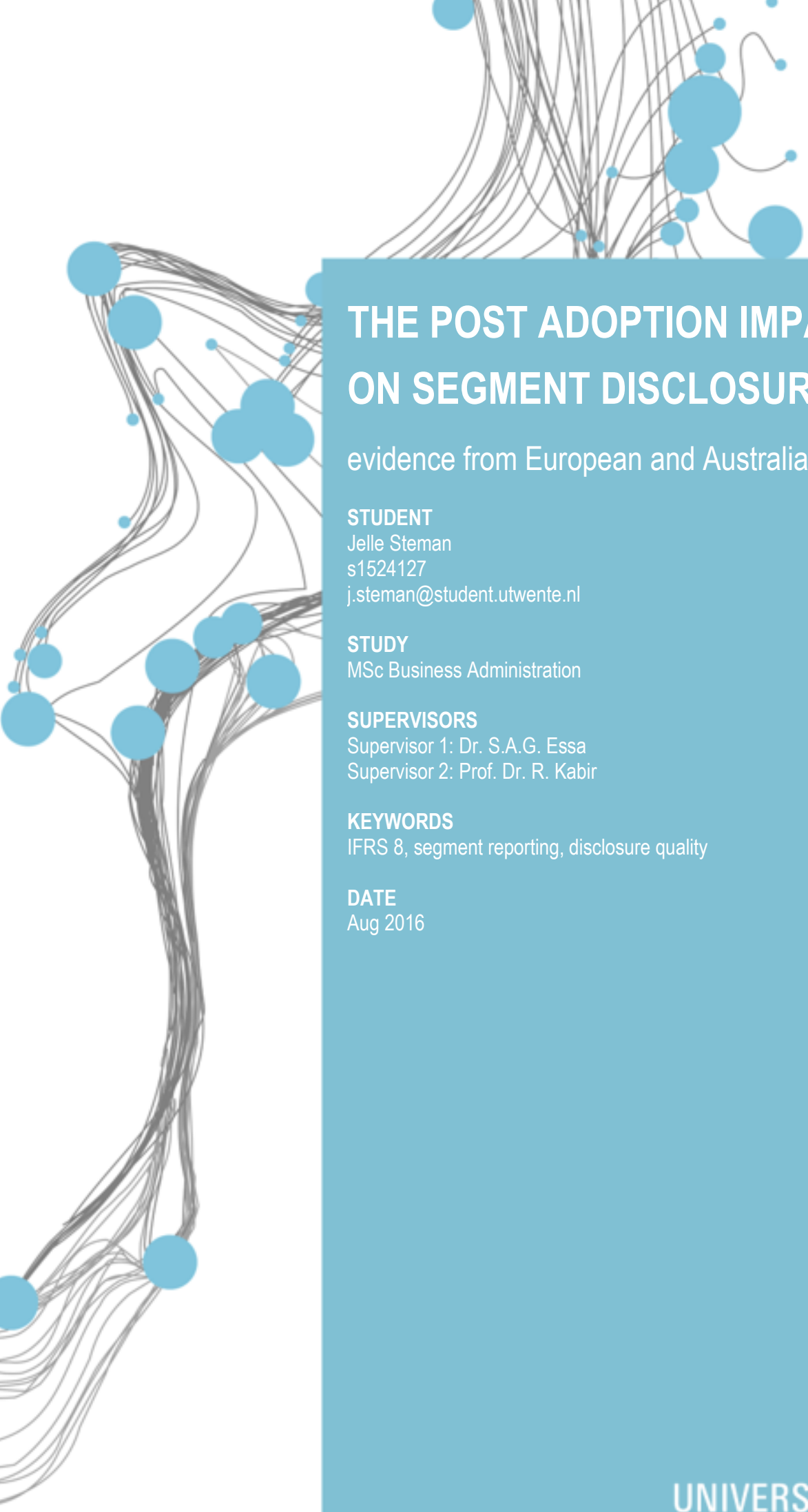

THE POST ADOPTION IMPACT OF IFRS 8 ON SEGMENT DISCLOSURE QUALITY

evidence from European and Australian listed firms

STUDENT
Jelle Steman
s1524127
j.steman@student.utwente.nl

STUDY
MSc Business Administration

SUPERVISORS
Supervisor 1: Dr. S.A.G. Essa
Supervisor 2: Prof. Dr. R. Kabir

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Abstract

Over the past decade segment disclosure quality has changed for most listed European firms. The IASB issued IFRS 8 in November 2006 to replace IAS 14R. In 2009 IFRS 8 became mandatory, changing the regulations for segment disclosure. This study is looking into the post adoption impact of IFRS 8 on segment reporting quality by comparing the latest IAS 14R data with 2014 data. The sample comprised 402 firms, 804 firm year observations, from the Benelux, Scandinavia and Australia. The sample included firms that reported geographical segments as well as business segments. In line with prior literature, segment reporting quality is measured with segment income reported, number of segment items, number of segments and the fineness of segment disaggregation. Univariate analysis of the four different segment reporting qualities shows that for the European firms only the number of items disclosed under geographical segments decreased and the fineness of segment disaggregation under business segments increased. The Australian firms declined the disclosure of segment income and number of items. Regression analysis shows no clear overall post-adoption impact of IFRS 8 on the four segment reporting quality variables. I find four different effects in specific settings, under different types of segments and for different segment reporting qualities.

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1 Introduction

This study examines the impact of IFRS 8 on segment reporting of European and Australian listed firms. Segment reporting started in the second half of the twentieth century, this was demanded by groups of financial analysts and regulators (Pardal and Morais, 2011). Pardal and Morais (2011) argue that the need for segment information came from the trend that firms became more diversified and pursued international strategies, which made firms more complex. Through segment reporting analysts can understand the financial performance of the different elements of complex firms (Pardal and Morais, 2011). For accounting periods starting on or after 1 January 2009 the International Financial Reporting Standards (IFRS) 8 *operating segments* became mandatory.[1] IFRS 8 replaced International Accounting Standards (IAS) 14 R *Segment Reporting*, which was the replacement of IAS 14 *Reporting Financial Information by Segment* (International Accounting Standards Board (IASB), 2015).

There are two motivations for doing a research in this field. The adoption of IFRS 8 immediately got the attention of academics before the adoption, during the adoption and shortly after the adoption (Nichols et al., 2013). Authors described various effects of the adoption of IFRS 8, for example on the decision usefulness of segment reports (e.g., Kajüter and Nienhaus, 2015, WP) or on several aspect of segment reporting quality (e.g., Leung and Verriest, 2015). However, the research field of segment reporting under IFRS 8 is still said to be "in its infancy" (Nichols et al., 2013, p. 302). Their argument was that there was only limited data at that moment, since IFRS 8 was only mandatory from 2009. The first motivation for this study is to add to this growing body of literature.

The second motivation for this study is to add evidence for the debate surrounding the IFRS 8 adoption. The adoption of IFRS 8 was surrounded by a large political debate in the European Union (Crawford et al., 2014). Apart from the political debate that faded away, there was and still is a debate about the effectiveness of the adoption of IFRS 8 and IFRS in general (e.g., Ball, 2016; Tokar, 2016). Mixed evidence by prior studies on the different elements of segment reporting have still not given one satisfactory overall judgement on the IFRS 8 adoption (Nichols et al., 2013). This study will try to add evidence to the debate.

