevance. Gjerde et al. (2008) tested if the value relevance of IFRS statements is significantly different from that of NGAAP statements. When testing the marginal contributions of IFRS they found that investors gained some valuable information from the IFRS restatements, specifically the restatement of the book value of equity. Devalle et al. (2010) assesses value relevance after the introduction of IFRS in Europe. The study illustrates that the change to IFRS affects the value relevance differently in different countries. The results vary drastically both in magnitude, significance, and direction. Studies on the effect of IFRS 15 adaption on value relevance is a new area of research. Napier and Stadler (2020) argue that the impact of the new standard on accounting numbers was minimal for most industries, except in a few industries, but do not provide empiricism.

In May 2014 IFRS 15, a new income recognition standard, was published for listed companies and others who report in accordance with IFRS. It was the result of a joint International Accounting Standards Board (IASB) and Financial Accounting Standards Board (FASB) project on revenue recognition. The aim was to strike a balance between IAS 18 and numerous FASB regulations. IFRS 15 replaces both IAS 18 Revenue and IAS 11 Construction contracts. The EU requires all companies listed in the EU to adopt IFRS 15 for fiscal years starting after 1 January



2018. IFRS 15 sets out rules for the recognition of revenue based on transfer of control to the customer from the entity supplying the goods or services. The standard has been operationalized through the introduction of a comprehensive five-step model.

The adoption of IFRS 15 is expected to result in a change in the quality of information in the business environment. Accounting theory claims that financial reporting lessens information asymmetry by disclosing relevant and timely information (Frankel & Li, 2004). The EU's movement to IFRS 15 may provide new intuitions on the quality of information as firms from different legal and accounting systems implement a single accounting standard at the same time. IFRS 15 has been prepared, among other things, to remove weaknesses and inconsistencies in previous standards, and at the same time provide more useful information. IFRS 15 will affect how companies recognize, measure, present and disclose their revenues and can affect how companies and their transactions are understood. Based on this, we think it is interesting to examine whether the implementation of IFRS 15 affects value relevance measures compared to previous revenue recognition standards and contributes to achieving the overall objective of the accounts.

## 1.2 The purpose of the study

To provide insight into the effects of the change to IFRS 15 on value relevance, this paper reviewed literature on the consequences of changing accounting principles and made an empirical analysis based on panel data. Whereby, the purpose of the study is to examine whether IFRS 15 provides value-relevant accounting information beyond the previous revenue recognition standards, IAS 18, and IAS 11. IFRS 15 is expected to lead to better accounting quality and to enable a better association between market-based and accounting-based performance, or value relevance. We examine whether value relevance has improved after the compulsory adoption of IFRS 15 using a sample of 1830 companies with 9150 observations listed in nine European countries: Denmark, Finland, Germany, Italy, France, Norway, Spain, Poland, and Sweden, as well as a combined sample of Belgium, the Netherlands and Luxembourg (BeNeLux).

To make this empirical study, we have derived a specific research question and derived relevant hypotheses that make the research question empirically testable. The theory presented in the literature review part of this paper forms the basis for the motivation and development of our hypotheses.

Our hypothesis is that the increased guidance and the IASB's intention with the new standard are good arguments for increased value relevance. Especially considering that the standard makers have identified and solved weaknesses of previous standards. In theory, this should lead to converging practices among companies, and be suitable for increasing the reliability and relevance of accounting information. Based on this, we believe that IFRS 15 will be incrementally value-relevant compared to previous standards that is mainly IAS 18 and 11. Our hypothesis for the study is as follows:

**Hypothesis 1:** The relation between stock prices and the accounting variables earnings and book value per share is stronger for European listed companies in the period after 1.1.2018, which is after the adaption of IFRS 15.

**Hypothesis 2:** The change is consistent across European countries.

### 1.3 Findings of the study and future research

Our study is a quantitative study based on a secondary panel data that was gathered from Refinitiv Eikon Datastream. We employ a causal research design and a deductive approach. Causal research design suits our intention of showing the interaction amongst stock price and book value & earnings before and after the adoption of IFRS 15, which is through examining cause and effect. In a deductive approach, as explained by Ghauri and Grønhaug (2005) & Saunders et al. (2016, p. 135), a researcher advances or develops a hypothesis from the existing knowledge or literature, makes assumptions, and then projects a research strategy that enables to test the said hypothesis. A deductive approach gives priority to previously existing theories and is based on testing them.

To analyse the panel data gathered we have chosen the fixed effects model, which enables us to tackle the problem of intra-group correlation as well as possible scale effects that might impair our ability to compare the explanatory power of the model in the period before and after the implementation of IFRS 15. The panel data is interpreted by comparing the result of the pre-IFRS 15 period and the IFRS 15 period by examining changes in  $R^2$  and coefficients. To confirm whether value relevance was positively affected by the adoption of IFRS 15, the  $R^2$  for the after-adoption period should be greater than pre-IFRS 15 period. To test for significant changes in  $R^2$  we employ statistical tests based on Cramer's z statistics (Cramer, 1987), which has been widely used in accounting literature.

Our analysis for the whole sample reveals that the relation between accounting values and stock prices is stronger for European listed companies after the adaption of IFRS 15. The change, however, is not consistent across European countries. In fact, several countries see detriments to this relationship, and the overall improvement is caused by a harmonisation between countries, not improvements within them.

The main aim of EU's IFRS 15 adoption to achieve better comparability of financial statements via harmonisation of accounting standards, across countries in EU. According to our findings, differences across countries in Europe are still significant. Further studies should investigate whether IFRS 15 have been implemented consistently throughout Europe. In addition, this study is limited to a short period (for the years 2015-2019). It would, however, be interesting to make subsequent studies to examine IFRS 15's long-term effect on the value relevance of accounting information based on including several years of observations. A study with a longer time perspective may, for example, be suitable for uncovering how value relevance develops as both accounting producers and accounting users learn to use IFRS 15. Therefore, we expect future studies to research to what extent accounting harmonisation is taking place regarding the implementation of IFRS 15 and its effect on value relevance.

#### 1.4 Organization of the study

The report consists of the following parts. The second Chapter presents literature review on the field of value relevance, including what the term implies, theoretical models that form the basis and previous value relevance research. This chapter ends with the presentation of the study's hypothesis's development and motivation. The third Chapter presents IASB's conceptual framework, previous standards (IAS 11 and IAS 18) and the new standard IFRS 15. Chapter 4 presents the general research method and derivation of regression specifications, which we use to test the hypotheses. The underlying data sample, descriptive statistics and correlation matrices are presented in Chapter 5. Chapter 6 presents the empirical finding of the study. The final chapter, Chapter 7, gives conclusion of the research and proposes further research.

## 2 Literature review and hypotheses development

This Chapter presents literature review on the field of value relevance, including what the term implies, theoretical models that form the basis and previous value relevance research. This chapter ends with the presentation of the study's hypothesis's development and motivation.

### 2.1 Value relevance theoretical background

The value relevance of accounting information is highly discussed among accounting scholars and by extension standard setters. The IASB defines the primary users of the accounts as current and future investors and creditors. Financial reporting does not provide information concerning the value of a reporting entity but assists in making such valuations (MacKenzie, 2013). Investors use accounting information, among other things, to value firms. Value relevance research measures the usefulness of accounting information from an investor's perspective (Beisland, 2009). Accounting numbers are "value relevant", if the figure is related to equity market values (Barth et al. (2001) & Ohlson (1995)). According to Barth et al. (2001, p. 79), "...an accounting amount is defined as value relevant, if it has a predicted relationship with equity market values". They argue that in value relevance studies, valuation methods are used as a theoretical basis for operationalizing and analysing the relevance and reliability of accounting information. As with accounting understanding, it is therefore important to understand valuation theory in value relevance studies.

### 2.2 Early accounting research

In the numerous studies on value relevance, there are several definitions that frame value relevance as a device for measuring the significance and reliability of economic and financial information. The early contributions on the subject can be traced back to the 1960s, before value relevance was used as a term, where some were motivated to analyse the association between market values and financial statements. Beaver (1968) and Ball and Brown (1968) focused, for example, on the reactions of market prices to operating income and studying how these performances influenced investors' choices. Ball and Brown drew inspiration from Fama, Fisher, Jensen and Roll (FFJR) (1969), their Chicago colleagues that pioneered the event study methodology, and developed an empirical test of their own. FFJR studied the effect of new information on stock prices, in the form of looking at abnormal movements in stocks prior to and after stock splits, or their announcements. This kind of study has later been known as an "event study", and the use of such studies is expansive across multiple fields of study. Whereas

the “event” studied in FFJR was stock splits, Ball and Brown studied the effect of “unexpected” changes in income.

Their working definition of expected income was a growth or decrease of reported annual income in line with the market, excluding the given security. They found excess abnormal income to be associated with a greater return on the given security, and vice versa. However, most of the abnormal returns were anticipated and priced in by the market before the release of the annual reports. In their conclusion they remark that at least one-half of all information about a firm throughout a year is captured in that year’s income number. As discussed, this information is largely available to the market prior to the release of the annual report, be it through interim reports, news stories, market research, or other means. Importantly, this study shifted accounting research more into the realm of the empirical and showed that there is a definite relation between accounting numbers and value. These two authors are still considered to be the pioneers of accounting in studies on the ability of accounting data to influence capital markets. Their studies are the basis for the scientific research on “Capital Market Research in Accounting.”

### 2.3 Ohlson’s Earnings, book values, and dividends in equity valuation (1995) and other relevant studies

Ohlson made several important contributions in the 90’s, most famously this article where he developed what has later been known as the Linear Information Model (LIM) or Price Regression Model (PRM). Ohlson’s study is based on the association between the market value of firms and the major accounting variables (i.e., operating income or earnings and equity). He set out to form a cohesive theory of value based on the clean surplus relation giving a distinct role to three variables: earnings, book value, and dividends. The clean surplus relation is simply the relation that any change in owners’ equity other than owner-transactions must go through the income statement. Thus, the value of the firm in an accounting sense increases with earnings less dividends adjusted for capital contributions. The purpose of Ohlson’s paper was to create a theory and model based on this relation that would provide a theoretically sound method of valuing businesses using this basic accounting information. Traditionally the value of any investment is the present value of future cash flows, in the case of a stock the present value of future dividend payments.

Ohlson uses the assumption of the clean surplus formula to replace dividends with earnings and book values in the present value formula. This leads to a model where firm value is determined

by a weighted average of book value and capitalized earnings (adjusted for dividends). Furthermore, the paper discusses the use of abnormal or residual earnings to derive value. Residual earnings are simply earnings minus a capital charge based on the previous year's book value, in the paper the risk-free rate of return is used, assuming risk neutrality. We can see that this definition of abnormal earnings is slightly different to the one in Ball and Brown (1968) that used a market rate of return. Of course, the paper also mentions that risk may be adjusted for, for example by implementing CAPM.

Another stated advantage of Ohlson's model is that it satisfies two Modigliani and Miller (1961; 1958) properties: dividends reduce market value in an even ratio, and dividends negatively affect expected future earnings. This is due to the clean surplus relation stating that dividends reduce book value, but do not affect today's earnings. We will not cover all the assumptions and derivations, but Ohlson's linear information model looks like this:

$$P_t = y_t + \alpha_1 x_t^a + \alpha_2 v_t \quad (1)$$

Where  $P_t$  is the market value of equity at time  $t$ ;  $x_t^a$  is the abnormal earnings at time  $t$ ;  $y_t$  is the book value of equity at time  $t$ ;  $v_t$  is the effect of other information and  $\alpha_1$  and  $\alpha_2$  are coefficients. There are several variations of this model used in the literature modified for use in price and return regressions. Book value can have a coefficient, different definitions of abnormal earnings, earnings, book value, whether there is included a variable for other information, deflators to compensate for certain econometric issues etc. These models allow researchers to show how much explanatory power the accounting information has on equity prices, which is used as a measurement of value relevance, a key part of accounting quality.

Another study by Barth et al. (1999) measured the effect that income can have on investors by equating cash flows from operating activities and accruals (flows from non-monetary components). Their result show that both monetary flows and accruals are "value relevant,". A distinction was, however, that the monetary component represents an incremental element, whereas the non-monetary component is perceived negatively by investors. Based upon Barth et al. (1999), Barth et al. (2005) projected a breakdown of non-monetary components to measure the negative relationship amongst market prices and accruals to see if investors are always negatively affected. Their study and several other studies showed that the non-monetary components (change in inventories and operating receivables) negatively affected market prices. On the other hand, changes in trade payables and depreciation with market prices were not significant.

## 2.4 Recent value relevance studies related to alternative methods of accounting, accounting standards and accounting regimes

The first study we looked in to was the study by Gjerde et al. (2008). In their article “The value-relevance of adopting IFRS: Evidence from 145 NGAAP [Norwegian generally accepted accounting principles] restatements”, Gjerde et. al. performs a value relevance study in what may be the most ideal circumstances possible. With the mandatory introduction of IFRS for public companies listed on regulated European markets in 2005, firms had to restate their 2004 financials using IFRS. This meant that financials based on the same underlying economics, firm events, and fact patterns were available in both local GAAP and IFRS. Using data from 145 Norwegian companies they test the data both unconditionally as independent samples and using marginal dependencies.

The measures for value-relevance they use are derived from price, return and abnormal return regressions, largely building on the model of Ohlson (1995), but with some modifications. For example, they follow Aboody, Hughes, and Liu (2002) and adjust their price term for possible market inefficiency. The argument to do this is that some markets are slow to price in accounting information, and a proper measure of the value relevance of the accounting information depends on the information being properly reflected in the price. This is quite contrary to Ball and Brown’s (1968) finding that most of the informational value of accounting information was already priced into the equity when the annual reports were released.

The study has two hypotheses: 1. the value relevance of IFRS statements is significantly different from that of NGAAP statements and 2. the value relevance of particular line items like earnings and book value are significantly different. The first is tested by evaluating the adjusted  $R^2$  of market value regressions based on equal models for the NGAAP and IFRS samples, while the second evaluates the individual items’ coefficients and their contribution to adjusted  $R^2$ . In their inefficiency-adjusted price regression based purely on book value and earnings they found no significant differences between the regimes. However, when splitting earnings into net operating income, net financial costs, and net unusual/non-recurring income per share, they found that NGAAP had a significantly higher adjusted  $R^2$ . Despite this, when testing the marginal contributions of IFRS they found that investors gained some valuable information from the IFRS restatements, specifically the restatement of the book value of equity. A result the authors aptly called “an intuitively appealing result”, as IFRS is primarily focused on the

fair value of the balance sheet. In order to test whether coefficients changed they used a t-statistic for the individual coefficients, as well as a Chow test for combined differences.

The second study we have looked at was the study by Devalle et al. (2010). Devalle assesses value relevance after the introduction of IFRS in Europe, focusing on the five exchanges of Frankfurt, Madrid, Paris, London, and Milan. This study is interesting as it uses panel data and focuses on several countries individually. The study illustrates that the change to IFRS affects the value relevance differently in different countries. The results vary drastically both in magnitude, significance, and direction. This illustrates that pooling data for different countries to check the effects of a new accounting standard may not be the best method of study.

The last study we have looked at was the study by Atwood et al. (2011). This article compares the usefulness of reported earnings across different accounting regimens. The main point of interest is the comparison of IFRS and USGAAP earnings, as these were at the time, and still are, the primary global accounting languages. It is also an interesting study to read now, as IFRS 15 is a combined effort of IASB and FASB to create an earnings standard which applies both under IFRS and USGAAP. The study added to the debate at the time of whether IFRS should be allowed on equal ground as USGAAP in the US, as well as showing some benefits of having competing systems. Having the same system may improve comparability and lower capital costs (i.e. Ahmed et al. (2013) for capital market effects), but with competing systems one may find areas of improvement by way of comparison.