To provide empirical evidence of the actual impact of IFRS 8 on segment disclosure quality, I collect data for a sample of 302 firms from the Benelux (Belgium, the Netherlands and Luxembourg) and Scandinavia (Denmark, Norwegian and Sweden) that are listed on a stock

[1] See for the complete list of abbreviations in *Appendix D*.

exchange. These countries were chosen because prior literature did not or to a limited extend look into these countries. Additionally, another 100 Australian firms are included as a control group to measure the post-adoption impact outside a European setting. A part of the data is derived from the ORBIS database. The specific data on segment reporting is added with hand-collecting the information needed from the publicly available annual reports. The latest year under a pre-IFRS 8 reporting standard, IAS 14R mainly, from 2006, 2007 or 2008 will be compared to 2014 IFRS 8 data, since this is the latest year that is completely available for all firms.[2] With regression analysis and controlling for factors that are also found to influence segment reporting quality this study looks at the post-adoption impact of the IFRS 8 on segment reporting quality. The control variables included in the regression analysis are firm size, market to book ratio, industry competition, leverage and profitability.

I contribute to the literature in the following ways. Firstly, I look at the post-adoption impact of IFRS 8 on segment disclosure quality. The current literature on the impact of IFRS 8 is limited to 2009 or 2010 and before data, measuring the "immediate" impact of the adoption of IFRS 8 (Bugeja et al., 2015).[3] Data from 2014 will be compared to the last IAS 14R data, instead of looking at the immediate impact of the IFRS 8 adoption on segment disclosure quality. Bell (2015) did measure the impact of segment reporting after a number of years. He used data from 2004 till 2013 to see if SFAS 131 has improved in the last ten years. SFAS 131 is, however, the United States (US) counterpart of the IFRS 8 and Bell (2015) used descriptive statistics. This study will look at the IFRS 8 adoption and will use a more advanced statistical measure to control for variables that are found to influence segment reporting quality.

The second contribution of this study to the current literature is that the main part of the data will come from Benelux' and Scandinavian' listed firms, countries with firms that are not yet (or in a limited way) analyzed by prior literature on the IFRS 8 adoption. Prior literature has extensively looked into US data, because of the SFAS 131 adoption. IFRS 8 has been adopted in many more countries, though not all of them are studied yet or only the most prominent companies. Crawford et al. (2012) and Aleksanyan and Danbolt (2015) for example have looked at the United Kingdom. Also Australian (Bugeja et al., 2015), German (Kajüter and Nienhaus, 2015, WP), Jordan (Mardini et al., 2012), Italian (Pisano and Landriani, 2012) and Spanish (Pardal and Morais, 2011) firms' segment disclosure has been more extensively

[2] For simplicity, in the remaining sections IAS 14R will be used to denote the pre-IFRS 8 standard, since most of the firms reported under IAS 14R prior to IFRS 8. The terms IAS 14R and IFRS 8 will be used for both the European and the Australian sample.

[3] Consequently, any prior segment reporting literature discussed in this master thesis addresses the immediate impact of the reporting standard adoption, unless clearly mentioned.

studied. Nichols et al. (2012) studied almost the same countries' segment disclosure, though in their study the countries were part of a larger sample and only the top tier firms were included. The authors studied listed European blue chip companies with a sample of only the top tier companies, in 14 countries.

The third contribution of this study is that it will look at the fineness of reported business segments, which is not done before in prior literature of IFRS 8. For geographical segments there are a few articles addressing the fineness of geographical segments. However, for business segments under IFRS 8 no prior literature has looked into a fineness.

This study will look at how the segment reporting quality has changed after the adoption of IFRS 8. Following Leung and Verriest (2015), segment reporting quality is defined "from an investor perspective, which is mainly determined by the amount of information firms disclose… as well as the level of disaggregation or fineness of segments…". (p. 267) Segment reporting quality will be analyzed from the perspective of Benelux' and Scandinavian' listed firms and additional control group is formed with Australian firms. The research setting and goal are captured in the following central research question:

What is the post-adoption impact of IFRS 8 on segment disclosure quality of European and Australian listed firms?

The results of the univariate analysis of the European sample of 302 firms, 604 firm-year observations, shows that only the number of items disclosed under geographical segments decreased and the fineness of segment disaggregation under business segments increased. In the sample of 100 Australia firms, 200 firm-year observations, a decline is observed in the disclosure of segment income and the number of items.

All in all, from the regression analyses it seems that IFRS 8 did not have a clear overall post-adoption impact on segment disclosure. Instead, I find four different effects in specific settings, under different types of segments and for different segment reporting qualities. First of all, in the Australian sample an effect of IFRS 8 on segment income disclosure is found under business segment reporting. Also under Australian business segment reporting a negative effect of IFRS 8 on the disclosure of segments items is found. Thirdly, the fineness of segment disclosure of Australian firms disclosing under geographical segments declined due to the adoption of IFRS 8. And lastly, within the European sample, IFRS 8 had a positive effect on the segment disaggregation of Scandinavian firms reporting under business segments.

The remainder is structured as follows: chapter 2 contains the literature review with the general information of IFRS 8, other IFRS adoptions, agency- and proprietary costs, voluntary influencers on segment reporting quality are discussed and segment reporting quality and economic effects of IFRS 8 are discussed. Chapter 3 is the methodology chapter in which the regression model is explained, variables are addressed and the sample is described. Chapter 4 show the results and the conclusion based on the results is given in chapter 5.

2 Literature review

This study is looking into the post-adoption impact of IFRS 8, but first prior literature in the field of segment reporting and especially IFRS 8 is addressed. What is the history of IFRS 8 and what is the content of the standard? What is the broader IFRS framework and how was the adoption impact on disclosure quality of other standards? How do the two most important theories in the field of segment reporting influence segment reporting quality? Voluntary influencers on segment reporting quality are addressed. Prior empirical evidence on segment reporting quality after the IFRS 8 adoption and on the economic effects of IFRS 8 will also be addressed in this chapter.

2.1 Road to introduction and content of IFRS 8

IFRS 8 is mandatory for fiscal years starting on the first of January 2009. The core principle of IFRS 8 is "an entity shall disclose information to enable users of its financial statements to evaluate the nature and financial effects of the business activities in which it engages and the economic environments in which it operates" (IASB, 2015, p. A307). IFRS 8 replaced IAS 14R, which was the replacement of IAS 14 (IASB, 2015). IFRS 8 is almost equal to Statement of Financial Accounting Standards (SFAS) 131 *Disclosures about Segments of an Enterprise and Related Information* issued by the Financial Accounting Standards Board (FASB), which was issued in the US in 1997 (Nichols et al., 2013; FASB, 2016). The reason that IFRS 8 and SFAS 131 are almost equal is because this standard was part of a project to reduce the differences between IFRS and the U.S. Generally Accepted Accounting Principles (GAAP) (Ernst & Young, 2016).

The IASB, the independent organization behind the IFRSs, is since 2001 the organization in charge to issue accounting standards (Ball, 2006). The predecessor of IASB, the International Accounting Standards Committee (IASC), issued IASs between 1973 and 2000 (Ball, 2006). Since 2001 the IASB is the organization in charge to issue accounting standards, though the IASs still apply for firms. Newly formed accounting standards from that moment onwards are called IFRS.

IFRS 8 is the third segment reporting standard of the IASB/IASC, after the introduction of IAS 14 and IAS 14 revised. IAS 14 was introduced in 1981 and determined that companies had to disclose significant information about industry and geographical segments. The standard got several critiques, but the most important critique is that the companies interpreted the significance in their own benefit and often did not report to much information of segments (Street and Nichols, 2002). So, in 1998 IAS 14R became effective. IAS 14R required companies

to disclose geographical and lines of business segments and companies had to make segments of business activities that had the same risk and return. The revised IAS 14 improved the number of items disclosed, less companies reported only one segment and more constancy between the rest of the annual report and the segment reporting was achieved (Street and Nichols, 2002). A negative note is that segments continued to be vague and broad and the standard was not fully embraced (Prather-Kinsey and Meek, 2004; Street and Nichols, 2002).

The adoption of IFRS 8 has caused quite some political controversy in the European Union (EU), since the implementation resulted in a debate about the control over accounting standards within the EU (Crawford et al., 2014). Topics of debate were the Americanization of IFRS/IAS, terminology as for example Chief Operating Decision Maker, non-IFRS measures in segment reporting and the reporting freedom IFRS 8 gave to companies. Crawford et al. (2014) concluded from their interviews that the standard, IFRS 8, itself was uncontroversial. It was just the first IFRS issued by the IASB that the EU could influence. An interesting critic for prior literature was that the term Chief Operating Decision Maker (CODM) is vague, since IFRS 8 has not defined who this person/group of persons is within a company. The amount of firms that disclosed who the CODM was is found to be between 36 percent (Nichols et al., 2012), 39 percent (McGregor et al., 2010), 51 percent (ESMA, 2011) and 69 percent (Crawford et al., 2012). The companies that disclosed the identity of the CODM identified the Board of Directors, a sub-group of the board, a management group or an individual like the CEO (ESMA, 2011; Nichols et al., (2012). Hence, there seems to be enough evidence to support the argument that the term CODM is vague.

In Australia IFRS 8 was also adopted in January 2009, though it officially called Australian Accounting Standards Board (AASB) 8 (Kang and Gray, 2013). The first Australian reporting standard was Accounting Standards Review Board (ASRB) 1005 *Financial Reporting by Segment* in 1986, which was revised into AASB 1005 in 2000. AASB 1005 was reissued in 2005 as AASB 114 *Segment Reporting*. AASB 8 replaces AASB 114 *Segment Reporting*, which in itself is the Australian equivalent to IAS 14R (Kang and Gray, 2013).

The biggest difference between IFRS 8 and its predecessor IAS 14R is the introduction of the management approach in identifying which operating segments to report. The management approach, as the IASB stated, is "identification of operating segments on the basis of internal reports that are regularly reviewed by the entity's chief operating decision maker in order to allocate resources to the segment and assess its performance" (IASB, 2015, p. A305). This is different from IAS 14R in that "IAS 14 required identification of two sets of segments—one based on related products and services, and the other on geographical areas" (IASB, 2015, p.

A305). Another difference is that IAS 14 required items that had to be disclosed for a segment, but IFRS 8 requires only a measure of profit/loss and assets for a segment. Any additional line items are only required when these are reported internally to the CODM (Ernst & Young, 2016). In 2011 IFRS 8 was changed a bit and now assets are not mandatory anymore to be disclosed.[4] Assets now need to be reported following the management approach, so if they are regularly reviewed by the CODM (Bugeja et al., 2015).

IAS 14R knows two segment types that a firm must report. The first is business or lines of business (LOB) segments and the second is geographical segments. Of these segments one is the primary segment and the other the secondary segment. It is up to the firm to decide which type of segment is the primary segment and which one is, consequently, the secondary segment. How to form one segment under IAS 14R is based on a risk and return principle. This principle is that each segment should have similar risks and returns.

The reporting difference between the primary segment and secondary segment under IAS 14R is that primary segments need to have 6 items, while the secondary segment under IAS 14R only needs to have three items (Bugeja et al., 2015; Nichols et al., 2012). For the primary segments the following six items need to be given; profit, assets, liabilities, depreciation, revenue and capital expenditure. For the secondary segment under IAS 14R profit, assets and capital expenditure need to be mentioned, the other three not. Under IFRS 8 in 2014 only the item profit needs to be addressed in any case, the other five items are only obliged to be reported when these are regularly reviewed by the CODM.

The IASB has stated that is anticipated four benefits of the adoption of IFRS 8 (IASB, 2013):

- being able to see the entity through the eyes of the management and therefore investors should be able to make better predictions;
- more consistency between the management commentary and the financial statements and therefore investors should have a better understanding of the communication;
- better at addressing the risks the management believes are important;
- low incremental costs and time savings due to the management approach was expected. This enhances the availability of interim reporting.

[4] The other amendment made was that that firms must disclose the judgements made by the management in the choices they made in the aggregation of operating segments. This is of no influence to this master thesis. (IAS Plus (Deloitte), 2016)

One of anticipated benefits is an increased consistency between segment disclosure and other parts of the annual report. Crawford et al. (2012) found that for geographical segments and for business segments on average four segments are disclosed. This in contrast with other sections of the annual report where seven segments are mentioned and there is referred to 34 countries. Nichols et al. (2012) found that 96 percent of the segment disclosure by firms is in line with other parts of the annual reports. They argue that most of the consistency was already achieved under IAS 14R and so this anticipated benefit did not materialize. So there seems to be mixed results with regard to the anticipated benefit of an increase in consistency between the segment reporting and other parts of the annual report. In the 2013 post implementation review of the standards' adoption by the IASB, the IASB stated that no prior literature has looked into the other three anticipated benefits of the IFRS 8 adoption (IASB, 2013).

2.2 Other IFRS adoptions

IFRS 8 is not the first IFRS standard that is adopted by the IASB. The standard of interest is part of 12 other IFRSs effective to date and three more standards are planned to be adopted in the near future. IFRSs are effective in more than 100 countries (De George et al., 2016). IFRSs are adopted for two major objectives; to have a single set of high quality reporting standards to improve disclosure quality and to enhance the comparability of reports of firms in the different countries (De George et al., 2016).

Appendix A gives an overview of the IFRSs that are adopted or are planned to be adopted and gives a description of the contents. IFRS planned to be adopted for the coming years are IFRS 9 Financial Instruments and IFRS 15 Revenue from Contracts with Customers for 2018 and IFRS 16 Leases in 2019.

IFRSs provide preparers and accountants guidelines in how to report. This can for example be how to prepare the first time under IFRS with IFRS 1 First-time Adoption of International Financial Reporting Standards. Other standards have the focus on how to prepare the specific accounts of for example goodwill (IFRS 3) or describe how to use fair value measures (IFRS 9). IFRSs that have the focus on the "format of disclosure" and are in that perspective similar to IFRS 8 are for example IFRS 7 Financial Instruments: Disclosures, IFRS 12 Disclosure of Interests in Other Entities or IFRS 16 Leases.

Many IFRS studies focus on the adoption in general and do not focus on specific standards. IFRS 8 seems to be the standard that has gotten the most attention of researchers, which is described later in this chapter in more detail. Another standard with the focus on the "format of disclosure" is IFRS 7, adopted in 2007. The adoption of IFRS 7 Financial Instruments:

Disclosures is about an increase the disclosure of financial instruments by firms (Bischof, 2009). IFRS 7 also uses the management approach as banks can report their financial instruments in such a way that it matches their risk profile and management strategies, which enhances the disclosure (Hodgeon and Wallace, 2008). Prior empirical studies are in line with each other and found that the adoption of IFRS 7 led to an improvement of the quantity and quality of disclosure and also the disclosure in text-form is more profound (Bischof, 2009; Hodgeon and Wallace, 2008; Nelson et al., 2008).