The study used three samples to test earnings: IFRS, USGAAP and Non-USGAAP domestic GAAP. All three samples showed that current and future earnings were positively associated, and losses were less persistent. The persistence of positive earnings showed no significant difference between the USGAAP and IFRS samples, however losses reported under IFRS were less persistent than losses reported under USGAAP. Moreover, they found current USGAAP earnings to be more indicative of future cash-flows than current IFRS earnings. This led them to the conclusion that the quality of USGAAP was superior to IFRS when it came to predicting future cash flows based on earnings.

## 2.5 Value relevance research related to IFRS 15

IFRS 15 is a new standard, which entered into force from the beginning of 2018. This means that the companies that use IFRS have reported in accordance with IFRS 15 for a maximum of three accounting periods. Searching for studies that was made on IFRS 15 in relationship to value relevance on Google Scholar, has not yielded significant number of studies. Based on



this, we will present two studies that we believe are tangentially relevant to our thesis and problem.

The first study is done by Kivioja and is called “The Impact of IFRS 15 on Analysts’ Forecast Accuracy” (2018). This is a master thesis looking at the effects of the newly implemented IFRS 15 on the accuracy of analyst forecasts. This is a different approach of assessing whether a new accounting standard yields higher quality information. The study showed higher errors after IFRS, which is likely to be caused by the standard being new and analysts lacking familiarity.

The other study is “The real effects of a new accounting standard: the case of IFRS 15 Revenue from Contracts with Customers by Napier and Stadler (2020)”. This research provides a framework for analysing various effects of new and amended accounting standards. It differentiates between accounting effects, information effects, capital market effects and real effects. Napier and Stadler (2020), argue that the impact of the standard on accounting numbers was minimal for most industries, except in a few industries, but do not provide empiricism.

## 2.6 Common models used to assess value relevance

Value relevance consists of an assessment relationship between accounting information and market values. The theoretical foundation of valuation moves to the concept of price and its vital role within the market. Parker (2006) argued that the purpose of a valuation is to find the price at which it is anticipated a property might change ownership in the open market. Most of the value relevance studies adopted the valuation approach through the Ohlson models. Holthausen and Watts (2001) showed that ‘value relevance’ use two different sub-theories of valuation. The direct valuation theory - proposes a relationship between accounting earnings and stock market value. Inputs-to-equity valuation theory - proposes the relationship between accounting numbers and a variable used in the valuation model. Holthausen and Watts (2001) contend that the role of accounting is to deliver information on inputs to valuation models that investors use to evaluate equity firms.

Value relevance in accounting studies has been the subject of several studies. Many of the studies have used empirical–statistical methodologies, which in most cases are based on regressions. The studies examine dependant variables derived using the market and independent variables that are contained in the financial statements. The main models that are used for analysing value relevance can be divided into two large groups and was investigated by Kothari and Zimmerman (1995). These authors divided the two model groups into Price and Return models. They confirm that price models' earnings response coefficients are less biased.

However, return models have less serious econometric problems than price models. The price model is based on Ohlson's model, which is presented under section 2.2. This model is a variant of the equity method and shows that the value of equity can be written down as a function of accounting variables in their entirety.

The return models aim to measure the relationship between a change in stock market prices and balance sheet values. These models are based on Easton and Harris (1991), who developed a theory of "value relevance" in accordance with the following two valuation approaches: book value valuation model and earning valuation model. The first found that the stock value of a listed firm is the result of two components: The first component is the equity value per share of the company  $j$  at time  $t$ . The second component is the differential between the share price and book values. It can be presented as follows (2):

$$P_{jt} = BVPS_{jt} + \mu_{jt} \quad (2)$$

Where,  $P_{jt}$ - the stock price of the company  $j$  at time  $t$ ,  $BVPS_{jt}$  - the book value of the shareholders' equity of the company  $j$  at time  $t$ , and  $\mu_{jt}$ - the difference between stock price and book value of the assets ( $P_{jt} - BVPS_{jt}$ ).

The second approach, which is based on the earnings valuation model, indicates that the price of the shares is a function of the income for the year, as shown below (3):

$$P_{jt} = E_{jt} \quad (3)$$

Where,  $P_{jt}$ - the share price of the company  $j$  at time  $t$  and  $E_{jt}$ - the book value of the net income of the company  $j$  at time  $t$ .

Return models, different from price models, do not analyse whether there is an association amongst market values and book values. However, their purpose is to determine the relationship between a change in price that is associated with a change in accounting values. The characteristic that these models assume is that they consider the firm's performance rather than the market value at a point in time.

## 2.7 Hypotheses for the current study

**Hypothesis 1:** The relation between stock prices and the accounting variables earnings and book value per share is stronger for European listed companies in the period after 1.1.2018, which is after the adaption of IFRS 15.

**Hypothesis 2:** The change is consistent across European countries.

Value relevance is a method for operationalizing and measuring the fundamental quality requirements, relevance and reliability of the accounting information (Barth et al., 2001). The development of IFRS 15 has been a joint comprehensive project that was started as early as 2002. The standard is likely to affect the measurement, timing and presentation of income EY (EY, 2019). According to the IASB, the purpose of the new standard is, among other things, to remove weaknesses and inconsistencies in previous standards, and to provide more user-friendly information (IFRS 15.IN5).

One of the other main objectives of the IASB in connection with the development of IFRS 15 was to prepare a more comprehensive and detailed set of rules related to disclosure (IFRS 15.BC2c). The purpose of this change was for the user to gain a greater understanding of the basis the companies have used for recognition and measurement of income. The new regulations place greater demands on both quantitative and qualitative variables, and the users' needs are in focus when preparing the note information. As disclosure is central to the users of the accounts, this indicates that the new user-oriented requirements are probably value relevant.

Increased guidance and consistent treatment of similar accounting issues help to strengthen the quality requirements in the conceptual framework, with the aim of providing users with decision-making information. However, it can be claimed that the guidance and examples in IFRS 15 are conventional and simple compared to the practical reality. This can potentially lead to different practices. Despite this, we believe that the increased guidance will lead to the accounting information giving a better picture of the substance of revenue, and consequently be suitable for being more value relevant.

Even though the intentions underlying IFRS 15 are implicitly to increase the value relevance of the accounting information, it is not a matter of course that this is the case. We therefore believe it will be interesting to examine whether the standard benefits investors. The other motivating factor for the first hypothesis is lack of research on the topic. As mentioned in the literature part, there were no similar studies performed that are directly related to our problem. We thus

have no basis in the literature for claiming that the implementation of IFRS 15 is value relevant. Despite this, we will consider the most important changes from the previous standards and discuss whether the changes are suitable for being value relevant.

We believe that the increased guidance and the IASB's intention with the new standard are good arguments for increased value relevance. Especially considering that the standard makers have identified and solved the weaknesses of previous standards. In theory, this could lead to converging practices among companies, and be suitable for increasing the reliability and relevance of accounting information. Based on this, we believe that IFRS 15 will be incrementally value-relevant compared to IAS 18 and 11. We also believe that the change should be consistent across European countries.

### 3 Accounting information

The objective of this chapter is to make a discussion on IASB's conceptual framework and examine the previous revenue recognition standards (IAS 11 & IAS 18) and the current revenue recognition standard (IFRS 15).

#### 3.1 Financial information reporting

Accounting literatures provide evidence that accounting information quality has economic consequences, such as on investment decisions (Bushman et al., 2006) and affect firm's costs of capital (Leuz and Verrecchia, 2000). To provide useful information, accountants are selective about what can be recorded in an entity's financial records. The principal means to realize recording selectivity in accounting is through recognition standards, which dictate at what point in time and how economic events may enter accounting records. Accounting theory claims that financial reporting lessens information asymmetry by disclosing relevant and timely information (Frankel and Li, 2004). Because there is considerable distinction in accounting quality across countries, international accounting systems can provide an interesting setting to examine the economic consequences of financial reporting.

In the accounting standards arena, rhetoric about recognition standards is ample. In its conceptual framework, the IASB prescribes four central recognition criteria's that are: definition, measurability, relevance, and reliability. The conceptual statements further stress the tension between relevance and reliability. For instance, recognizing revenue before cash is received may affect information reliability. However, if uncertainty on reliability of information is resolved, revenue recognition is justified because relevant information can be conveyed in time to help users make decisions.

#### 3.2 A conceptual framework for financial reporting

The idea of the conceptual framework is to deliver a set of consistent principles to support regulation and reporting of financial information as part of the decision process. IASB has developed a conceptual framework document called the Framework for the Preparation and Presentation of Financial Statements (IASB, 2018). The conceptual framework is essential for the preparation of new IFRS standards and the primary concern for a framework has been recognition and measurement issues. To gain a better understanding of the preparation of IFRS 15 and revenues based on a conceptual approach, we do a review of IASB's conceptual

framework. The conceptual framework is an attempt to provide a meta-theoretical structure for external financial reporting (Wolk et al., 2001, p. 208).

The two most important financial reporting standard-setting bodies, the FASB and the IASB, have concluded that they need a framework to provide structure and direction to their work in developing requirements for financial reporting. The IASB's Framework for the Preparation and Presentation of Financial Statements was first produced in 1989 and is gradually being reviewed and replaced by a new Conceptual Framework. The 1989 Framework for the Preparation and Presentation of Financial Statements (developed by the predecessor of IASB; IASC) was replaced in 2010 by the Conceptual Framework for Financial Reporting (IASB). This is the result of a joint project with FASB (Picker et al., 2016). The current framework is the "Conceptual Framework for Financial Reporting" and was published in March 2018.

The conceptual framework employs normative accounting theory (Kabir, 2005). As a foundation, we can argue the reason for developing financial accounting theories is to improve practice. In pursuing this exertion, one must enter the normative approach and search for practices that should be used in distinction to describing practices that are used. By nature, normative theories are deductive and are built on premises (Baksaas et al., 2015). This means that the direction of conceptual development is downward towards the prescribed practices that are consistent with those premises. In effect, normative/prescriptive theories contain propositions of what could and indeed what should be done, without regard to what is being done. Not having a formal framework means that accounting standards are established randomly or only to deal with certain problems. Lack of a framework may also mean that standards might fail to address important issues. For example, until the IASB developed its Conceptual Framework, there was no proper definition of terms such as 'asset', 'liability', 'income' and 'expenses'. In the next paragraphs we will discuss the central elements of IASB's conceptual framework, which can be summarized by the following figure.

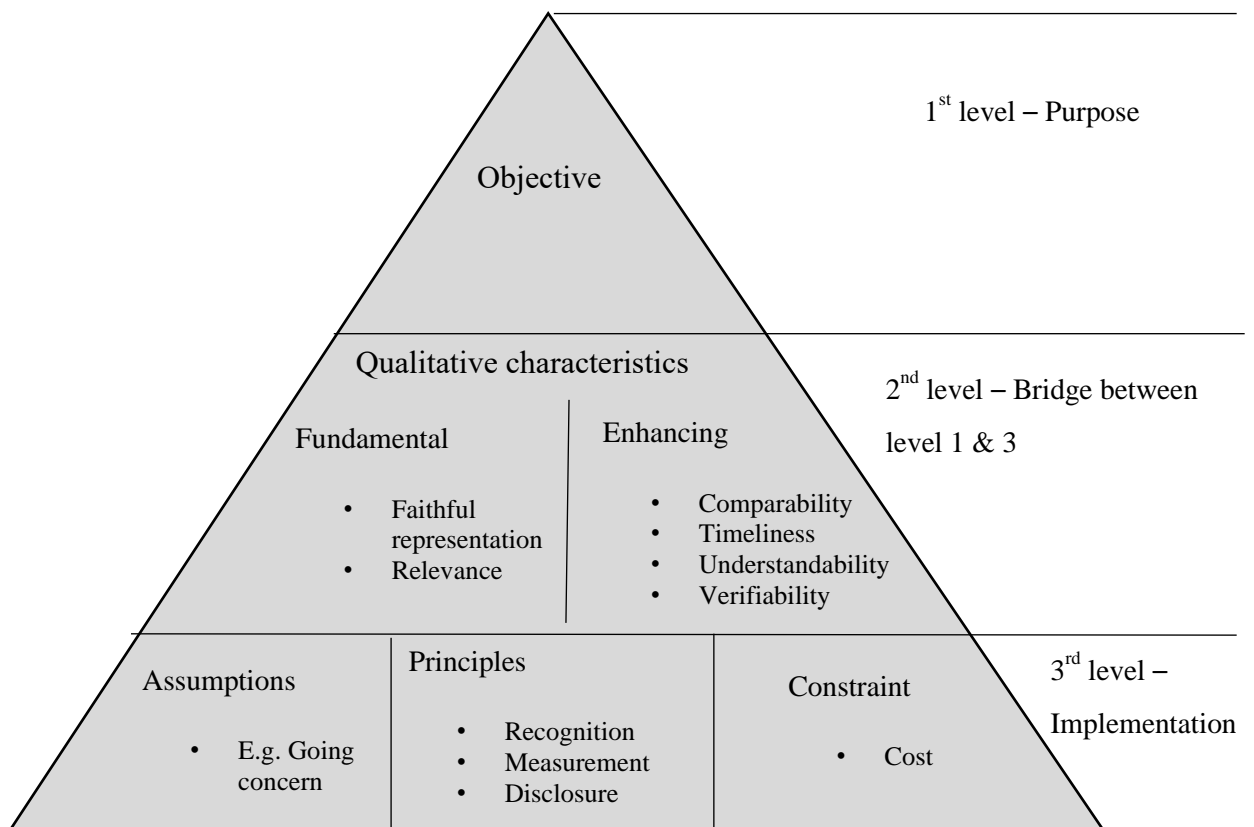


Figure 1 IASB's Conceptual Framework for financial reporting  
 This figure shows a high-level overview of the Conceptual Framework.

### 3.2.1 The purpose of a conceptual framework

The introduction to the Conceptual Framework describes the objectives, usefulness, and limitations of general-purpose financial statements. It is stated in the Framework that the objective of general-purpose financial reporting is to deliver financial information about the reporting entity that is useful to the existing and potential investors, lenders, and other creditors in making decisions relating to providing resources to the entity. It is clearly specified that financial reporting does not provide information concerning the value of a reporting entity but assists in making such valuations (MacKenzie, 2013).

IASB uses the framework as a basis for setting new accounting standards, amending the current ones, and eliminating inconsistencies in the light of the framework. The framework can be regarded as the very foundation of IFRS and has several purposes. IASB has stated that the purpose of its Framework is firstly to assist them with the development of new international accounting standards. Secondly, it is to assist national standard-setting bodies to develop accounting standards for the preparation of financial statements, that is both in applying accounting standards and in dealing with items that are not the subject of any accounting standard. In addition, it is to help auditors form an opinion on compliance with accounting

standards and assist users in understanding financial statements that have been prepared in accordance with accounting standards (Picker et al., 2016, p. 6).

### 3.2.2 Qualitative characteristics of useful financial information

Financial accounting standard setting encompasses making choices between alternative accounting methods. Accounting methods are multidimensional in nature, and each method can have many characteristics which may be relevant for making a choice. Chapter 2 (IASB, 2018) of the Conceptual Framework differentiates between fundamental and enhancing qualitative characteristics. The fundamental qualitative characteristics are most important and govern the content of financial reporting information. Fundamental qualitative characteristics differentiates useful financial reporting information from information that is not useful. Enhancing qualitative characteristics distinguishes more useful information from less useful information. The two fundamental qualitative characteristics, according to IASB (2018), are relevance and faithful representation. Financial information is relevant when it can make a difference in the decisions made by users. This is if it has predictive value, confirmatory value, or both. To be a faithful representation, information must be complete, neutral, and free from error. The Boards' objective is to increase these qualities to the highest degree possible.

The enhancing qualitative characteristics can improve a decision's usefulness when the fundamental qualitative characteristics are established. However, they cannot govern financial reporting quality on their own (IASB, 2018). The first enhancing qualitative characteristic is comparability, which is "the quality of information that enables users to identify similarities in and differences between two sets of economic phenomena" (IASB, 2018). Users can, for example, compare two periods of financial results or compare companies within the same industry. In order to be able to do this, the basis of the preparation of the financial statements should have some degree of consistency. Consistency, although related to comparability, is not the same. It refers to the use of the same methods for the same items either from period to period within a reporting entity or in a single period across entities.

Verifiability as a second element, helps assure users that financial information faithfully represents the economic phenomena it purports to represent. It means that different observers could reach consensus, although not necessarily complete agreement, that a depiction is a faithful representation. The final enhancing qualitative characteristic is timeliness. Timeliness means having information accessible to decision-makers in time to be capable of influencing their decisions. Information may become less useful if there is a delay in reporting it. There is



an equilibrium between timeliness and the delivery of reliable information. The last element is understandability. Understandability will increase when financial information is presented clearly and concisely. Understandability is referred to, when the quality of information allows users to comprehend their meaning (IASB, 2018).

### 3.2.3 Underlying assumption

According to (IASB, 2018), “The going concern basis” of accounting is the assumption in preparing the financial statements. It means that an entity will remain in operation for the foreseeable future and does not anticipate going into liquidation. It is management who makes an assessment regarding the entity’s ability to continue in operation as a going concern. If the result of management’s assessment casts significant doubt upon going concern, it is vital that management discloses this fact, together with the basis on which it prepared the financial statements. When the financial statements are prepared on the going concern basis it is not necessary to disclose this basis. The going concern assumption (according to the conceptual framework) is particularly relevant for the valuation of assets.

### 3.2.4 Recognition

In the accounting standards arena, recognition is a central element. It involves the process of capturing for inclusion in the statement of financial position or statements of profit or loss and other comprehensive income an item that meets the definition of one of the elements of financial statements – an asset, a liability, equity, income or expenses. (IASB, 2018). An asset or liability should be recognized if it will be both relevant and provide users of the financial statements with a faithful representation of the transactions of that entity, The Framework takes these fundamental qualitative characteristics, along with the definitions of the elements of the financial statements, as the key components of recognition. Even if an item is not recognized, then the preparers of the financial statements should consider whether, in order to meet the faithful representation requirement, there should be a description in the notes of the financial statements.

## 3.3 The change to a new standard (IFRS 15)

As we have mentioned above, one of the purposes of the conceptual framework is to assist standard-setting bodies with developing accounting standards for the preparation of financial statements. In May 2014 IASB published IFRS 15 - Revenue from Contracts with Customers. This standard was the result of a development process extending over many years and is intended to replace IASB’s brief and outdated revenue recognition standard, and FASB’s

separate guidelines for recognizing revenue. Entities have been required to apply IFRS 15 for accounting periods beginning on or after 1 January 2018. IFRS 15 replaced IAS 18 that was issued in 1981, as well as International IAS11 that was issued in 1979. The new revenue standard aimed to give clearer guidance on revenue recognition for all entities with contracts with customers and reduce the potential for earnings management.

IFRS 15 has adopted a ‘performance obligation’ method, where revenue is recognized as and when an organization performs obligations included in a contract with a customer (IFRS 15 Appendix A). On the other hand, IAS 18 required revenues to be recognized as soon as the risks and rewards of ownership of goods had been substantially transferred from seller to buyer. Entities according to IFRS 15 should review their contracts to identify the performance obligations that the contracts impose on the entity. To show the main differences between the new standard and the previous standards we have chosen to take a brief look on the standards below.

### 3.4 Revenue under IAS 18 Revenue

#### 3.4.1 IAS 18’s objective and definition of revenue

The objective of IAS 18, according to the standard, is to prescribe the accounting treatment of revenue arising from certain types of transactions and events. It includes the sale of goods, the rendering of services and interest or rental income. The IASB Framework has a so-called ‘balance sheet approach’ to revenue recognition (Barker et al., 2020). IASB states that revenue is recognized in the income statement when: there is an increase in future economic benefits related to an increase in an asset or a decrease in a liability, and this increase in economic benefits can be reliably measured. IAS 18 Revenue deals more widely than the Framework with the measurement and recognition of revenue. It defines revenue as “the gross inflow of economic benefits during the period in the course of the ordinary activities of an entity, when those inflows result in increases in equity, other than increases relating to contributions from equity participants.” (IAS 18. 7). The definition is an adaptation of the definition of ‘income’ in the International Accounting Standards Committee’s (the predecessor of IASB) Framework for the Preparation and Presentation of Financial Statements (IASC, 1989) with revenue being considered as income arising in the course of the entity’s “ordinary activities”.

Barker (2010) has questioned whether the definition of income provided by the IASB is suitable, and Nobes (2012) has stretched this critique to the definition of revenue. Barker (2010) has questioned whether the definition of income provided by the IASB is appropriate, and

Nobes (2012) has stretched this critique to the definition of revenue. Barker's view was that income should be viewed simply as an increase in equity rather than as an increase or decrease to assets or in liabilities that results in an increase in equity. While Nobes proposes that a literal application of the definition of income and revenue may lead to omissions of revenue in some cases and double counting of revenue in other cases. This led to, according to Nobes (2012, p. 85), the suggestion that a replacement for IAS 18 should deal with the wider topic of 'income', and then define 'revenue' more narrowly.

#### 3.4.2 Measurement of revenue under IAS 18

When a transaction takes place, the amount of revenue is decided by the agreement of the buyer and seller. The revenue is measured as the fair value of the consideration received or to be received, which will take account of any trade discounts and volume rebates (IAS 18.9 – IAS 18.10). It, according to Mirza et al. (2011), is the fair market price excluding any discount allowed for buying in large quantities. If a sale is a cash sale, then revenue is the instant proceeds of the selling amount. However, in some cases when the payment is deferred (future payment), the fair value can be less than the amount of cash that will be received (the transaction includes a financing component). For example, according to Mirza et al. (2011), a firm might sell goods or services and give the customer interest-free credit. Giving interest-free credit should be considered as a financing transaction, and the revenue recognized should be the discounted present value of the future receipts. The difference between the nominal sale value and the fair value of the consideration is recognized as interest income.

#### 3.4.3 Recognizing revenue under IAS 18

IAS 18 set out two sets of conditions, one for the sale of goods and the other for the rendering of services, for revenue to be recognized. The key requirement for recognizing revenue from the sale of goods, according to IAS 18, is that 'the entity has transferred to the buyer the significant risks and rewards of ownership of the goods', reinforced by a requirement that 'the entity retains neither continuing managerial involvement to the degree usually associated with ownership nor effective control over the goods sold' (IAS 18.14). In addition, first, it is important that the amount of revenue can be measured reliably. Secondly, it is probable that economic benefits associated with the transaction will flow to the entity. Third, the costs incurred for the transaction can be measured reliably.

For services, the language was largely the same as for construction contracts under IAS 11, referring to the percentage of completion method. This approach was justified as providing

‘useful information on the extent of service activity and performance during a period’ (IAS 18.20). The standard also covered interest, royalties, and dividends as types of revenue, and required disclosure of ‘the amount of each significant category of revenue recognized during the period’ (IAS 18, 29-30). Usually when applying the recognition criteria of IAS 18, one applies it to each transaction (Mirza et al., 2011). However, occasions may arise involving more complex transactions that require the criteria to be applied to the components of a transaction.

#### 3.4.4 Disclosure requirements under IAS 18

Accounting standards include disclosure requirements, which is setting out the information that entities must disclose. IAS 18 requires disclosure of: “the accounting policies adopted for recognizing revenue, and each significant category of revenue in the period, including revenue from: the sale of goods, the rendering of services, interest, royalties and dividends (IAS 18.35).” In addition, there should be disclosure, for each significant category of income, of the amount of revenue arising from the exchange of goods or services.

#### 3.5 Revenue under IAS 11 Construction contracts

The objective of IAS 11 is to prescribe the contractor’s accounting treatment of revenue and the costs associated with construction contracts. According to the standard, sales revenue on a construction contract is generally based upon stage of completion. A construction contract is a contract that is negotiated with a client for the construction of: a single asset such as a building, road, pipeline or a number of related assets (Mirza et al., 2011). However, a construction contract might also be negotiated for the construction of assets that are closely interrelated in terms of their design, technology, and function (IAS 11.3– 11.4). The scope of IAS 11 also includes construction contracts with a short interval.

According to Christian and Lüdenbach (2013), construction of real estate meet the definition of a construction contract, if the buyer is able to stipulate the major structural elements of the design of the real estate before construction begins or specify major structural changes once construction is in progress. If the definition, however, is not met, IAS 18 applies instead of IAS 11 (IFRIC 15). According to the standard, IAS 11 does not apply to service contracts. The concept of IAS 18 for recognizing revenue and the associated expenses for rendering of services is generally consistent with the requirements of IAS 11 (IAS 18.21).

### 3.5.1 Revenue recognition & measurement under IAS 11

Contract revenue encompasses not only the initial amount of revenue agreed in the contract, but also (IAS 11.11– 11.15): variations in contract work, claims, and incentive payments. If the outcome of a construction contract can be predicted or estimated reliably, revenue and costs should be recognized in proportion to the stage of completion of contract activity. This is known as the percentage of completion method of accounting. (IAS 11.22). According to Mirza et al. (2011), the work on a large construction contract is likely to cover at least two accounting periods. The main problem with the accounting treatment of revenue and cost under construction contracts is therefore to decide how to allocate the revenue and costs of the contracts among different accounting periods and when to recognize profit.

IAS11 requires construction contracts to be reported on an accrual basis and revenue and costs should be matched in the accounting periods. To be able to estimate the outcome of a contract reliably, the entity must be able to make a reliable estimate of total contract revenue, the stage of completion, and the costs to complete the contract (IAS 11.23-24). If the outcome, however, cannot be estimated reliably, no profit should be recognized. Instead, contract revenue should be recognized only to the extent that contract costs incurred are anticipated to be recovered (IAS 11.32). This means that in each accounting period, a proportion of the estimated profits on the contract are taken to profit/loss. IAS 11, however, did not specify a specific method for determining the stage of completion. An entity may use the more appropriate of input measures or output measures to estimate completion (IAS 11.30).

Provided that estimates are made accurately or on a realistic basis, the amounts taken to profit/loss in each year, in accordance with IAS 11, will reflect the underlying position over the life of the contract. These requirements apply the concept of care and help to warrant that the information in the financial statements is reliable. However, we can say that IAS 11 appears to be at odds with the ‘accounting equation’ approach, which is adopted by the IASB Conceptual Framework and other accounting standards. This approach states that equity is the difference between assets and liabilities, and profit for the year is the increase in equity. IAS 11, therefore, takes a different approach of the accounting process, in which transactions are matched to accounting periods.

### 3.5.2 Disclosure under IAS 11

IAS11 requires disclosure of the amount of contract revenue recognized as revenue in the period. The methods used to determine the amount of revenue and the stage of completion of

contracts in progress (for example, the cost basis). And for each contract in progress at the end of the reporting period, the total costs incurred, and profits recognized (net of any losses recognized) to date. (IAS 11. 39)

In relation to the statement of financial positions, IAS11 requires disclosure of the amount of advances received (amounts received from customers before the related work has been carried out). The amount of retentions (amounts not paid by the customer until the contract is completed to his satisfaction). The gross amount due from customers or the gross amount due to customers for contract work. (IAS 11. 40)

## 3.6 Revenue under IFRS 15

### 3.6.1 Introduction

The IASB issued IFRS 15: Revenue from contracts with customers in May 2014. This standard is the product of a major joint project that began in 2002 between the IASB and FASB and replaces IAS 18, IAS 11, and associated interpretations (EY, 2019). IASB and FASB sum up the importance of revenue as follows: “Revenue is a vital metric for users of financial statements and is used to assess a company’s financial performance and prospects (IASB, 2014).” The objective of IFRS 15 is to establish principles to be applied in reporting useful information to users of financial statements about the nature, amount, timing and uncertainty of revenue and cash flows arising from a contract with a customer. According to (Flood, 2017, p. 5), the FASB and the IASB believed that the result of their project will simplify revenue recognition guidance and provide consistency across entities, jurisdictions, markets, and industries.

It is effective for annual accounting periods beginning on or after the 1<sup>st</sup> of January 2018, but earlier application was also allowed, according to IASB (2014). In line with the new standard, the timing and amount of revenue recognized may not change for simple contracts but may well change for more complex arrangements. IFRS 15 sets out rules for the recognition of revenue based on the transfer of control to the customer from the entity supplying the goods or services. The fundamental principle of IFRS 15 Revenue from Contracts with Customers is that revenue is recognized to describe the transfer of goods or services to a customer that reflects the contemplation to which the entity expects to be entitled to receive (Picker et al., 2016). Under IFRS 15 the transfer of goods and services is based upon the transfer of control, rather than the transfer of risks and rewards as in IAS 18. Control of an asset is described in the standard as the ability to direct the use of, and obtain substantially all the remaining benefits from, the asset.

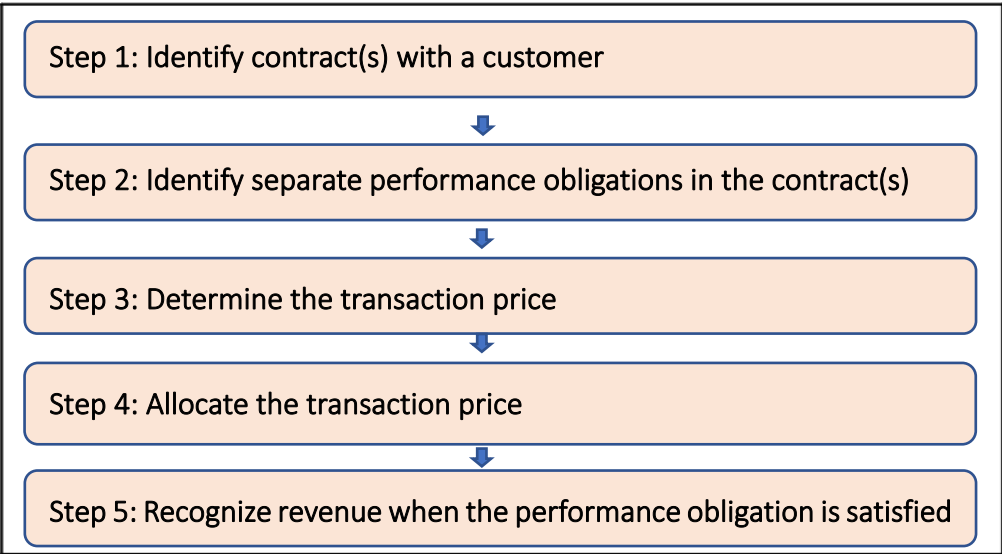
3.6.2 Scope of IFRS 15

The scope of the Standard is extensive. The Standard applies to contracts with customers and it affects all public companies, non-public companies, and non-profit organizations (AICPA, 2016). IFRS 15 defines a customer as: a party that has contracted with a company to obtain a good or service that is an output of the company’s ordinary activities in exchange for consideration. The revenue standard (IFRS 15) applies to all contracts with customers except Leases within the scope of IFRS 16, Insurance contracts within the scope of IFRS 4, Financial instruments and other contractual rights and obligations within the scope of IFRS 9, IFRS 10, IFRS 11, IAS 27 or IAS 28 and non-monetary exchanges between entities in the same line of business to facilitate sales to customers. (IFRS 15. 5)

3.6.3 Revenue recognition and measurement

IFRS 15 defines revenue to some extent more simply than the standard IAS 18, as “income arising in the course of an entity’s ordinary activities.” The standard’s core principle is that an entity “recognizes revenue to depict the transfer of promised goods or services to the customer in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services”. Generally, revenue is recognized when the entity has transferred promised goods or services to the customer. IFRS 15 follows a logical process for the recognition of revenue. The standard sets out a five-step framework to apply in implementing this principle. The following is a summary of the framework based on (Flood, 2017) & (KPMG, 2019):

Figure 2 IFRS 15 Framework for Revenue Recognition  
This figure shows the five steps of the comprehensive IFRS 15 revenue recognition model.