IFRS literature further points out is that it is unlikely that effects of IFRS 8 will be equal across countries. Since it is argued that, despite the adoption of IFRS, it is expected that differences between countries' reporting practices will remain because of the institutional settings, with its legal and political systems (Soderstrom and Jialin Sun, 2007). Also, national patterns in accounting practices continue to exist after the IFRS adoption (Kvaal and Nobes, 2012).

2.3 Agency- and proprietary costs

The two most important theories in the field of segment reporting are about agency- and proprietary costs. These costs might explain why and how the managers make decisions with regard to the disclosure of segment information. As such, they can give the underlying reasons why for example firms increase or decrease the disclosure of segment income.

Agency costs

Firms are owned by shareholders, also called the principal in agency costs terms. The managers are the agents of shareholders to strive for an increase in firm value. However, both parties have different interests and hence, the theory of agency costs is born (Jensen, 1986). The agents have reasons to strive for (too much) growth because it increases their power and their own compensation, without it necessarily being good for the firm value for shareholders (Jensen, 1986). In other words, managers build their own empire. Here the disclosure of information comes into play. To enable the shareholders to monitor the managers and their achieved results, managers need to do (segment) reporting, which is influenced by agency costs.

Prior empirical evidence has provided some insights in how exactly agency costs influence segment disclosure. Managers for example are not willing to show shareholders information on segments that are underperforming (Berger and Hann, 2007). And Wang et al. (2011) found that firms with higher agency costs report less differences in segment earnings growth

variability. That is, managers want to hide the inefficient allocation of organizational resources in their segment reporting.

Proprietary costs

Proprietary costs, as Aleksanyan and Danbolt (2015) put it, are "disadvantages associated with disclosure of competitively sensitive information" (p. 43). Managers of firms want to hide information to competitors, in order prevent competitors entering their markets and hurting future profits. Proprietary costs are especially of influence in segment reporting, since the segments are considered "competitively sensitive and proprietary in nature" (Leuz, 2004, p. 164). Botosan and Stanford (2005) even found that firms change their disclosure to protect profits rather than to hide bad performance.

Prior studies found various effects of proprietary costs on segment reporting quality. Leuz (2004) found that for a sample of German firms, when proprietary costs are high, segment information is more aggregated and firm profitability is relatively low compared to that of its competitors. When proprietary costs are high firms will reveal less about segment growth differences (Wang et al., 2011). Furthermore, firms are unwilling to increase the number of segments reported since the expected proprietary costs for more disclosure will be higher than a simple increase in the number of items (Gisbert et al., 2014).

2.4 Voluntary segment disclosure influencers

Aside the compulsory influence of accounting standards on segment reporting there are also other forces shaping segment reporting on a voluntary basis. These factors are voluntary in that managers do not have to change segment reporting obligatorily, but they might be willing to change because of these factors. They provide reasons why managers are motivated to disclose or withhold segment information. The voluntary influencers on segment reporting quality include for example (Blanco et al., 2015; Bugeja et al., 2015; Leung and Verriest, 2015; Pardal et al., 2015):

- Abnormal profit,
- Audit firm,
- Entry barriers,
- Firm age,
- Firm complexity,
- Firm size,
- Foreign sales,

- Growth,
- Industry competition,
- Leverage,
- Listing,
- Loss,
- New/outside financing,
- Profitability.

These factors might motivate managers in different ways of providing segment reporting. Larger firms for example have more resources to be able to give better disclosures, larger firms also have more analysts and investor following and it is easier for larger firms to hide proprietary costs (Leuz, 2004). Larger firms are thus in a better position to give more segment information. Firms that are under more pressure of enforcement, with a big 4 audit firm or firms that are listed, are likely to give better segment disclosures (Hope, 2003; Leuz and Verrecchia, 2000). Abnormal profit, entry barriers, industry competition, leverage, loss, new/outside financing and profitability are all related to the earlier discussed agency and/or proprietary costs.

All these voluntary factors are potential control variables for the regression analyses in that they too influence segment reporting quality. But not all of the factors are straightforward in their influence on segment disclosure or prior literature found conflicting ways in which they might influence segment reporting. Firms with more foreign sales will disclose more disaggregated geographical segment information and less segment income data, for business segments it is found to be the other way around (Leung and Verriest, 2015). The idea of firm age is twofold, older firm have built a reputation that they want to keep via better disclosures (Blanco et al., 2015). Younger firms might also be willing to profit from extra disclosures, because of the uncertainty that surrounds younger firms (Blanco et al., 2015).

2.5 Empirical evidence of IFRS 8 effects

Segment reporting quality effects of IFRS 8

The impact of IFRS 8 on the disclosure quality of segment reporting did get attention of prior studies. As addressed in the introduction, these studies focus on the "immediate" impact of the mandatory IFRS 8 adoption on segment reporting quality. Immediate in this research setting implies that prior articles compared the latest pre-IFRS 8 data with the first available IFRS 8 data. Though this study focusses on the post-adoption impact of IFRS 8, any immediate

changes in segment reporting quality might give a good first impression of the effect of IFRS 8 on segment reporting quality.

In Panel A of *Table 1* an overview of the results found by prior studies is given per segment reporting quality, following the segment reporting quality definition of Leung and Verriest (2015). For the first segment reporting quality, the disclosure of segment income, no clear change in reporting quality is found. Two articles find mixed results, two articles find no change, one article finds an increase and a sixth article finds a small decline. What is noteworthy is that almost all studies report already high percentages of the sample that disclose segment income, some even report that all companies disclosed segment income. This indicates a limited possibility to increase the disclosure of segment income even more.

Of the seven studies looking at the disclosure of segment line items four report a decline in the number of items and three report an increase. Interesting is that both Leung and Verriest (2015) and Nichols et al. (2012), with some of the same sample companies as this study, report a decline. The study of Pisano and Landriani (2012) further points out that while an overall change can be observed in a sample, a substantial 22 percent of the companies show an opposite movement in the disclosure.

The management approach towards segment reporting, is found to have led to increase in the disclosure of additional segments after the introduction of IFRS 8 (Nichols et al., 2013). This effect is also strongly found in the prior studies looking into the effect of IFRS 8. All five studies show an increase in the number segments disclosed. Nichols et al. (2012) reported the results per country and of the six relevant countries five disclosed more segments. Only Swedish firms on average did not disclose more segments.

The segment reporting quality fineness of segment disaggregation is the quality that got the least attention by prior researchers. But all three studies find an increase in the fineness score. Doupnik and Seese (2001) found that more companies (40 %) increased the fineness after the SFAS 131 adoption than companies that decreased the fineness (25%). Aleksanyan and Danbolt (2015) noted that most segments are broadly identified segments, though the tendency of doing so declined after the IFRS 8 adoption.

Economic effects of IFRS 8

This study aims to look at the disclosure quality of segments after the IFRS 8 adoption. But in the end segment reporting is only a way of communicating, not a target itself. What really matters are the additional benefits achieved due to IFRS 8. These additional benefits are called

economic benefits. This section will address these possible benefits of IFRS 8 found in the limited prior literature, shown in Panel B in *Table 1*.