**Step 1.** Identify contract(s) with a customer (IFRS 15: 9-10). Under step 1, it must be assessed whether there is a contract with the customer that meets the criteria of the standard. The standard highlights five criteria that must be met for a contract to exist. A contract, according to IFRS 15, is an arrangement between two or more parties that creates enforceable rights and obligations. That is among other things “the parties have approved the contract and are committed to fulfilling the terms of the contract”. If the criteria are not met, then the contract does not exist for the purpose of applying the standard, and any payment received from a customer is generally recognized as a liability. Contracts entered at or near the same time with the same customer are combined and treated as a single contract when certain criteria are met.

**Step 2.** Identify separate performance obligations in the contract(s) (IFRS 15: 22,23, 27 & 29). Under this step, it must be assessed whether the goods and/or services, i.e., all deliveries that the seller has committed to in the contract, are distinct, and therefore shall be treated as a separate delivery obligation. If those goods and/or services are distinct, the promises are performance commitments and are accounted for separately and are identifiable. The key point is distinct goods or services. The promises are called performance obligations. A good or service is distinct if it can be sold separately because it has a distinct function or a distinct profit margin.

**Step 3.** Determine the transaction price (IFRS 15: 47-72). The third step is to determine the transaction price, which is the same as the expected consideration from the customer. In many cases, this amount will be easy to determine, especially when the price is fixed and when the seller receives payment at the moment goods or services are split into services and transferred to the customer. The transaction price may be more difficult to determine when a variable consideration has been agreed, when payment is received at a later date than when the goods or services are transferred, or in cases where there is payment in other than money. Variable contingent amounts are included where it is highly probable that there will not be a reversal of revenue recognized when any uncertainty associated with the variable consideration is resolved. Examples where this consideration can arise include discounts, refunds, rebates, credits, price concessions, and penalties.

**Step 4.** Allocate the transaction price (IFRS 15: 73–75): After the transaction price has been determined, the next step is to allocate the transaction price to each individual delivery obligation based on the relative standalone selling prices of each distinct good or service. This is the observable price of a similar product or service that a company sells separately. If this price is not directly observable, it must be estimated. The standard specifies three different



methods for how the price can be estimated. If an entity sells a bundle of goods or/and services, which it also supplies unbundled, the separate performance obligations in the contract should be priced in the same proportion as the unbundled prices. This would, for example, apply to mobile service contracts where the handset can be supplied for 'free'. The entity must look at the stand-alone price of the handset and some of the compensation for the contract should be allocated to the handset.

**Step 5.** The last step in the five-step model is to recognize income when the delivery obligation is fulfilled. When a customer receives a good or a service it becomes an asset, even if momentarily in the case of a service. The entity satisfies a performance obligation by transferring control of a promised good or service to the customer (IFRS 15: 31). Control of an asset refers to the ability to direct the use of, and obtain substantially all the remaining benefits from, the asset (IFRS 15.33). The IASB clarified the key terms in the definition of control under (IFRS 15.BC120). A performance obligation might be satisfied (i.e., goods or/and services might be transferred) at a point in time, such as when goods are delivered to the customer (IFRS 15: 38), or over time.

An obligation satisfied over time will meet one of the following criteria (IFRS 15: 35). First, the customer simultaneously receives and consumes the benefits as the performance takes place. Second, the entity's performance creates or enhances an asset that the customer controls as the asset is created or enhanced. Third, the entity's performance does not create an asset with an alternative use to the entity and the entity has an enforceable right to payment for performance completed to date.

The amount of revenue recognized is the amount allocated to that performance obligation. An entity must be able to reasonably measure the outcome of a performance obligation before the related revenue can be recognized. In some circumstances, such as in the early stages of a contract, it may not be possible to reasonably measure the outcome of a performance obligation, but the entity expects to recover the costs incurred. In these circumstances, revenue is recognized only to the extent of costs incurred. (IFRS 15: 45)

#### 3.6.4 Disclosure requirements of IFRS 15

In addition to the five steps, IFRS 15 contains more notes requirements than IAS 11 & IAS 18. The objective of the standard with the notes, among other things, are to make the accounting users understand the type, amount, time of recognition, uncertainty, and related cash flows (IFRS 15.110). The disclosures can include quantitative & qualitative information about

contracts with customers, any impairment losses recognized, significant judgments made in applying the revenue guidance, information regarding the entity's performance obligations and assets recognized from the costs to obtain or fulfil a contract. These disclosures are required for each accounting period a statement of comprehensive income and of financial position is presented. (IFRS 15. 102-103). We expect that it is important that those responsible for preparing notes be prepared on the additional information the new standard requires. Companies that have several segments with many different product lines, can face major challenges when they need to meet the new note requirements.

### 3.7 Assessing the effects of IFRS 15

IFRS 15 is a much broader document than IAS 11 and IAS 18. The standard clearly defines revenue and revenue recognition involves a step-by-step approach. IFRS 15 offers guidelines for different types of transactions such as sale with a right to return, principal versus agent considerations, consignment arrangements and others. The implementation of the new standard is expected to change the way revenue is recognized by firms. According to Industry insights for IFRS 15 by Deloitte (2014), applying the new rules of IFRS 15 may result in significant changes to the profile of revenue and cost recognition. However, when one talks about accounting numbers the effect is not similar across industries.

Some studies, for example Napier and Stadler (2020), argue that the impact of the standard on accounting numbers was minimal for most industries. The effects for telecommunications, construction and software industries are argued to be more notable, with some companies arguing equal underlying values will be represented differently due to differences in contractual arrangements. We can take the construction industry as an example.

The construction industry often has long-term contracts and will thus be affected by the new rules under IFRS 15 for timing (Step five of the standard). Firms in the sector that are engaged in the construction and sale of real estate will probably notice a greater difference as a result of IFRIC 15 being superseded by IFRS 15 (EY, 2019). At the same time, the lapse of IFRIC 15 will also probably affect other firms in the sector as the interpretation may also apply on a general basis in the delimitation between IAS 11 and IAS 18. Contracts in the construction sector often consist of several performance obligations. The question that arises is whether these goods and services are distinct and can be considered as a separate performance obligation to be recognized and measured separately. If separate performance obligations have been identified, the transaction price shall be distributed based on its relatively independent sales

price and timed separately. A good example of such an accounting problem in this sector is the sale of apartments that also provide access to common areas. EY (2019) claims that the revenue recognition of such common areas is somewhat unclear. However, the principles and guidance in IFRS 15 appear to be better suited to deal with accounting issues related to the splitting and merging of multiple transactions in relation to IAS 11 and 18.

Under IFRS 15, firms must assess whether at least one of the three criteria mentioned under step 5 are met. According to EY (2019) this evaluation requires firms to perform an analysis that might differ from what they did under the previous standards. Firms that enter contracts to construct real estate for a customer, need not determine whether the contract either meets the definition of a construction contract (to apply IAS 11) or is for the provision of services (under IAS 18) so as to recognize revenue over time. Instead, under IFRS 15, an entity needs to determine whether its performance obligation is satisfied over time by evaluating the three criteria for over-time recognition (IFRS 15: 35). Under IFRS 15, it must be considered whether the seller has the right to demand payment for delivery to date, given that it does not have an alternative use. If this requirement is met, the income must be accrued over time.

If an entity does not satisfy a performance obligation over time, the performance obligation is satisfied at a point in time. This may mean that some companies that previously recognized income at a certain time will now have to recognize income over time and vice versa. Under IFRS 15, small differences between otherwise equal contracts could possibly have a fundamental effect on the timing of revenue recognition.

## 4 Methodology

### 4.1 Linear regression model with panel data

Time horizon is an important issue when designing research, as research can be executed at a particular time that is cross-sectional or over a prolonged time period, which is longitudinal (Saunders et al., 2016, p. 200). The purpose of this study is to observe developments or changes of a phenomenon through time, that is the effects of IFRS 15 on the relationship between stock prices and key accounting figures. For this reason we have used panel data that is also called longitudinal data, as it adds a temporal dimension to cross-sectional data (Stock & Watson, 2020, p. 362).

Panel data have several advantages over cross section or time series data. Their main advantage is that they give more observations and allow control for time-invariant omitted variables. Using a panel data model helps to tackle intragroup correlation that is caused by multiple observations,  $t$ , for each company,  $i$ . Panel data can enable us to control the unobserved heterogeneity among the individual cross section units. It can also allow us to control the effects of unobserved variables in estimating a model. Panel data can be systematized by taking three dimensions into consideration: number of cross section units ( $i = 1, 2, 3, \dots, n$ ), number of time periods ( $t = 1, 2, 3, \dots, T$ ) and the number of variables ( $v = 1, 2, \dots, k$ ). (Stock & Watson, 2020)

For the current study, we employ a fully restricted model. If one imposes a strong restriction that every entity is homogeneous, then one has a purely restrictive model (pooled regression model). The model is based on the assumptions required for multiple linear regression model that include linearity, exogeneity, homoscedasticity and no perfect multicollinearity. Under these assumptions, OLS produces efficient and consistent parameter estimate provided that the conditional density of the random variable does not vary across entities ( $i$ ) and over time ( $t$ ). In this case, all entities are assumed to be homogeneous. (Stock & Watson, 2020)

### 4.2 Fixed effects model

Researchers can face several issues when they employ panel data models. One of these is the uncertainty that lie in choosing to apply the fixed effects regression versus the random effects models. We have employed the fixed effects model to analyse the relationship between stock price ( $P$ ) and accounting data (BVPS & EPS). It enables us to tackle the problem of intra-group correlation as well as possible scale effects that might impair our ability to compare the explanatory power of the model in the period before and after the implementation of IFRS 15.

The standard errors for the fixed effects model are called clustered standard errors, which are robust to both heteroskedasticity and to correlation over time within an entity. The fixed effects model is more convincing tool for estimating *ceteris paribus* other effects (Wooldridge et al., 2016, p. 444).

Provided the full restricted model assumptions hold, the sampling distribution of the OLS estimator in the fixed effects regression model is normal in large samples. The variance of the estimates can be estimated, and we can compute standard errors, t-statistics and confidence intervals for coefficients (Stock & Watson, 2020). There are several ways for estimating a fixed effects model (Wooldridge et al., 2016). One popular method is the “within” estimation (mean-corrected estimation) that uses variation within each individual or entity. The “within” estimation uses deviations from group means or variation within each individual or entity. According to Stock and Watson (2020), the fixed effects estimation explores the association between the predictor and outcome variables within an entity by removing the effect of unobserved characteristics so that one can assess the net effect of the predictors on the outcome variable.

### 4.3 Multiple regression based on fixed effects

Making an appropriate analysis of data mainly determined by the kind of data gathered. For our research we use a multiple regression analysis method based on panel data to analyse the data collected. The analysis was done using Stata, a complete, integrated statistical software package that provides data analysis and data management. For a deeper understanding of multiple regression analysis and the assumptions, which is the basis for the least square’s method, reference is made to Stock and Watson (2020).

Multiple regression is a statistical method used to study or analyse the relationship between one or more independent variables,  $X_{1i}, X_{2i}, \dots, X_{ki}$  and a dependent variable  $Y$ . Multiple regression analysis can be used to test the meaning of the explanatory variable, predict new values of the independent variable, or evaluate whether the model fits the data. At the same time, it is important to point out that regression analysis can be used to test whether possible relationships are significantly different from zero. In a multiple regression analysis, it is common to assume that the relationships are linear. In other words, the dependent variable  $Y$  is expressed as a linear function of the independent variables  $X_{1i}, X_{2i}, \dots, X_{ki}$ . If a good fit is not achieved using a linear model, it is possible to expand the model using transformed variables using non-linear relationships.

To consider omitted variables an error term is included symbolized as  $\varepsilon(u_i)$ . The error term includes the part of the dependent variable that cannot be explained linearly by the independent variables used. The regression line of a general linear multiple regression can be expressed as follows (model with k independent variables):

Consider the panel regression model Stock and Watson (2020, p. 219)

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_i + u_{it} \quad (4)$$

where the  $Z_i$  are unobserved time-invariant heterogeneities across the entities  $i=1, \dots, n$ . We aim to estimate  $\beta_1$ , the effect on  $Y_i$  of a change in  $X_i$  holding  $Z_i$  constant. Letting  $\alpha_i = \beta_0 + \beta_2 Z_i$  we obtain the model

$$Y_{it} = \alpha_i + \beta_1 X_{it} + u_{it} \quad (5)$$

Having individual specific intercepts  $\alpha_i$ ,  $i=1, \dots, n$ , where each of these can be understood as the fixed effect of entity  $i$ , this model is called the *fixed effects model*.

In practice, the regression coefficients in a linear regression model are often calculated by the ordinary least squares method (OLS). This means that  $\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki}$  are calculated in such a way that the sum of the vertical square distances between the regression lines and the points is minimized. The OLS provides the overall rationale for the placement of the line of best fit among the data points being studied. To be able to use the least squares method and draw statistical inference conclusions, certain prerequisites must be met. However, the preconditions are not usually fully met, and it is therefore important to use good judgment in a sensible way where the usefulness of the analysis must be weighed against the possibilities of error. The underlying assumptions for the OLS are as follows (Stock, J. & Watson, M., 2020). The first least square assumption is that the conditional distribution of  $u_i$  given  $x_i$  has a mean of zero, i.e.  $E(u_i/X_i) = 0$ . Second, the variables,  $(X_i, Y_i)$ ,  $i = 1, \dots, n$ , are independent and identically distributed (i.i.d). Third large outliers are unlikely:  $X_i$  and  $Y_i$  have nonzero finite fourth moments. Fourth, no perfect multicollinearity and this happens when one of the regressors is a perfect linear function of the other regressors. It usually arises from a mistake in choosing which regressors to include in a multiple regression.

In addition to the above least square assumptions, the error term must have a constant variance for all combinations of values of  $X_{1i}, X_{2i} \dots X_{ki}$  (no heteroscedasticity). If the conditions for the first three assumptions are met and if errors are homoscedastic, then the OLS is the best (most efficient) linear conditionally unbiased estimator (BLUE) (Stock & Watson, 2020, p. 195). By most efficient, it is meant that the method gives the lowest variance among other estimators.

#### 4.4 Model for the current study

Our study is based on Ohlson's Linear Information Model (LIM). Based on this model, firm value is a function of book value of equity and expected future residual earnings. This assumes of clean surplus accounting. In order to test our hypothesis, we have used the 'price regression model' (PRM).