IFRS 8 seems to have a positive effect on the decision usefulness for investors, though the evidence is not so strong. Crawford et al. (2012) for example found after 20 interviews that the average opinion was in favor of a better decision usefulness due to IFRS 8, though the group of users of the reports did support this view the least. Kajüter and Nienhaus (2015, WP) did also find that the management approach of IFRS 8 has a positive effect on the decision usefulness. They also found that the value relevance of IFRS 8 is better than in the IAS 14R situation.

The results in prior literature do not give a clear view of whether analysts did benefit from the IFRS 8 adoption. He et al. (2012, WP) did find an increase in the analyst forecast accuracy, but Leung and Verriest (2015) did not find a change. Furthermore, He et al. (2012, WP) did not find that the analyst forecast dispersion improved. Though, the information asymmetry is reduced after the IFRS 8 adoption (Kajüter and Nienhaus, 2015, WP). Analyst forecast dispersion and bid-ask spreads did not get better after the IFRS 8 adoption (Leung and Verriest, 2015). Future research seems to be necessary to determine if analysts did benefit from the IFRS 8 adoption.

As addressed in section *2.1*, the IASB (2013) anticipated four benefits of IFRS 8 and by 2013 only the consistency between the segment reporting and the management review was found to be improved. With the latest empirical evidence of Barneto and Ouvrard (2015) that IFRS 8 did not improve the understanding of the firms' business model the anticipated benefit of an improvement in being able to see the firm though the eyes of the management did not seem to be materialized.

With the limited prior evidence on the economic effects of IFRS 8, future research still has enough to look at. For example, studying in how far the two remaining anticipated benefits did materialize. This study however focuses on the post-adoption impact of IFRS 8 on segment reporting and will continue by stating the hypotheses in the next chapter.

Table 1 – Prior empirical findings on segment reporting quality and economic effects of IFRS 8

Panel A: Segment reporting quality effects				
Topic	Author(s)	Study setting	Results	Effect
Segment income				
	Aleksanyan and Danbolt (2015)	889 firm-year observations of 100 FTSE firms	Small differences of segment profit information between IAS 14R and IFRS 8 were observed, for LOB and geographical segments.	Mixed
	Bugeja et al. (2015)	277 Australian companies	All 277 firms that disclosed segment income under IAS 14R also disclosed segment income under IFRS 8.	No change
	Crawford et al. (2012)	150 firms in the United Kingdom	Pre IFRS 8 85 percent of the firms reported segment income of continuing operations, after the adoption the percentage increased to 89 percent.	Increase
	Leung and Verriest (2015)	737 firms with geographical segments and 632 firms with business segments in Europe	A significant decline of 4.89 percent of firms that reported geographical segment stopped reporting segment income. The firms disclosing business segment significantly increased (4.53 %) their reporting an income measure.	Mixed
	Nichols et al. (2012)	335 European blue chip firms	All firms kept on reporting segment income.	No change
	Pisano and Landriani (2012)	124 Italian companies	A small decline of 113 to 112 firms that report segment income.	Small decline
Segment items				
	Aleksanyan and Danbolt (2015)	889 firm-year observations of 100 FTSE firms	The average firm reported in total 45.35 items in 2008 under IAS 14R reporting which rose to 57.32 under IFRS 8 in 2010. Of the 57.32 items under IFRS 8 40.87 were mandatory items and 16.46 were non-mandatory items.	Increase
	Bugeja et al. (2015)	277 Australian companies	A decrease in the disclosure of capital expenditure (277 to 160), depreciation (277 to 200), liabilities (277 to 2018), assets (277 to 244) and revenues (277 to 274) was found. All firms kept on reporting segment income.	Decline
	Crawford et al. (2012)	150 firms in the United Kingdom	The mean number of items disclosed per segment decreased from 7.02 to 6.43. Especially liabilities were less reported.	Decline
	Leung and Verriest (2015)	737 firms with geographical segments and	The number of items disclosed by firms reporting geographical segment declined from 3.75 on average under IAS 14R to 2.98	Decline

		632 firms with business segments in Europe	under IFRS 8. Firms disclosing business segments decreased the average items from 5.58 to 5.27 after the IFRS 8 adoption.	
	Mardini et al. (2012)	109 Jordanian companies	An increase in the number of items disclosed is found.	Increase
	Nichols et al. (2012)	335 European blue chip firms	A decrease in the number of items reported is found. Under IAS 14R 2673 items were disclosed (8.79 per segment), while under IFRS 8 only 2572 items (8.38 per segment) were disclosed. The items sales and profitability were reported just as much as before the adoption.	Decline
	Pisano and Landriani (2012)	124 Italian companies	In the sample of firms 23 percent reported the same number of items, 22 percent reported less items and 55 percent reported more items. The average of reported items increased from 8.47 in 2008 to 10.33 items in 2009.	Increase
Number of segments				
	Aleksanyan and Danbolt (2015)	889 firm-year observations of 100 FTSE firms	A major decline in the average number of reported segments was observed using a narrow definition of "segments". Using a broader and more widely used definition they found an increase in the number of reported segments.	Increase
	Bugeja et al. (2015)	1617 Australian companies	The authors found an increase in the number of reported segments due to IFRS 8; 62 firms (3.28 %) reported less segments, 1285 firms (79.47 %) reported an equal amount of segments and 270 firms (16.70 %) reported more segments.	Increase
	Leung and Verriest (2015)	737 firms with geographical segments and 632 firms with business segments in Europe	Under both types of segment reporting the authors found an increase in the number of segments disclosed. Under geographical segments from 4.75 on average to 5.13 and under business segments from 3.15 on average to 3.34 on average.	Increase
	Nichols et al. (2012)	335 European blue chip firms	In the first year of adoption 62 percent of the sample (201 firms) still had the same number of segment, 27 percent (88 firms) reported more segments and 11 percent (37 firms) reported fewer segments. On average a significant increase from 3.84 to 4.19 segments per firm was found. Per relevant country; Belgium: 9 no change firms, 6 increase and 4 a decline. Average changed from 4.0 to 4.5. The Netherlands: 15 no change firms, 5 increase and 2 a decline. Average changed from 3.77 to 4.00.	Increase Increase Increase

			Luxembourg: 3 no change firms, 2 increase and 1 decline. Average changed from 3.67 to 4.33.	Increase
			Denmark: 15 no change firms, 2 increase and 1 decline. Average changed from 2.83 to 2.89.	Increase
			Norway: 14 no change firms and 3 increase firms. Average changed from 4.18 to 4.59.	Increase
			Sweden:19 no change firms, 5 increase and 4 decline. Average changed stayed equal at 4.29.	No change
	Pisano and Landriani (2012)	124 Italian companies	The average number of segments increased from 3.71 on average under IAS 14R to 3.85 on average under IFRS 8 reporting. Of the firms, 87 (71 %) did not change the segments, 18 (14 %) increased the number of segments, 13 firms (11 %) decreased the number of segments and 4 firms (4%) had different segments but the same number of segments.	Increase
Fineness				
	Aleksanyan and Danbolt (2015)	889 firm-year observations of 100 FTSE firms	Most reported segments are defined in broader terms than only one country. Under IFRS 8 24 percent of the segments are single country segments. Using a broader definition of segments, they found that 43 percent of the segments are single country segments. They concluded that most of the reported geographic segment are broadly aggregated areas and that the tendency of doing so decreased after the IFRS 8 adoption.	Increase.
	Doupnik and Seese (2001)	254 Fortune 500 firms reporting geographical segments (SFAS 131 reporting)	A higher fineness score was found for 40 percent of the firms after the SFAS 131 adoption and 25 percent of the firms had a lower fineness score. 115 out of 254 firms (45.3 %) reported country-level disclosures after the SFAS 131 adoption compared to 53 out of 229 (23.1 %) before.	Increase
	Leung and Verriest (2015)	737 firms with geographical segments and 632 firms with business segments in Europe	An increase in the fineness of geographical segment reporting is found after the IFRS 8 adoption.	Increase
Panel B: Economic effects				
Business model clearness	Barneto and Ouvrard, (2015)	101 reports of European firms	Segment reporting, also after the adoption of IFRS 8, does not increase the understanding of a firms' business model.	No change

Decision usefulness	Crawford et al. (2012)	20 Interviews	The management approach was welcomed and it is suggested by interviewees that it is useful for investors, though this is the least supported by the interviewees that are the real users of the reports.	Small increase
Analyst forecast accuracy Analyst forecast dispersion	He et al. (2012, WP)	173 Australian firms	The analyst forecast accuracy is found to be greater after the AASB 8 (=IFRS 8) adoption, while analyst forecast dispersion is not significantly different.	Increase No change
Value relevance Information asymmetry Decision usefulness	Kajüter and Nienhaus (2015, WP)	280 firm-year observations of German firms	IFRS 8 is more value relevant compared to IAS 14R and information asymmetry is reduced due to IFRS 8. The management approach seems to have a positive effect on the decision usefulness for investors.	Increase Improvement Improvement
Forecast accuracy Dispersion Bid-ask spreads Cost of capital	Leung and Verriest (2015)	Between 499 and 1101 observations of European firms	The authors do not find that changes in segment reporting quality are systematically related to economic outcomes like forecast accuracy, dispersion or bid-ask spreads. Firms that increase the disclosure of segment income are less faced with an increase in the cost of capital.	No change No change No change Small improvement

Table 1 gives an overview of the results found by prior studies on the four segment reporting qualities in Panel A. In Panel B the empirical results of prior studies on the economic effects of IFRS 8 are given. All studies focus on the IFRS 8 implementation, apart from the study of Doupnik and Seese (2001), which added because of the limited IFRS 8 evidence on the fineness of segment disaggregation.

3 Hypotheses

This study will use the definition of segment reporting quality of Leung and Verriest (2015) as a guideline to look at the post-adoption impact of IFRS 8. Leung and Verriest (2015) stated that there is not one well defined measure of segment disclosure quality. But their definition was "the amount of segment reporting information and the level of segment disaggregation" (p. 284). They argued that there is not one criteria of comparability of segment reporting quality across firms and they therefore used the amount of reported information, though it is a more quantitative measure. For capturing the amount of segment information Leung and Verriest (2015) identified if a firm reports segment income and they counted the number of items disclosed. For capturing segment disaggregation, they used the number of segments disclosed and a fineness score.

Segment income

Segment reporting is developed as a tool for investors and analysts to understand complex firms (Pardal and Morais, 2011). Hence, it is reasonable that firms disclose items that investors and analysts need. With IFRS 8 came the introduction of the management approach (IASB, 2015). Due to the management approach investors should see the firm through the eyes of the management. Also for the management one could argue that segment income is one of the most important items and so an income measure should be disclosed in annual reports.

As addressed in section *2.3*, proprietary and agency costs might be present in segment reporting and especially segment income is a relatively important item. Because of proprietary cost reasons firms might not want to disclose segment income to competitors. Highly profitable segments might mean new competitors entering the market, hurting future profits. Using the proprietary cost theory, firms therefore are less likely to disclose segment income. However, since segment income is that important to investors, firms might be willing to disclose segment income to prevent agency problems. On the other hand, if a firm has poor performing segments, it might want to hide segment income to prevent agency problems with shareholders. All in all, the theories of agency- and proprietary costs might give arguments why a firm might be willing to show or hide segment income, but upfront it is not clear if it is more likely that firms will hide or show segment income after the IFRS 8 adoption.

The item profit, however, is mandatory to be given by firms on a segment level both under IAS 14R and under IFRS 8, so there should not be any change. The proprietary and agency

costs theories provide conflicting reasons why firms might (not) to disclose segment income. As described in section *2.5,* prior empirical evidence shows that many firms already report segment income, leaving little space for a further increase in the disclosure of segment income. Therefore, it is most likely that the disclosure of segment income did not change after the IFRS 8 adoption. Accordingly, I expect that:

H1: The adoption of IFRS 8 did not cause a change in the number of firms that reported segment income.

Number of items disclosed

A second aspect of the amount of segment information is the number of items disclosed. At the introduction of SFAS 131 the FASB expected more items per segment to be disclosed, however at the introduction of the IFRS 8 the IASB did not say a thing about a change in number of items disclosed (FASB, 2016; Nichols et al., 2013). Under IAS 14R firms had to disclose profit/loss, assets, liabilities, depreciation, revenues and capital expenditure. Though under IFRS 8 only profit/loss and assets are mandatory, while liabilities, depreciation, revenues and capital expenditures are only required if this information is given to the CODM, following the management approach. In 2011 IFRS 8 was amended in such a way that the reporting of assets per segment is not mandatory anymore. Firms now have to report assets per segment when they also report this to the CODM (Bugeja et al., 2015).

Critics of IFRS 8 expected a lower amount items would be disclosed (Nichols et al., 2013). Since less items are mandatory, a decrease in the number of items disclosed is most logical and the following hypothesis is stated:

H2: The adoption of IFRS 8 led to a decline in the number of items disclosed.

Number of reported segments

The first aspect of segment disaggregation is the number of reported segments. With the adoption of IFRS 8 the way segments are formed is changed. Under IAS 14R segments were formed based on business activities with similar risks and returns. The IFRS 8 reportable segments are the internally used segments to report to the CODM.

The IASB expected that the adoption of the management approach in segment reporting would result in more reported segments, since the implementation of SFAS 131 resulted in an increase of operating segments (Nichols et al., 2013). This expectation is supported by prior

IFRS 8 literature analyzing the number of segments reported, that all found an increase in the number of segments disclosed. Therefore, I expect that:

H3: The adoption of IFRS 8 led to an increase in the number of segments disclosed.

Fineness of segment disaggregation

The second aspect of segment disaggregation is the fineness of segment disaggregation. The number of reported segments gives an indication of the level of disaggregation. More segments will most likely imply a higher level of disaggregation. Though, this is not necessarily the case. Doupnik and Seese (2001) argue that information based on an individual country level is more valuable to investors than broadly aggregated segments. And information based on a small set of countries is most likely more useful for investors than an aggregated continent or one aggregated segment labeled "foreign" for example (Doupnik and Seese, 2001).

A first measure of the fineness of segment disaggregation is made by Doupnik and Seese (2001) for a study looking into geographic area disclosures under SFAS 131 in a sample of US fortune 500 firms. The fineness measure introduced by Doupnik and Seese (2001) is further modified by Leung and Verriest (2015). Their adapted model distinguished five geographical segment groups, ranging from a total for foreign to segmentation per country. While Doupnik and Seese (2001) only distinguished between four segment groups, Leung and Verriest (2015) also distinguish a group of countries within a continent. Furthermore, originally the model gave scores between zero and three, while the adapted model gives scores between one and five. This study will use the fineness measure adopted by Leung and Verriest (2015) to measure a potential change in the fineness of segment disaggregation of geographical segments.