##### 4.4.1 General panel model

The price regression model is based on the model of Feltham and Ohlson (1995). According to Ohlson's model, the value of the firm is a linear function of its book value added to the present value of future net income. This model is a variant of the equity method and shows that the value of equity can be written down as a function of accounting variables in their entirety (6).

$$P_{it} = \beta_0 + \beta_1 BVPS_{it} + \beta_2 EPS_{it} + \varepsilon_{it} \quad (6)$$

Our model can be written as follows (7), which is based on the general panel model in econometrics (Bollen & Brand, 2010)),

$$P_{it} = \beta_0 + \beta_1 BVPS_{it} + \beta_2 EPS_{it} + \beta_{yzt} Z_i + \lambda_t \eta_i + \varepsilon_{it} \quad (7)$$

where  $P_{it}$ , the dependent variable, is the price of each individual share of the company  $i$  at time  $t$ ;  $BVPS_{it}$  &  $EPS_{it}$ , the independent variables, are the vector of time-varying covariates for the  $i$ th company at the  $t$ th time period,  $\beta_{yxt}$  ( $\beta_1$  &  $\beta_2$ ) are the row vector of coefficients that give the impact of  $BVPS_{it}$  &  $EPS_{it}$  on  $P_{it}$  at time  $t$ .  $Z_i$  is the vector of observed time-invariant covariates for the  $i$ th company with  $\beta_{yzt}$  a row vector of coefficients at time  $t$  that give the impact of  $Z_i$  on  $P_{it}$ . The  $\eta_i$  is a scalar of all other latent time-invariant variables that influence  $P_{it}$  and  $\lambda_t$  is the coefficient of the latent time-invariant variable ( $\eta_i$ ) at time  $t$  and at least one of these  $\lambda_t$  is set to one to provide the units in which the latent variable is measured (e.g., set  $\lambda_1 = 1$ ). The  $\varepsilon_{it}$  is the random disturbance for the  $i$ th company at the  $t$ th time period with  $E(\varepsilon_{it}) = 0$  and  $E(\varepsilon_{it}^2) = (\sigma^2_\varepsilon)$ . It is assumed that  $\varepsilon_{it}$  is uncorrelated with  $BVPS_{it}$  &  $EPS_{it}$ ,  $Z_i$ , and  $\eta_i$ . The  $\eta_i$  represents individual heterogeneity that affects the outcome variable. We assume that  $\eta_i$  is uncorrelated with  $Z_i$ , if both are included in the same model.  $Z_i$  and  $\eta_i$  have no 't' subscript but does have 'i' subscript. This means that these variables vary across different companies, but do not change over time for an individual company and are time-invariant variables.

##### 4.4.2 The price regression model (PRM) based on fixed effects model (FEM)

Returning to the general panel model (7), suppose that we keep the coefficients for the time-varying variables equal for all waves ( $\beta_{yxt} = \beta_{yx}$ ,  $\lambda_t = 1$ ), we drop  $\beta_{yzt} Z_i$ , we allow the latent

time-invariant variables ( $\eta_i$ ) to correlate, and we set the equation error variances equal. This option leads the general model to become (8), which is the equation for the usual fixed effects model (FEM).

$$P_{it} = \beta_0 + \beta_1 BVPS_{it} + \beta_2 EPS_{it} + \eta_i + \varepsilon_{it} \quad (8)$$

According to Stock and Watson (2020), the fixed effects estimation explores the association between the predictor and outcome variables within an entity by removing the effect of unobserved characteristics so that one can assess the net effect of the predictors on the outcome variable. The most obvious difference between the FEM and the REM is the absence of the time-invariant *observed* variables and their coefficients ( $\beta_{yz}Z_i$ ). FEM folds these variables into  $\eta_i$ , the latent time-invariant variable. The reason is that the FEM allows  $\eta_i$  to correlate with  $x_{it}$  ( $BVPS_{it}$  &  $EPS_{it}$ ) and if we were also to include time-invariant *observed* variables ( $Z_i$ ), these would be perfectly collinear with  $\eta_i$  and we could not get separate estimates of the effects of  $\eta_i$  and  $Z_i$ . Hence, we allow  $\eta_i$  to include  $Z_i$  as well as latent time-invariant variables. Though losing the ability to estimate the impact of time-invariant variables is a disadvantage, we still are controlling for their effects by including  $\eta_i$  in the model.

There are several ways for estimating a fixed effects model (Wooldridge et al., 2016). One popular method is the “within” estimation (mean-corrected estimation) that uses variation within each individual or entity. The “within” estimation uses deviations from group means or variation within each individual or entity. Because  $\eta_i$  is constant for each  $i$ , centring eliminates the individual effects (4):

$$P_{it} - \overline{P_{it}} = \beta_1(BVPS_{it} - \overline{BVPS_{it}}) + \beta_2(EPS_{it} - \overline{EPS_{it}}) + (\mu_{it} - \overline{\mu_{it}}) \quad (9)$$

Where  $\mu_{it} = \eta_i + \varepsilon_{it}$ , and  $\mu_{it} - \overline{\mu_{it}} = \varepsilon_{it} - \overline{\varepsilon_{it}}$

#### 4.4.3 Using the explanatory power of $R^2$

Empirical testing must be assessed using statistical tools that, among other things, using the  $R^2$ .  $R^2$  is a measure of "goodness-of-fit". This means that it says something about how well the model is fitted to the data. (Stock & Watson, 2020). The interpretations of the empirical results for this study are based on  $R^2$ , which is commonly used in statistical analysis.  $R^2$  is used as the explanatory power of value relevance in studies such as Francis and Schipper (1999) , Gjerde et al. (2008) and Atwood et al. (2011). For instance, (Francis & Schipper, 1999) compared  $R^2$  from previous studies to observe the development of value relevance.  $R^2 \in [0,1]$  and if  $R^2 = 1$  the variability in stock price (market-based performance) will be perfectly explained by



accounting information (such as BVPS & EPS) and it will not be required to test the value relevance. While if  $R^2 = 0$ , BVPS & EPS does not explain the change in stock price. Measurements of the explanatory power enables us to examine the development and changes in value relevance.

To test the hypothesis of this study using our model, we can employ different econometric tests that can be calculated or done using Stata. Cramer's z statistics (Cramer, 1987) and Chow- test are among the methods that are based on  $R^2$  and are used in the accounting literature to compare the results obtained for comparing value changes before and after adoption of a new standard or the occurrence of an event . To make our analysis, we have chosen Cramer's z statistics. To confirm whether value was affected due to the adoption of IFRS 15, the  $R^2$  for the IFRS 15 period should be greater than the pre-IFRS 15 period. This is to ascertain if there are significant differences between the two periods. Cramer's Z is computed using the following formulas (10) & (11), which are based on Simon et al. (2017):

$$Z = \frac{R_1^2 - R_2^2}{\sqrt{\text{Var}(R_1^2) - (R_2^2)}} \quad (10)$$

$$\text{Var}(R^2) \sim \frac{4}{N} R^2(1 - R^2)^2 \left[1 - \frac{2(q + 1) + 3}{N}\right] \quad (11)$$

Where, N = total sample size, q = number of predictors,  $R^2_1$  &  $R^2_2$  are  $R^2$  for regression one and two, and  $\text{Var}(R^2)_1$  &  $\text{Var}(R^2)_2$  are variances of first and second regression

#### 4.5 Threats to the internal validity in multiple regression analysis

There are threats to both internal and external validity Stock and Watson (2020, p. 331). Referring to Stock and Watson (2020), for the internal validity to exist, first the estimator of the causal effect should be unbiased and consistent. Second the hypothesis tests should have the desired size and confidence intervals should have the desired coverage probability. Thus, for the first condition to be fulfilled we need the OLS estimator to be unbiased and consistent. For the second condition, the standard errors must be valid such that hypothesis testing, and computation of confidence intervals yield results that are trustworthy. External validity might be threatened, if there are differences among the population studied and the population of interest. And if there are differences in the settings of the considered populations. The internal validity threat is the main issue in multiple regression analysis, and we would like to make a further discussion on the threats.

There are sources that can cause the OLS estimator in our multiple regression model to be biased and inconsistent. We discuss some of these in the next paragraphs. Beside these threats for consistency of the estimator, we also briefly discuss causes and solutions of inconsistent estimation of OLS standard errors.

#### 4.5.1 Omitted Variable Bias

Inclusion of additional independent variables reduces the risk of omitted variable bias. This may, however, increase the variance of the estimator of the coefficient of interest. In order to reduce this effect and help us on whether to include an additional variable, we have considered the following guidelines based on Stock and Watson (2020). First, we specified the coefficient(s) of interest. Second, we identified the most important potential sources of omitted variable bias by using knowledge available before estimating the model. We used, finally, different model specifications to test whether questionable independent variables (regressors) have coefficients different from zero.

#### 4.5.2 Misspecification of the functional Form of the Regression Function

A regression suffers from misspecification when the functional form of the estimated regression model is different from the functional form of the population function (Stock & Watson, 2020). A problem that arises frequently in regression analysis is that of testing whether the functional form employed for the  $k$  regressors,  $X_1, \dots, X_k$ , is appropriate (Harvey & Collier, 1977). Misspecification of the functional form can lead to biased and inconsistent coefficient estimators. Using Stata, we look at different ways of specifying variables in a regression model in choosing the right model. The starting point for OLS is that a regression model must be linear in the parameters. This does not prevent us from changing the scale of the variables and thereby, among other things, being able to model non-linear relationships. We first looked at various forms of changing the scale of the variables and what consequences this has for the results. Then we go through more comprehensive changes such as logarithmic transformations and the inclusion of polynomials.

### 4.6 Sources of inconsistency in OLS standard errors

There are threats to computation of consistent standard errors, which we present below.

#### 4.6.1 Heteroskedasticity

The error term of a regression model is homoscedastic, if the variance of the conditional distribution of  $u_i$  given  $X_i$ ,  $\text{Var}(u_i|X_i = x)$ , is constant *for all* observations in our sample (Stock & Watson, 2020):

$$\text{Var}(u_i|X_{1i}, X_{2i}, \dots, X_{ki}) = \sigma^2 \quad (12)$$

If instead there is dependence of the conditional variance of  $u_i$  on  $X_i$  (in our case BVPS & EPS), the error term is said to be heteroskedastic. To reveal the problem of heteroskedasticity we have used plots, scatter diagrams of standardized residuals against predicted values and scatter diagrams of standardized residuals against values of  $X_i$  (BVPS & EPS). We tried to assess the problem using statistical tests such as the Breusch-Pagan test and the White test. If these tests are statistically significant, the null hypothesis that there is homoskedasticity is rejected (Kaufman, 2013). Of course, our data was heteroskedastic.

There are several solutions to heteroskedasticity, depending on what the underlying problem is (Kaufman, 2013). To assess if the heteroskedasticity is due to specification errors, we changed the specification of the regression model (to log-transform variables). This will often reduce the problem of heteroskedasticity and alleviate problems with outliers. In addition, we have employed heteroskedasticity-robust standard errors, in the form of clustered standard errors, that can produce valid standard errors under heteroskedasticity. This does not change the slope coefficients, but only the standard errors. Consequently, t-tests, F-tests and confidence intervals are also affected. The tests then become expectant, but they are not effective. This means that there are estimators with less statistical uncertainty, namely GLS. However, estimating heteroskedasticity-robust standard errors is the easiest way to deal with the problem.

#### 4.6.2 Correlation of the error term across observations

If the population regression error is correlated across observations, we have serial correlation. Inconsistent standard errors will produce invalid hypothesis tests and wrong confidence intervals. (Stock & Watson, 2020) For example, when testing the null hypothesis that some model coefficient is zero, we cannot trust the outcome anymore because the test may fail to have a p-value of  $<0.05$  due to the wrongly computed standard error. This often happens in applications where repeated observations are used, which in our case is the use of panel data studies. As for heteroskedasticity, use of robust standard errors helps to obtain valid standard errors when there is serial correlation.

### 4.6.3 Outliers

It is easy to come up with situations where extreme observations, i.e., observations that deviate considerably from the usual range of the data, may occur. Such observations are called outliers (Stock & Watson, 2020, p. 159). Extreme observations are problematic because they can have a strong influence on the regression solution. This means that the results can be very different in analyses with and without these observations. Basically, one would think that observations with y-values that deviate strongly from the predicted value (very high residuals) are problematic. It is common to use standardized residuals such as the deviation between observation and prediction in the number of standard deviations.

Simple rules of thumb is to look for residuals that deviate more than +/- 2 standard deviations (a more conservative rule limit +/- 3 standard deviation)(Osborne & Overbay, 2004). Large residual is only a necessary but not sufficient condition for exercising influence on the regression solution. In addition, the observations must have weight. An intuitive way to define weight is to say that the observation has unusual / extreme values on the explanatory variables. A common way to Measuring this on is a measure called leverage (Zhang, 2016). It is this combination that is problematic: large deviation and large weight. They have, perhaps undue, influence on the regression. There are several measures that measure this combination. The most used in Stata is leverage to squared residual, which we have used in assessing our data.

### 4.6.4 Multicollinearity

Multicollinearity means that one or more explanatory variables are strongly correlated that so there remains little unique variation to estimate the slope coefficient(s) (Stock & Watson, 2020, p. 228). This affects the standard errors in the analysis. There are several signs of multicollinearity. One sign is high uncertainty and instability, observed in the form of unusually large standard errors and estimates that vary greatly with small changes in the model. Another sign is non-significant estimates, but high  $R^2$ .

A better test for multicollinearity is to examine the variation inflation factor (VIF) (Mansfield & Helms, 1982). This tells how much the variance of the estimates is affected by the covariation between one explanatory variable and the others. A rule of thumb is that this should not be over 10 (a more conservative rule is 5) 2007). Using Stata, we have tested our data for multicollinearity and find that our data does not have a multicollinearity issue.

## 5 Data

### 5.1 Choice of sample

For various research questions and objectives, it is difficult and sometimes impossible for researchers to gather or analyse all the existing data. This is due to economical limitations, time, and availability and access of data. As a result, in order to decrease the quantity of data, considering only a portion of the data instead of all cases or components, one will employ sampling techniques. Population is the complete set of conditions that a sample is taken from (Saunders et al., 2016). Our research is time and resource bounded which will make this study concentrate on listed companies in Europe that have implemented IFRS 15 and have easily available data from secondary sources. Specifically, the paper focuses on 1830 listed companies in 10 selected countries or regions, with longitudinal data where observations are for the same subjects each time.

### 5.2 Sample construction

We collected our data through Refinitiv Eikon, using the Worldscope and Datastream databases. When collecting the data, we decided to combine Belgium, the Netherlands and Luxembourg to get a larger combined sample from these countries, hereafter referred to as BeNeLux. This was under the implicit assumption that there would be only slight differences between these countries, which may not be the case. In addition to BeNeLux we collected data from the major stock exchanges of Denmark, Finland, France, Germany, Italy, Norway, Poland, Spain, and Sweden, in total 9 countries and 1 combination of countries, hereafter referred to as countries. Initially we also wanted to include certain other countries, however some, for example Greece, lacked Worldscope data. The United Kingdom was included, however upon our initial tests this data seemed flawed. Most of the UK price data was given in pence while the corresponding accounting information was given in pounds. As we could not in a timely manner check all the data, and a simple division by hundred yielded unsatisfactory results in our initial regressions, we decided to leave the UK out of our study.