While there is limited prior research on the fineness of geographical business segments, there is an absence of research on the fineness of business segment disaggregation under IFRS 8. This study will address this gap in the literature. Since there are no arguments for a possible hypothesis, an increase is just as likely as a decrease in the fineness of business segments. For geographical segment fineness there are also no arguments to state a hypothesis. Therefore, no formal hypothesis is stated to test the influence of IFRS 8 on segment disaggregation.

Overall adoption impact

This study looks at how the adoption of IFRS 8 had an impact on four aspects of segment reporting quality. IFRS 8 raised the concern that information quality would decline, especially

for geographical data (Nichols et al., 2013; IASB, 2013). Hence, the last step is to look at these aspects combined, to see what the overall post-adoption impact of IFRS 8 is.

Leung and Verriest (2015) concluded that their findings "cast doubt on whether IFRS 8 achieved its goal of improving the usefulness of segment information to users, since there appear to be little to no economic and informational consequences even for improved firms" (p. 275). Also Aleksanyan and Danbolt (2015) doubt the effectiveness of the IFRS 8 adoption in improving the information environment of investors.

Section *2.2* provided information of the other IFRS adoptions, IFRS 7 for example was found to increase disclosure quality and quantity. Moreover, results are likely to vary between countries due to enforcement differences and national patterns. A post-adoption effect of IFRS 8 on segment disclosure quality is therefore likely to differ between countries.

Both Leung and Verriest (2015) and Aleksanyan and Danbolt (2015) cast doubt on the overall effectiveness. Hence this study will not have a hypothesis based on prior literature. IFRSs are however adopted with two objectives in mind, one of which is to increase the disclosure quality. So, ideologically one could argue that the adoption IFRS 8 was not intended to decrease segment reporting quality. Consequently, I hypothesize that an increase in segment reporting quality is the effect of IFRS 8, stated in the following hypothesis:

H4: The adoption of IFRS 8 led to an increase in the quality of segment disclosure.

4 Methodology

This chapter is about the methodology, how the research will be conducted. First the sample will be given, then the research design is given and next the segment reporting quality and control variables will be discussed.

4.1 Sample

The data necessary for the analysis was extracted from the Bureau van Dijk Orbis database. Firms included in the total sample are industrial companies. Banking and insurance companies were excluded in line with prior literature (Wang and Ettredge, 2015). The firms included in the sample were classified by the Orbis database to be from Belgium, The Netherlands, Luxembourg, Denmark, Norway or Sweden. The requested data had to be available for the needed years and if not enough firm data was available the firm was excluded from the analysis. Other reasons for firms to not make it into the final sample are no IFRS accounting in 2014, early adoption year unknown, no segment info, no report available, no ORBIS data available in year of early adoption and reverse takeovers. The final sample contains 302 companies, from Belgium (64), the Netherlands (53), Luxembourg (9), Denmark (35), Norway (44) and Sweden (97). These countries where chosen because prior literature on IFRS 8 segment reporting did not or to a limited extend look into these specific countries. See *Appendix B* for the complete list of companies included in the analysis.

In order to place the European results in perspective, data of 100 Australian firms, 200 firm year observations, is gathered. Besides the requirements stated in the previous paragraph the Australian firms had to be in the same 3 digit SIC industries as at least one of the European firms and the firm size had to approximate the average firm size of the European sample.

The ORBIS database does not contain the specific data for measuring the four dimensions of segment reporting quality. So the dataset will be expanded via hand-collecting the necessary data out of annual reports. The annual reports used are the two annual reports about the last annual year under IAS 14R (2006/2007/2008) and 2014. Microsoft excel will be used for collecting the data and SPSS will be used for analyzing the data, since these programs are available to and known by the author.

4.2 Research design

Bugeja et al. (2015) mentioned in footnote 19 of their paper that a potential limitation of their and other papers studying IFRS 8 was that they only study the variables at the same time as the adoption. For SFAS 131 Bell (2015) also mentions that most of the literature focusses on

the immediate impact of the change from SFAS 14 to SFAS 131. Though Bugeja et al. (2015) mention that segment reporting is not static and it might be a good idea to do a time-series analysis. The reason Bugeja and colleagues did not choose for a time-series analysis was a lack of machine readable data and secondly the authors had no idea what a suitable time period was. Machine readable data is available now, though a part of it must be hand collected.

To test the hypotheses a regression model will be used, in line with prior literature in the field of segment disclosure (e.g. Bugeja et al., 2015; Ettredge et al., 2006, Leung and Verriest, 2015). Using a regression analysis allows to control for other variables that too influence segment reporting quality. By ruling out other, voluntary, influencers on segment reporting quality a "clean" influence of IFRS 8 on segment reporting can be analyzed. The regression model that will be used is adapted from Leung and Verriest (2015), namely;

$$SRQ_{it} = \beta_0 + \beta_1 IFRS8_{it} + \beta_2 Size + \beta_3 MTB + \beta_4 Herf + \beta_5 Lev + \beta_6 ROA + \varepsilon_{it}$$

where $_i$ represents each firms and $_t$ represents the historical IAS 14R versus IFRS 8 data. *SRQ* is one of the four segment reporting quality variables and *IFRS8* distinguishes between IAS 14R and IFRS 8 data. *Size*, *MTB*, *Herf*, *Lev* and *ROA* are the controlling variables for firm size, growth, industry competition, leverage and profitability. See *Appendix C* for an overview of the variable definitions.

To test the hypotheses, the results will be given per segment reporting quality. So, first the disclosure of segment income (or not) will be the *SRQ* in the formula and so on for the other the three segment reporting qualities. The main variable of interest is the independent variable *IFRS8*. *IFRS8* is an indicator variable that has the value 1 for the post adoption period and the value 0 for the IAS 14R period. By analyzing the *IFRS8* variable in its direction and significance the specific hypotheses will be tested.

The type of regression analysis depends on the different measures of segment reporting quality. Segment income will be analysed with a logistic regression, since the dependent variable is binary (Leung and Verriest, 2015). A score of one will be given to companies that report income at a segment level and a zero score will be given to companies that do not report income at a segment level. The number of items disclosed, the number of segments disclosed and the fineness of the reported segments will be analyzed with a linear regression.

4.3 Segment reporting quality variables

Segment reporting quality has not one specific well-defined measure, as argued in the literature review (Leung and Verriest, 2015). Instead segment reporting quality has two aspects. The first aspect is items and the second aspect is segments. The items are measured with segment income reported and the number of items. The segments are measured with the number of segments reported and the fineness of segment disaggregation. Like the regression model, this study follows the study of Leung and Verriest (2015) in the operationalization of segment reporting quality variables. For each of these segment reporting quality variables the measure is defined below.

Segment income

Segment income is measured with an indicator variable set to 1 if a firm reports income at a segment level, and otherwise the variable is set to 0. Differences in empirical findings of prior literature might be caused by a different operationalization of the term "segment income" and alike by various authors (Aleksanyan and Danbolt, 2015). This study takes the approach that segment income must give investors an appropriate judgement of a segments' result and an investor must be able to use it for his or her analysis. I.e. EBIT, segment result, operating result and more refined income measures are considered as "segment income".

Number of items disclosed

The number of financial items disclosed.