To avoid duplicate listings, we only collected primary listings. The initial data from the countries consisted of 22 910 observations between 2015 and 2019. In table 1 we have a breakdown of what steps we used to go from this initial data to our final data set of 9 150 observations, or 1 830 companies with the proper data for all five years. To keep our panel data completely balanced, we removed all observations of a given company, if it failed any of our requirements in one or more years. Financial institutions were left out as a large part of their

transactions are covered by more specific standards (IFRS 9, IAS 39 and others), and thus not under the purview of IFRS 15 or this study. We also excluded companies with industry descriptors including the word oil, as this industry is highly affected by special taxes and regulation. Finally, companies with a negative book value per share are excluded.

*Table 1 Sample construction*

This table shows how many observations and companies remained after each step data selection. We excluded any company that was listed as not using IFRS in any of the years, any company with missing data for our crucial variables. We excluded any company listed in industry groups relating to financial fields, as these are not equally affected by IFRS 15, and companies with the keyword “oil” and “gas” in the description. We also excluded any companies with a negative book value less earnings for the same year. These are excluded as a special case of companies with severe troubles. \*We follow Gjerde et al. (2008) in subtracting EPS from BVPS to avoid any potential multicollinearity. \*\* We perform analysis both with and without companies having one or more observation in the top or bottom 1% of price.

	<b>Observations</b>	<b>Companies</b>
Initial Datastream/Worldscope Data 2015-2019	22 910	>4 582
Using IFRS in all years	13 315	2 663
Missing Price, BVPS or EPS in 1 or more years	11 990	2 398
Excluding industry group 4-6 (banks, financial institutions etc.)	10 010	2 002
Excluding industry descriptor including “oil”	9 705	1 941
Excluding companies with negative BVPS less EPS*	9 150	1 830
Excluding top and bottom 1% of Price**	8 815	1 763

### 5.3 Variables and descriptive statistics

#### 5.3.1 Variables

Our model is based on the relationship between Price (P) and Book value per share (BVPS) & Earnings per share (EPS). This study adopted the PRM variables used by prior studies. The dependent variables for this study are the Stock price and the independent variables are BVPS and EPS. Under table 2 we have presented the descriptive statistics for these variables. Therefore, it is considered appropriate to first define these variables.

Price is the share price for the respective company that is the stock price for company  $i = 1, 2, \dots, N$  at time  $t$ . The difference between the firm’s assets and liabilities is denoted as book value of equity and often reported on a per share basis as BVPS (Berk & DeMarzo, 2020). BVPS is the ratio of equity that is available to common shareholders divided by the number of shares outstanding at the end of an accounting period  $t$  and for each company  $i = 1, 2, \dots, N$ .

Net income represents the total earnings of the firm's equity holders and often reported on a per share basis (Berk & DeMarzo, 2020). EPS is calculated as a firm's profit amount at the end of an accounting period divided by the number of shares outstanding of its common stock for period  $t$  and for each company  $i = 1, 2, \dots, N$ . The resulting amount serves as an indicator of a firm's profitability.

### 5.3.2 Descriptive statistics

The objective of descriptive statistics is to describe the key features of the data and summarize the results. Table 2 presents descriptive statistics for the share price, book value of equity per share, and earnings per share, for the 10 countries, respectively. Table 2 reveals that price has an average of € 42.37, median of €7.96 and standard deviation of €290.66, respectively. The sample shows a high standard deviation in the dataset that reveals that the data of share price are far spread across the mean of the data. This confirms the variability of firm's size, industry classification and share structure traded in the EU stock market. When one looks on country by country basis, one can see from the table 3 that the average Price for the pre-IFRS 15 period is significantly higher than for the IFRS 15 period for Denmark, France, and Norway. Price has increased for IFRS 15 period for Benelux and Sweden. However, there was insignificant variation for the rest of countries.

EPS, according to table 2, has a mean of €-1,42, median of €0.31 and standard deviation of €122.87. From the value of the standard deviation, it can be inferred that the EPS are not tightly clustered around the mean of sample data under study. Compared to the pre-IFRS 15 period, the average EPS is larger for the IFRS 15 period for all countries except for Denmark and Norway. These is presented under table 3. BVPS has a mean of € 30.62, median of € 3.87 and standard deviation of € 315.02, respectively. The standard deviation reflects that BVPS values are widely spread out around the mean because it is relatively large. Compared to the pre-IFRS 15 period, the average BVPS under table 3 is slightly larger for the IFRS 15 period for all countries except Denmark, France, and Norway.

*Table 2 Descriptive statistics normalised in euros.*

In this table we present descriptive statistics for our sample, divided into countries and total. For better comparability we have normalised the variables in euros, indicated by the subscript €. Price is the price per share and EPS is earnings per share. BVPS is the book value per share (book value of equity per share) less the earnings per share to avoid potential collinearity of the independent variables as the earnings of year t are included in the book value per share of year t.

Variable	Country	N	mean	sd	median	p25	p75
Price <sub>€</sub>	BeNeLux	670	54.48	196.10	21.06	8.20	48.40
	Denmark	370	147.55	703.92	28.57	8.10	61.03
	Finland	485	10.51	10.85	6.75	2.96	13.98
	France	1710	110.00	555.45	21.13	5.83	59.50
	Germany	1535	39.86	78.66	18.35	6.09	44.70
	Italy	785	8.21	12.28	3.24	1.15	11.16
	Norway	480	19.95	138.16	3.59	1.05	9.52
	Poland	1270	7.32	22.41	1.84	0.68	4.55
	Spain	415	14.83	23.08	8.10	2.38	17.86
	Sweden	1430	7.51	9.86	4.54	0.92	10.24
	Total	9150	42.37	290.66	7.96	2.06	24.26
EPS <sub>€</sub>	BeNeLux	670	2.21	8.21	0.97	0.06	2.48
	Denmark	370	-18.81	310.39	1.13	0.01	2.44
	Finland	485	0.47	0.81	0.30	0.02	0.79
	France	1710	-6.84	244.38	0.79	-0.07	2.98
	Germany	1535	1.50	5.02	0.69	0.09	2.10
	Italy	785	0.43	1.07	0.16	0.01	0.63
	Norway	480	-0.61	19.50	0.07	-0.10	0.42
	Poland	1270	0.45	1.78	0.11	0.00	0.42
	Spain	415	1.59	8.71	0.35	0.04	0.92
	Sweden	1430	0.24	1.33	0.14	-0.04	0.51
	Total	9150	-1.42	122.87	0.31	0.00	1.21
BVPS <sub>€</sub>	BeNeLux	670	26.65	75.44	9.27	4.17	22.73
	Denmark	370	140.70	825.15	9.06	3.35	27.68
	Finland	485	4.68	4.92	3.15	1.41	5.64
	France	1710	92.58	608.34	11.81	4.00	30.20
	Germany	1535	16.87	36.36	7.55	3.42	17.79
	Italy	785	4.39	6.53	2.03	0.90	5.21
	Norway	480	9.09	50.33	1.97	0.77	4.13
	Poland	1270	4.75	10.20	1.86	0.73	4.01
	Spain	415	14.60	76.72	3.25	1.48	6.49
	Sweden	1430	2.72	4.20	1.46	0.40	3.51
	Total	9150	30.62	315.02	3.87	1.34	11.33



*Table 3 Changes in mean and standard deviation*

Here we present changes to mean and standard deviation between our pre-IFRS 15 (2015-2017) and post-IFRS 15 (2018-2019) periods. The variables are presented in the local currencies. All variables are presented on a per share basis. EPS is earnings, and BVPS is the book value of equity less the earnings of the same year to avoid potential collinearity.

	Country	2015-2017		2018-2019		Differences	
		Mean	sd	Mean	sd	$\Delta$ Mean	$\Delta$ SD
Price	BeNeLux	52.67	187.28	57.20	208.97	4.53	21.69
	Denmark	1350.55	6596.50	723.52	1838.60	-627.04	-4757.91
	Finland	10.54	10.54	10.46	11.32	-0.08	0.78
	France	117.08	620.53	99.38	440.36	-17.71	-180.17
	Germany	39.77	73.86	39.99	85.41	0.22	11.55
	Italy	7.95	11.47	8.62	13.41	0.67	1.94
	Norway	220.96	1573.09	147.52	769.27	-73.44	-803.82
	Poland	34.05	102.74	27.31	84.26	-6.74	-18.48
	Spain	14.23	22.04	15.72	24.60	1.49	2.56
	Sweden	69.47	89.17	81.42	110.81	11.95	21.64
	Total	116.08	1423.48	84.99	478.40	-31.10	-945.09
EPS	BeNeLux	2.10	7.40	2.37	9.30	0.27	1.91
	Denmark	-26.20	549.75	-311.74	3602.50	-285.54	3052.75
	Finland	0.46	0.81	0.49	0.81	0.03	0.01
	France	-9.51	300.80	-2.84	116.69	6.67	-184.12
	Germany	1.47	5.03	1.56	5.01	0.09	-0.02
	Italy	0.36	0.84	0.53	1.35	0.17	0.51
	Norway	-0.20	201.91	-15.85	168.46	-15.65	-33.45
	Poland	2.05	7.63	1.72	7.59	-0.33	-0.04
	Spain	1.33	6.17	1.98	11.52	0.65	5.35
	Sweden	1.43	13.80	3.90	10.95	2.48	-2.85
	Total	-1.82	176.88	-12.52	727.49	-10.70	550.61
BVPS	BeNeLux	25.42	73.84	28.49	77.88	3.08	4.04
	Denmark	1187.44	6876.92	840.81	4874.38	-346.62	-2002.54
	Finland	4.54	4.88	4.90	4.99	0.36	0.11
	France	102.83	689.05	77.22	461.61	-25.61	-227.44
	Germany	16.16	35.58	17.92	37.49	1.76	1.91
	Italy	4.22	6.10	4.64	7.14	0.42	1.04
	Norway	90.57	519.95	83.73	433.18	-6.84	-86.77
	Poland	19.04	38.32	22.26	50.48	3.22	12.17
	Spain	14.08	74.07	15.37	80.76	1.29	6.69
	Sweden	25.92	42.96	28.08	37.28	2.16	-5.69
	Total	84.49	1435.55	66.75	1015.68	-17.74	-419.87

The data under table 3 suggest that in the IFRS 15 period there has been changes in the average value of some of the variables used in the price regression model (PRM). However, these results say nothing about changes in the explanatory power of the PRM; nor do they provide information as to whether the relationship between Price (measure of market performance) and BVPS & EPS (measures of accounting performance) has changed as a result of IFRS 15 adoption.

Before we go into analysis, we have examined for statistically significant differences for the sample averages of each of the variables across countries of exchange, for the pre-IFRS 15 or the IFRS 15 period, using a One-Way ANOVA test. This was done using a Kruskal-Wallis test, which is used to determine if there is a statistically significant difference between the medians of the ten countries (groups).

The test revealed ( $p = 0.0001$ ) that the average sample medians of all variables vary across the countries for both the pre- IFRS 15 and IFRS 15 period. The average sample medians of all variables vary across countries for both the pre-IFRS 15 and IFRS 15 period. In other words, there was a statistically significant difference in median of all the variables between two or more of the countries of exchange. These preliminary analyses suggest that the data analysis should be carried out on a per-country basis, in addition to for the whole sample together. This is in line with previous research on value relevance that was done on adoption of new accounting standards (for instance Devalle et al. (2010)).

## 6 Empirical results

### 6.1 Analysis of total sample

**Hypothesis 1:** The relation between stock prices and the accounting variables earnings and book value per share is stronger for European listed companies in the period after 1.1.2018, which is after the adaption of IFRS 15.

*Table 4 Panel regression of the complete sample*

This table contains panel regressions of our complete sample as well as the sample without extreme values (top and bottom 1% of price). The independent variable is price per share (P), and the dependant variables are earnings per share (EPS) and book value of equity per share less earnings per share (BVPS) (to avoid potential collinearity). We also report the constant. We compare the models before the introduction of IFRS 15 (1) (2015-2017) and after the introduction (2) (2018-2019). The difference is (2) – (1), and the test statistic tests whether the difference is statistically significant using a two-sided T-test. To test differences in R<sup>2</sup> we use Cramer (1987) to estimate the standard deviation of R<sup>2</sup>. The model uses fixed effects. Standard errors are clustered by ID (Companies) and included underneath in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% levels.

Variables	Total including extreme observations				Total excluding extreme observations			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	0.786 (0.519)	-1.681*** (0.367)	-2.467	-6.732***	0.855*** (0.264)	0.984*** (0.188)	0.129	0.685
BVPS	1.466*** (0.414)	-1.096*** (0.300)	-2.562	-8.537***	0.549*** (0.178)	1.683*** (0.257)	1.134	4.410***
Constant	-6.308 (34.155)	137.117*** (15.441)	143.425	9.288***	30.467*** (4.688)	4.840 (6.517)	-25.627	-3.932***
Observations	5,490	3,660			5,289	3,526		
R2 Within	0.664	0.793	0.129	30.833***	0.081	0.151	0.070	8.255***
R2 Between	0.956	0.407	-0.549	-44.128***	0.216	0.353	0.137	16.693***
R2 Overall	0.946	0.220	-0.726	-60.547***	0.210	0.344	0.135	16.259***
Companies	1,830	1,830			1,763	1,763		

To test our hypothesis that IFRS 15 has increased the value relevance of accounting information in Europe, we first analyse our complete sample together. In table 4 we show the panel regression based on our sample of 1 830 companies in 9 countries and BeNeLux. To illustrate the effect extreme observations may have on this kind of regression we show the same panel regression but excluding the 1% highest observations of price and 1% lowest observations of price. We argue that the sample excluding extreme observations will provide more correct and actionable results and include both to showcase why.

We are interested primarily in how the explanatory power of the model has changed, as this is the essence of value relevance. We use Cramer (1987) to test for significant differences in R<sup>2</sup>, and regular T-tests to test for differences in coefficients. Changes in coefficients are interpreted to show which part of the model has changed to change the overall model. In the panel regression of our entire sample, we see an increase in within R<sup>2</sup>, but a drastic decrease in between R<sup>2</sup>. Our sample has many companies and a short time span, so overall most of the variance is between companies and the overall explanatory power of the model has drastically

decreased. Furthermore, both earnings and book value go from having positive coefficients to having negative coefficients in the period after the introduction of IFRS 15. The implication is that with a constant book value, an increase in earnings of €1 would lead to a *decrease* in price of €1.68, and an increase of €1 in book value would similarly lead to a *decrease* of €1.10. Overall, the post-IFRS 15 period implies that an empty, listed company with no accounting value would be worth more than a company with solid profits and equity. This is obviously counter intuitive, and probably points to some issue with the data used.

All our data is scaled on a per share basis based on the share structure at the time of data collection. This allows analysis of for example returns over time but may be the cause of this issue. Companies that have had to restructure in the form of stock splits or reverse stock splits are given less or more influence in the regression based on this. Specifically, companies such as Norwegian Air Shuttle that have a history of negative or very low earnings and have undergone major reverse stock splits are given an undue amount of influence in the regression. Both the independent and dependant parts of the model are scaled up due to the reverse split(s), however as the earnings are negative and the book value is low in relation to the stock price, this creates outliers that skew the regression coefficients below zero. Therefore, we find it prudent to remove such observations and redo our analysis.

Therefore, in our second pair of panel regressions in table 4 we reduce the sample by excluding the top and bottom 1% of price observations, 183 observations in total, and then rebalance the dataset by removing an additional 152 observations. In this set of regressions all coefficients are intuitively consistent. If we compare the sample including outliers to the one excluding them, the first has higher values of  $R^2$ , however this is caused by the error terms, not by the independent variables. The error terms explain a large amount of the variance of the outliers, and this in turn leads to high  $R^2$  values, as much of the overall variance comes from the outliers.

In our sample before the introduction of IFRS 15 the model has an overall  $R^2$  of 0.21. This increases to 0.34 after the introduction of IFRS 15, an increase of 0.14 which is statistically significant at  $p < 0.01$ . This is largely due to an increase in the coefficient of book value, which goes from 0.55 to 1.68, a change that is also significant at the  $p < 0.01$  level. This implies that if we hold earnings constant, an increase in book value of €1 leads to an increase in price of €1.68 after the introduction of IFRS 15. The standard deviation of book value increases but decreases as a fraction of the coefficient. The earnings coefficient also increases; however, this increase is not statistically significant. Despite the increase in coefficient, the standard deviation of earnings decreases in absolute numbers. Another positive sign is the constant going from being

statistically significant ( $p < 0.01$ ) to being insignificant. Overall, we see an improvement in fit caused by changes in the independent variables. This indicates an overall improvement in value relevance after the introduction of IFRS 15.

*Table 5 Marginal improvements of book and earnings regressions*

We present the total panel regression without extreme variables (top and bottom 1% of price) alongside regressions using only earnings per share (EPS, E) or book value per share (less earnings per share) (BVPS, B) as independent variables. (1) represents the period before IFRS 15 while (2) represents the period after. We calculate marginal improvements in  $R^2$  of including EPS (BVPS) by subtracting B (E)  $R^2$  from total  $R^2$ . The model uses fixed effects. Standard errors are clustered by ID (Companies) and included underneath in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% levels.

Variables	Total regression		Earnings regression		Book value regression	
	(1) P	(2) P	(E1) P	(E2) P	(B1) P	(B2) P
EPS	0.855*** (0.264)	0.984*** (0.188)	0.440*** (0.125)	0.352* (0.190)	n.a. n.a.	n.a. n.a.
BVPS	0.549*** (0.178)	1.683*** (0.257)	n.a. n.a.	n.a. n.a.	0.318*** (0.097)	1.331*** (0.292)
Constant	30.467*** (4.688)	4.840 (6.517)	44.434*** (0.208)	47.299*** (0.379)	37.476*** (2.345)	15.410*** (7.156)
Observations	5,289	3,526	5,289	3,526	5,289	3,526
R2 Within	0.081	0.151	0.018	0.007	0.027	0.104
Marginal improvement	n.a.	n.a.	0.054	0.047	0.063	0.144
R2 Between	0.216	0.353	0.242	0.297	0.166	0.332
Marginal improvement	n.a.	n.a.	0.050	0.021	-0.025	0.056
R2 Overall	0.210	0.344	0.173	0.226	0.159	0.323
Marginal improvement	n.a.	n.a.	0.051	0.021	0.037	0.118
Companies	1,763	1,763	1,763	1,763	1,763	1,763

To further investigate what causes the increase in value relevance we present models using either earnings or book value as solitary independent variables and compare these up against the overall model. We observe that book value and earnings act as mediating variables on each other, as their coefficients are higher when both are including in the model. To calculate the improvement of the model by including earnings (book value) we subtract total  $R^2$  values from  $R^2$  values from the book value (earnings) model. In our period before IFRS 15 the earnings and book value show quite similar overall marginal improvements of 0.05 and 0.04. However, in the post-IFRS 15 period the book value model shows a marginal improvement of 0.12, while the earnings model only shows an improvement of 0.02 (down from 0.05). This indicates a shift in the value relevance of the accounting values from earnings to book value. This is also indicated by the drastically increased coefficient of book value in our total regression. The earnings model also show a decrease in the significance of earnings ( $p < 0.01$  to  $p < 0.1$ ), also indicating earnings has become a worse predictor when on its own. Such a shift from earnings to book value is in line with the goals of the conceptual framework which puts emphasis on the balance sheet.

As hypothesised, we observe an overall improvement in value relevance in the period after the introduction of IFRS 15. This improvement is caused by an increase in the relevance of the

book value of equity. The coefficient for the book value increases drastically, and the marginal improvement of including the book value in the model increases as well. Earnings is less affected when analysed with book value but shows decreases in relevance and coefficient when looked at separately.

#### 6.1.1 Conclusion to main hypothesis

Our analysis of the combined sample shows that the relationship between price and the accounting variables EPS and BVPS has improved in the post-IFRS 15 period compared to the pre-IFRS 15 period. This improvement is driven by an increase in the relevance of BVPS, including a shift from EPS to BVPS. We find this consistent with the goals of the Conceptual Framework, which emphasises the importance of the balance sheet.

#### 6.2 Analysis of individual countries

Our second hypothesis is that the change should be consistent across the European countries in our sample. To analyse whether we see the same improvement in individual countries as we did in the combined sample, we perform the same panel regressions, but split into each country. These regressions are presented in the following tables.

Table 6 Panel regression of individual countries

We run our panel regression on all ten countries before (1) and after (2) the introduction of IFRS 15. The dependant variable is price per share, while the independent variables are earnings per share (EPS) and book value per share less earnings per share (BVPS). We present differences by subtracting (2) from (1) and present test statistics based on two-sided t-tests to show whether the differences are significant or not. For R<sup>2</sup> we apply Cramer(1987). The models use fixed effects. Standard errors are clustered by ID (Companies) are included underneath in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% levels.

Variables	BeNeLux				Denmark			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	3.356 (2.119)	1.874*** (0.429)	-1.482	-3.457***	0.857* (0.475)	-2.493*** (0.087)	-3.349	-38.440***
BVPS	1.803*** (0.189)	5.259*** (1.309)	3.456	2.640***	1.725*** (0.334)	-1.763*** (0.071)	-3.488	-48.930***
Constant	-0.211 (4.707)	-97.081** (38.213)	-96.870	-2.535***	-675.852* (383.793)	1,428.761*** (32.783)	2104.614	64.199***
Observations	402	268			222	148		
R2 Within	0.324	0.237	-0.086	-3.675***	0.119	0.297	0.178	3.864***
R2 Between	0.260	0.286	0.026	0.974	0.989	0.468	-0.522	-8.995***
R2 Overall	0.258	0.287	0.029	1.079	0.982	0.256	-0.726	-12.119***
Companies	134	134			74	74		
Variables	Finland				France			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	1.499*** (0.366)	1.572 (1.073)	0.073	0.068	-0.949*** (0.347)	-1.303*** (0.098)	-0.354	-3.62***
BVPS	1.653*** (0.406)	1.129** (0.478)	-0.523	-1.094	0.633*** (0.095)	-1.507* (0.871)	-2.140	-2.456***
Constant	2.351 (1.952)	4.157 (2.645)	1.806	0.683	42.942*** (6.483)	212.020*** (67.004)	169.077	2.523**
Observations	291	194			1,026	684		
R2 Within	0.185	0.071	-0.114	-5.506***	0.855	0.768	-0.087	-6.677***
R2 Between	0.292	0.316	0.024	0.782	0.641	0.930	0.289	16.881***
R2 Overall	0.287	0.304	0.017	0.548	0.655	0.891	0.235	15.212***
Companies	97	97			342	342		
Variables	Germany				Italy			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	3.332*** (0.760)	1.019** (0.505)	-2.312	-4.576***	3.138*** (0.914)	2.081** (0.852)	-1.057	-1.240
BVPS	2.453*** (0.478)	1.431** (0.601)	-1.022	-1.702*	1.330 (1.251)	3.889*** (1.017)	2.559	2.516**
Constant	-4.759 (8.466)	12.761 (11.128)	17.520	1.574	1.203 (5.498)	-10.530** (5.113)	-11.733	-2.294**
Observations	921	614			471	314		
R2 Within	0.296	0.039	-0.257	-12.874***	0.172	0.431	0.258	9.466***
R2 Between	0.643	0.465	-0.178	-7.949***	0.563	0.477	-0.086	-3.204***
R2 Overall	0.628	0.455	-0.173	-7.768***	0.505	0.461	-0.044	-1.750*
Companies	307	307			157	157		

Table 7 Continuation of Panel regression of individual countries (table 6)

Variables	Norway				Poland			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	-0.189 (0.196)	-3.789*** (1.220)	-3.599	-2.951***	2.185** (0.961)	1.113** (0.435)	-1.073	-2.464***
BVPS	-4.701*** (0.556)	3.909*** (0.961)	8.610	8.960***	-0.467 (0.515)	-0.874 (1.305)	-0.407	-0.312
Constant	646.705*** (50.324)	-239.811*** (61.201)	-886.515	-14.485***	38.451*** (10.113)	44.837 (28.805)	6.386	0.222
Observations	288	192			762	508		
R2 Within	0.960	0.987	0.027	6.465***	0.093	0.110	0.017	1.004
R2 Between	0.989	0.982	-0.007	-3.204***	0.000	0.353	0.353	10.452***
R2 Overall	0.849	0.902	0.053	5.634***	0.001	0.335	0.335	9.900***
Companies	96	96			254	254		

Variables	Spain				Sweden			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	2.995* (1.706)	0.590 (0.555)	-2.405	-4.336***	1.537** (0.712)	1.165*** (0.276)	-0.372	-1.347
BVPS	0.098 (0.094)	0.875 (0.811)	0.777	0.958	0.857** (0.405)	2.466*** (0.581)	1.609	2.772***
Constant	8.870*** (3.352)	1.107 (13.554)	-7.763	-0.573	45.069*** (11.451)	7.624 (17.245)	-37.445	-2.171**
Observations	249	166			858	572		
R2 Within	0.124	0.059	-0.065	-3.851***	0.118	0.222	0.104	4.643***
R2 Between	0.042	0.018	-0.023	-1.693*	0.468	0.457	-0.010	-0.580
R2 Overall	0.042	0.018	-0.024	-1.685*	0.433	0.443	0.010	0.568
Companies	83	83			286	286		

Even though our model is very simple and all companies in our sample use the same reporting standards which define our explanatory variables, we see a large disparity between regressions, both between countries and between our periods. Some of our findings are problematic, as they contradict sound intuition. For example, the post-IFRS15 period in Norway show a statistically significant negative earnings coefficient, implying that a company would decrease in value if it were to earn more money. In contrast standard regressions of single years primarily yield intuitively consistent results, and when they do not the offending coefficients are insignificant.

To evaluate changes in our variables we calculate T-statistics with the null hypothesis being no change in the coefficient between our periods. In our model there is one variable that consistently changed in the same direction, that being earnings. The coefficient for earnings had a statistically significant ( $p < 0.05$ ) change in seven out of ten samples, all of which were with a reduction in coefficient from pre-IFRS15 to post-IFRS15. This includes negative coefficients growing more negative. This is a strong indication that IFRS15 in fact had an impact on the way earnings relate to market price. The change in coefficient being negative does not necessarily mean earnings have become less value relevant. For example, a change which leads to more earnings being recognized which also falls in line with the market's understanding of value creation, will make the coefficient lower, but the relationship between



earnings and price stronger. In our samples for BeNeLux and Norway, EPS went from being statistically insignificant to being statistically significant at the  $p < 0.01$  level. However, the Norwegian coefficients are negative, which is counterintuitive and leads to an issue with the underlying data. Similarly, Sweden increased from being significant at  $p < 0.05$  to being significant at  $p < 0.01$ . In Finland earnings went from being significant at the  $p < 0.01$  level to being insignificant, while Germany and Italy saw decreases from  $p < 0.01$  to  $p < 0.05$ . Overall, the implementation of IFRS15 seems to have had an effect on the relation between earnings and pricing, but whether this change has made earnings a better or worse predictor of price seems to vary on a country-by-country basis.

Book value has more split results, with four samples seeing a significant positive increase in coefficient while Denmark and France saw the opposite. Italy was the only country to see a change in the p-value of book value from insignificant in the pre-IFRS15 period to significant ( $p < 0.01$ ) in the post-IFRS15 period. In France, the book value sees a decrease from being significant at the  $p < 0.01$  level to only being significant at the  $p < 0.1$  level. Book value in Finland and Germany move down a single threshold, while in Sweden it moves up. Once again, we see major differences between countries.

We use (Cramer, 1987) to analyse differences in  $R^2$ , which similarly to the coefficients yields varying results. Five countries show an increase in  $R^2$  while four show a decrease. The only country not showing a significant difference was Poland. The countries that see a statistically significant increase in R-squared all see shifts in one or both explanatory variables T-statistic from one threshold to another. Italy is the only one of these countries with a negative shift in the T-statistic of earnings, but this is made up for by more relevance from the book value.

### 6.3 Analysis excluding extreme values

In our initial selection of data, we excluded outliers in the form of companies with a negative book value, but there are other outliers in our data set that have a drastic impact upon our regression results. The data is based on the share structures of the companies today, meaning that all variables are adjusted thereafter. Because of this companies such as Norwegian Air Shuttle that have had massive reverse stock splits have a grave impact on the results of our regressions. One may think that this is not an issue, as both the dependant and independent variables are increased with the same multiples, however the issue is not so simple. In the case of Norwegian, and companies that reverse stock split may follow a similar trend in general, the inflated price of previous years is not accompanied by inflated positive earnings but inflated negative earnings. This means a large amount of the variation in the dependant variable is caused by Norwegian, and this comes paired with negative or relatively meagre earnings. In fact, this one company causes the earnings coefficient of Norway to be negative in our panel regression, as it turns positive once Norwegian is excluded. These observations have a high leverage and share of the squared residual.

This example illustrates that the high volatility of stock data leads to the possibility of extreme outliers that may negatively impact our ability to draw the correct conclusions from our PRM. Therefore, we also conduct analysis excluding companies with extreme observations by removing the top and bottom 1% of price observations. This results in an initial exclusion of 183 observations, and an additional 152 observations are removed to balance the data set, leaving us at 8 815 observations total, or 1 763 companies.

Table 8 Panel regression excluding top and bottom 1% of price observations

We run our panel regression on all ten countries before (1) and after (2) the introduction of IFRS 15. This sample excludes extreme observations in the form of the top and bottom 1% of observations of price. The dependant variable is price per share (P), while the independent variables are earnings per share (EPS) and book value per share less earnings per share (BVPS). We present differences by subtracting (2) from (1) and present test statistics based on two-sided t-tests to show whether the differences are significant or not. For R<sup>2</sup> we apply Cramer(1987). The models use fixed effects. Standard errors are clustered by ID (Companies) and included underneath in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% levels.

Variables	BeNeLux				Denmark			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	1.368*** (0.330)	1.003*** (0.258)	-0.364	-1.412	2.477*** (0.836)	1.230 (0.749)	-1.247	-1.665*
BVPS	1.528*** (0.202)	2.116** (0.913)	0.588	0.644	1.322* (0.663)	2.016*** (0.415)	0.694	1.675*
Constant	-1.333 (5.118)	-16.664 (24.058)	-15.331	-0.637	62.701 (63.112)	7.346 (41.333)	-55.355	-1.339
Observations	399	266			186	124		
R2 Within	0.324	0.237	-0.086	-3.662***	0.119	0.297	0.178	3.565***
R2 Between	0.337	0.336	-0.001	-0.049	0.228	0.135	-0.093	-5.927***
R2 Overall	0.329	0.328	-0.002	-0.060	0.220	0.136	-0.084	-4.894***
Companies	133	133			62	62		
Variables	Finland				France			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	1.499*** (0.366)	1.572 (1.073)	0.073	0.068	0.512 (0.454)	0.691* (0.410)	0.179	0.435
BVPS	1.653*** (0.407)	1.129** (0.478)	-0.523	-1.094	0.268 (0.190)	1.254*** (0.482)	0.986	2.046***
Constant	2.401 (1.993)	4.244 (2.701)	1.843	0.682	36.949*** (7.359)	13.883 (14.541)	-23.066	-1.586
Observations	285	190			975	650		
R2 Within	0.185	0.071	-0.114	-5.448***	0.047	0.095	0.048	2.795***
R2 Between	0.281	0.306	0.024	0.773	0.115	0.571	0.456	27.736***
R2 Overall	0.277	0.294	0.017	0.546	0.111	0.555	0.444	25.193***
Companies	95	95			325	325		
Variables	Germany				Italy			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	3.309*** (0.860)	0.951* (0.536)	-2.358	-4.395***	3.147*** (0.916)	2.097** (0.867)	-1.049	-1.210
BVPS	2.433*** (0.497)	1.395** (0.606)	-1.038	-1.7130*	1.332 (1.256)	3.919*** (1.031)	2.586	2.509**
Constant	-4.941 (8.414)	11.627 (10.999)	16.568	1.506	1.344 (5.717)	-11.202** (5.448)	-12.545	-2.3028**
Observations	900	600			447	298		
R2 Within	0.344	0.042	-0.302	-15.099***	0.172	0.434	0.261	9.387***
R2 Between	0.647	0.459	-0.188	-8.186***	0.563	0.467	-0.095	-3.407***
R2 Overall	0.629	0.445	-0.184	-8.075***	0.504	0.452	-0.052	-1.987**
Companies	300	300			149	149		

Table 9 Continuation of Table 8

Variables	Norway				Poland			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	0.920*** (0.141)	1.121 (1.346)	0.202	0.150	1.793*** (0.686)	0.961** (0.457)	-0.832	-1.822*
BVPS	1.157*** (0.288)	1.369 (1.229)	0.211	0.172	0.137 (0.430)	-0.159 (1.385)	-0.296	-0.214
Constant	18.119 (11.239)	20.536 (50.443)	2.417	0.048	22.000** (8.597)	23.682 (28.368)	1.683	0.059
Observations	285	190			735	490		
R2 Within	0.312	0.093	-0.219	-10.074***	0.152	0.077	-0.075	-9.485***
R2 Between	0.444	0.399	-0.045	-1.412	0.584	0.004	-0.580	-25.585***
R2 Overall	0.429	0.387	-0.042	-1.321	0.529	0.000	-0.529	-21.126***
Companies	95	95			245	245		
Variables	Spain				Sweden			
	Before (1) P	After (2) P	Difference	T-stat	Before (1) P	After (2) P	Difference	T-stat
EPS	3.005* (1.715)	0.592 (0.559)	-2.413	-4.318***	1.092** (0.447)	1.091*** (0.226)	-0.001	-0.005
BVPS	0.098 (0.094)	0.879 (0.817)	0.781	0.956	0.625** (0.249)	2.141*** (0.426)	1.516	3.561***
Constant	9.369** (3.583)	1.121 (14.515)	-8.248	-0.568	50.481*** (7.027)	15.366 (12.599)	-35.115	-2.787***
Observations	234	156			843	562		
R2 Within	0.124	0.059	-0.065	-3.739***	0.082	0.186	0.104	4.496***
R2 Between	0.039	0.017	-0.023	-1.578	0.443	0.424	-0.019	-1.030
R2 Overall	0.039	0.017	-0.023	-1.571	0.409	0.408	-0.001	-0.071
Companies	78	78			281	281		

From comparing tables 6 and 7 to tables 8 and 9, we can see that when the extreme observations are removed our regressions look quite different. Continuing our example from earlier, we see that the earnings coefficient in Norway is now positive in both periods. Norway has no significant changes in the coefficient, but the overall fit is worse for the post-IFRS 15 period, with a significant decrease in  $R^2$  within companies, and insignificant decreases in  $R^2$  between companies and overall. Both periods show lower explained variances when compared to the model including outliers. Much of this variance was explained by the error variables, and not truly by the explanatory variables in our model. All the regressions now have intuitively consistent coefficients, as they are now all positive for both earnings and book value per share. An interesting observation is that the model seems consistently better at predicting variation in price between companies than variations within individual companies. This may be due to our data set having ample companies but a short time period. Perhaps quarterly data would yield slightly better results within companies.

Once again, our countries have very different developments from the period before IFRS 15 to the period after IFRS 15. The significance of the book value increases in Denmark, France, Italy, and Sweden, all seeing a significant *increase* in the coefficient at  $p < 0.05$ , except for Denmark which is only significant at  $p < 0.10$ . However, out of these only France experiences an increase in overall  $R^2$ , with the others seeing a mix of increases and decreases in within and

between  $R^2$ . For a better overview of what kind of changes each country has, we present table 10.

*Table 10 Overview of significant changes*

Here we present significant changes in the coefficients of our independent variables and  $R^2$ . EPS is earnings per share and BVPS is book value of equity per share less EPS. All presented changes are significant at the 5%-level or higher. A significant increase in the change of a coefficient means that the change is significant, and the coefficient is higher in the post-IFRS 15 period, and vice versa. There were no significant increases in EPS or decreases in BVPS, marked with n.a. for not applicable. The number of countries each change applies to is marked in parentheses next to the last country. The table is based on the panel regressions without extreme observations presented in tables 8 and 9.

	<b>Significant increase</b>	<b>Significant decrease</b>
R2 Within	Denmark, France, Italy, Sweden (4)	BeNeLux, Finland, Germany, Norway, Poland, Spain (6)
R2 Between	France (1)	Denmark, Germany, Italy, Poland (4)
R2 Overall	France (1)	Denmark, Germany, Italy, Poland (4)
EPS-coefficient	n.a. (0)	Germany, Spain (2)
BVPS-coefficient	France, Italy, Sweden (3)	n.a. (0)

The only countries that see an increase in the significance of earnings is France and Sweden, but France only sees an increase from earnings being insignificant to significance at  $P < 0.10$ , while Sweden goes from  $P < 0.05$  to  $P < 0.01$ . Moreover, there is no change in the coefficient for earnings in Sweden, only its significance. Sweden sees a shift in the model from the constant being the most important variable, to the explanatory variables proper, but despite this does not see an increase in overall or between  $R^2$ , only the within estimate sees an increase.

As shown in table 10 the only country that sees an increase in overall  $R^2$  is France, while Denmark, Germany, Italy, and Poland all see significant decreases. Based on this the general trend across Europe has been a decrease in value relevance after the introduction of IFRS 15. Earnings have become less significant in several countries, with Germany and Spain having significant decreases in the coefficient as well. As we discussed book value seems more value relevant in certain countries, with coefficient increases in France, Italy, and Sweden, but this is not enough to increase overall value relevance except for in France.

### 6.3.1 Conclusion to secondary hypothesis

In summary, we do not see consistent increases in value relevance in the individual countries and reject our hypotheses that changes will be consistent across countries. There are more countries seeing negative changes in the relationship between price and our independent variables. However, the analysis of the total sample showed improvements in the value relevance, so how do we explain these seemingly contradictory results? There has been a harmonisation in the coefficients between countries in the post-IFRS 15 period as compared to the pre-IFRS 15 period. The average EPS coefficient in the 10 countries goes from 1.91 to 1.13

and the standard deviation of the EPS coefficients between countries is reduced from 1.00 to 0.43. For BVPS the average coefficient goes from 1.06 to 1.61 and the standard deviation only increases from 0.76 to 1.06, which is a reduction in the standard deviation to coefficient ratio. This harmonisation across countries leads to an improvement when the combined sample is analysed and indicates that the new standard has improved comparability between countries. The introduction of IFRS 15 seems to have helped converge different practices between countries.

## 6.4 Robustness and generalisability

As shown the model is not very robust to observations involving big (reverse) stock splits, with coefficients being skewed into the negatives by extreme cases. We focus more on the data excluding extreme observations, as these result in internally consistent results. Market data is generally prone to heteroskedasticity and high kurtosis and skewness, which is also the case in our data set. In addition to our PRM panel regressions we have analysed our variables individually and using standard regressions for each year.

### 6.4.1 Single variable panel regressions

To supplement our PRM analysis we have also performed panel regressions with just earnings or book value per share as the explanatory variable. When earnings are isolated, we see similar results as in our main model, with several of the regressions losing significance. The same goes for book value, with some of the regressions improving as we saw earlier. This is to be expected as we have tested for collinearity in the explanatory variables and there was little to none.

### 6.4.2 Yearly standard regressions

We have performed yearly standard regressions and graphically examined for trends. This supports the value relevance decreasing after the introduction of IFRS 15 in individual countries. Finland and France are the odd ones out. The combined yearly regressions yield the same results as the panel analysis, with better regressions in the post-IFRS 15 years driven by an increase in the BVPS coefficient.

### 6.4.3 Outlier regressions

The most extreme changes in the explanatory power of the PRM panel-model are in France and Poland. France goes from an overall  $R^2$  of 0.111 to 0.555, while Poland goes from 0.529 to 0.000. Such extreme changes cannot be explained by mere changes in accounting standards and may point to methodological issues with using panel regressions in value relevance research.

An alternative to panel regressions would be to perform standard regressions at each point in time and compare those instead of comparing two panel regressions. Tables 11 and 12 contain yearly price regressions for France and Poland. We can see that France does appear to have a massive increase in  $R^2$  like the one observed in our panel model. Similarly, Poland sees a drastic downturn in year 5, but the yearly price regressions explain far more variance than the panel model. The problem seems to stem from a sharp change within the post-IFRS 15 period. One issue with studying IFRS 15 is there is no accessible way to analyse changes purely caused by the standard, as the rules of implementation allow different solutions, and the reported changes caused by IFRS 15 are not available as variables in our databases.

*Table 11 Yearly regressions for France*

Standard OLS regressions for France in our panel period. The dependant variable is price (P), dependant variables are earnings per share (EPS) and book value per share less EPS (BVPS). Robust (White) standard errors are presented in parentheses underneath. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% levels.

<b>France</b>	2015	2016	2017	2018	2019
VARIABLES	P	P	P	P	P
EPS	0.774** (0.302)	1.629*** (0.464)	8.074*** (0.473)	2.282*** (0.314)	2.468*** (0.454)
BVPS	0.165*** (0.026)	0.060* (0.036)	0.158*** (0.026)	1.046*** (0.060)	1.209*** (0.074)
Constant	35.032*** (3.421)	40.038*** (3.945)	31.724*** (3.695)	11.677*** (3.277)	17.419*** (4.874)
Observations	325	325	325	325	325
R-squared	0.117	0.115	0.526	0.665	0.527

*Table 12 Yearly regressions for Poland*

Standard OLS regressions for Poland in our panel period. The dependant variable is price (P), dependant variables are earnings per share (EPS) and book value per share less EPS (BVPS). Robust (White) standard errors are presented in parentheses underneath. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% levels.

<b>Poland</b>	2015	2016	2017	2018	2019
VARIABLES	P	P	P	P	P
EPS	3.934*** (0.410)	2.251*** (0.590)	2.916*** (0.685)	5.321*** (0.460)	1.846*** (0.447)
BVPS	0.850*** (0.075)	1.139*** (0.127)	0.710*** (0.114)	0.206*** (0.057)	0.388*** (0.079)
Constant	5.271** (2.345)	4.273 (3.126)	9.008*** (3.068)	8.463*** (2.011)	11.981*** (3.173)
Observations	245	245	245	245	245
R-squared	0.643	0.590	0.503	0.598	0.294

#### 6.4.4 Generalisability

As we have seen a lot of variation between countries within our sample, we do not think our findings are generalisable to samples outside of Europe, such as Australia, Southeast Asia or

with the introduction of the IFRS 15 equivalent, ASC 606, in the United States. As the legal, market and control environments are even more varied than those found within continental Europe, we assume there would be variation in the effects of IFRS 15 being introduced outside of Europe as well.



## 7 Conclusion and further study

The quality of accounting information has a key impact on user's decision making. To be useful accounting information should have certain qualities. IASB (2018) differentiates useful financial reporting information from information that is not useful. The two fundamental qualitative characteristics, according to IASB (2018), are relevance and faithful representation. The importance of accounting information on the quality of information has made standard setting bodies (that includes IASB & FASB) to evaluate standards and set new standards that improves the quality of information. This is one of the reasons for the introduction of IFRS 15. IFRS 15 has been prepared, among other things, to remove weaknesses and inconsistencies in previous standards, and at the same time provide more useful information. IFRS 15 affects how companies recognize, measure, present and disclose their revenues and can affect how companies and their transactions are understood. Prior to 2018, companies followed a variety of revenue standards, that includes IAS 11 & IAS 18, depending on their source of revenue.

The adoption of IFRS 15 was expected to result in a change in the quality of information in the business environment. Accounting theory claims that financial reporting lessens information asymmetry by disclosing relevant and timely information (Frankel & Li, 2004). Because there are considerable distinctions in accounting quality across countries, international accounting systems can provide an interesting setting to examine the economic consequences of financial reporting. International accounting literature provide evidence that accounting information quality has economic consequences, such as on valuation (Robert et al., 2006) and affect the information asymmetry component of the firm's cost of capital (Leuz & Verrecchia, 2000). The value relevance of accounting information is highly discussed among accounting scholars and standard setters. In value relevance research, the relationship between accounting information and market values is studied. According to Barth et al. (2001), accounting information is termed as value-relevant, if it has a predictive connotation with market values.

The main finding of this study revealed that the relation between key accounting values and market values (stock prices) is stronger for European listed companies after the adaption of IFRS 15 when analysing the sample as a whole. The change, however, is not consistent across European countries. Our findings revealed that countries that observe the same accounting standards do not necessarily react to new standards in a uniform manner. There is a lot of variances between countries in value relevance both before and after the introduction of IFRS 15. We found evidence of a harmonisation after the introduction, leading to more similar results

across countries, and an improvement in the overall regressions. However, on a per country basis we see more countries with decreases in value relevance than we do increases. The relevance of earnings has decreased in most countries, while book value sees minor improvements. The only country that sees a consistent improvement in value relevance is France. As such IFRS 15 has improved the comparability of accounting information across countries, but not improved value relevance within countries.

The main aim of EU's IFRS 15 adoption to achieve better comparability of financial statements via harmonisation of accounting standards, across countries in EU. According to our findings, differences across countries in Europe are still significant. Further studies should investigate whether IFRS 15 have been implemented consistently throughout Europe. In addition, this study is limited to a short period (for the years 2015-2019). It would, however, be interesting to make subsequent studies to examine IFRS 15's long-term effect on the value relevance of accounting information based on including several years of observations. A study with a longer time perspective may, for example, be suitable for uncovering how value relevance develops as both accounting producers and accounting users learn to use IFRS 15. Therefore, we expect future studies to research to what extent accounting harmonisation is taking place regarding the implementation of IFRS 15 and its effect on value. The implementation of the IFRS 15 equivalent, ASC 606, in the United States also offers an opportunity to study the effects of the same revenue recognition model replacing a different set of standards.

This study has a narrow purview, looking only at one facet of accounting information quality. Studies may also be performed to study the effect of IFRS 15 on earnings management, timely loss recognition, analyst forecast errors and whether earnings are more or less predictive of future performance. Qualitative studies may be conducted for example by asking analysts whether the implementation of IFRS 15 has made their job easier through new disclosure rules or whether the new revenue recognition model requires more or less adjustment when used as input in their valuation models.

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