Number of segments disclosed

The number of segments disclosed. In line with prior literature segments labeled "headquarters", "corporate" and alike will be excluded from the study, since these segments are not real operating segments under IFRS 8 (Berger and Hann, 2003; Leung and Verriest, 2015).

Fineness

The fineness of segment disaggregation will have different measures for business segment reporting and for geographical segment reporting. For the fineness of geographical segment reporting the measure of Doupnik and Seese (2001) and refined by Leung and Verriest (2015) will be used. Each segment is given a value and then the average is taken for each firm to come up with one average segment fineness score. Segments will be given the following values;

1, for geographical segments labeled as “foreign” or “other”

2, for geographical segments labeled as multiple continents

3, for geographical segments labeled as a single continent

4, for geographical segments labeled as a group of countries within a continent

5, for geographical segments labeled as a single country or areas within a country.

Leung and Verriest (2015) used only 3 segment quality measures for business segments and did not even try to develop or use a measure of fineness for business segments. However, also for business segments one could argue that there is a fineness. The starting point for the business segment fineness measure is the number of 4-digit Standard Industrial Classification (SIC) codes assigned by the ORBIS database to a company. Then, for every segment that a company has less (more) than the number of segments assigned by the ORBIS database one point is subtracted (added up).

In order to test hypothesis 5 about the overall post adoption impact of IFRS 8 on segment reporting quality for business and geographical segments an aggregated segment reporting quality variable will be computed, as in Leung and Verriest with their variable “AggTrans” (2015, p. 286). To give each of the previously mentioned segment reporting quality variables an equal weight in the aggregated variable the four variables are first transformed in 10-percentile-ranked variables. These percentile-ranked variables each contribute for 25 % in the aggregated segment reporting quality variable.

4.4 Control variables

Based on prior literature in the field of segment reporting quality that used regression analysis and the literature about voluntary factors influencing segment disclosure quality, as described in section *2.4*, the following five control variables will be used. See below for each of the controlling variables, why they will be included and how they will be calculated.

Firm Size (Size)

Firm size is included as a controlling variable since larger firms are found to provide better disclosures (Buzby, 1975; Leuz, 2004). The size of a firm is calculated by the natural logarithm of total assets.

Growth (MTB)

Growth is included to capture the relationship between growth opportunities and segment disclosure, as growing firms disclose more (Easton and Monohan, 2005). Growth is

measured with the log of the market to book ratio plus 10, calculated by the market value of equity divided by the book value of equity (Blanco et al., 2015).[5]

Industry competition (Herf)

An industry competition measure is included since proprietary costs are found to be related to segment disclosure (Hayes and Lundholm, 1996; Leuz, 2004). This control variable is measured using the Herfindahl-Hirschman Index, as in Blanco et al. (2015);

$$\text{Herf}_j = \sum_{i=1}^{N} (S_{ij} / S_j)^2$$

where S_{ij} is firm $_i$'s percentage sales in industry $_j$ as defined by the three-digit SIC code, S_j is the sum of relative percentage of sales for the top 50 firms in industry j and N is 50, the number of firms in industry j included in the Herfindahl-Hirschman Index. Higher values of *Herf* indicate larger levels of industry concentration and lower levels of industry competition.

Leverage (Lev)

Leverage is included because firms with more debt are incurring larger monitoring costs and for decreasing these costs firms tend to disclose more (Jensen and Meckling, 1976). Leverage will be calculated with the book value of total debt divided by the book value total assets.

Profitability (ROA)

Profitability is included to capture the relationship between disclosure and profitability (Singhvi and Desai, 1971). Profitability is measured with ten percentile ranks of return on assets, or ROA in short (Blanco et al., 2015). ROA is defined as operating income (EBIT) divided by total assets (Pardal et al., 2015).

[5] The natural logarithm cannot handle the 4 negative market to book ratio's in the total sample. Therefore, the value 10 is added to make sure all the values are at least one before computing the natural logarithm.

5 Results

This chapter will address the results of the regression analysis, but first the descriptive statistics will be given. Next, the regression analysis of segment income, number of items disclosed, number of segments disclosed and the fineness will each be addressed. Then, in section 5.6 the overall effect of IFRS 8 will be analyzed. The chapter will end with robustness tests of the results found.

5.1 Descriptive statistics

The sample and all the variables are shown in *Table 2.* The sample in Panel A: European sample holds 604 firm year observations, one for each firm under IAS 14R segment reporting and one firm year observation under IFRS 8 segment reporting. Of the four years included in the sample (2006, 2007, 2008 and 2014) a mean of 3.44 is found, indicating that most of the firms did not apply IFRS 8 early. Of the two possible segment types 32 percent of the sample disclosed geographical segments and the other 68 percent applied business segments.

An income measure at a segment level was reported by 87 percent of the companies. The number of items disclosed by firms' ranges between 1 and 191, with an average of 13.62. When only one item was reported it was most often revenues. The single firm reporting 191 items reported four extensive tables of segment income, assets, equity and liabilities and a cash flow statement. The number of segments disclosed varied between 1 and 19, though on average 3.637 segments were disclosed by firms. The fineness score ranged between -4 and 19 and averaged 2.748, though the absolute values do not tell something about the relevant change.

On average firms have € 4155 million total assets, with a minimum of € 6 million and a maximum of € 117 billion. The market to book ratio, without log, ranged between -8.92, a negative book value of equity, and 175.95 at most. The average firm is worth 2.30 times its book value of equity on the market. The Herfindahl measure for industry competition, is on average 0.07. The Herfindahl score of 0.07 indicates that the average sample company operated in unconcentrated markets (U.S. Department of Justice, 2010). A Herfindahl score of 0.25 and higher can be interpreted as being a highly concentrated market, so the maximum value of 0.47 implies a highly concentrated market (U.S. Department of Justice, 2010). The leverage ranges between 0.02 and 2.51, the average sample firm has 57 percent, debt. The profitability was on average 6.5 percent.

Panel B: Australian sample in *Table 2* shows the variables of the Australian control sample. The number of firms included is 100 and for each firm there are two firm year observations. Most of the average values in Panel B are in line with Panel A. Notable is that slightly more

Table 2 - Descriptive statistics

Panel A: European sample						
	N	Mean	Standard Deviation	Minimum	Median	Maximum
Year of data	604	3.44	0.63	1	3.50	4
IFRS 8	604	0.50	0.50	0	0.50	1
Segment type	604	0.32	0.47	0	0.00	1
Sinc	604	0.87	0.34	0	1.00	1
Sitems	604	13.62	13.37	1	12.00	191
Nseg	604	3.64	1.79	1	3.00	19
Fineness	604	2.75	1.98	-4	3.00	19
Firm size (€ m)	604	4155	11890	6	744	117412
MTB	604	2.30	7.48	-8.92	1.32	175.95
Herfindahl	604	0.07	0.06	0.03	0.06	0.47
Leverage	604	0.57	0.20	0.02	0.58	2.51
ROA	604	0.065	0.135	-1.090	0.066	0.62
Panel B: Australian sample						
	N	Mean	Standard Deviation	Minimum	Median	Maximum
Year of data	200	3.48	0.56	1	3.50	4
IFRS 8	200	0.5	0.50	0	0.05	1
Segment type	200	0.37	0.48	0	0.00	1
Sinc	200	0.88	0.32	0	1.00	1
Sitems	200	11.05	6.02	1	10.00	44
Nseg	200	3.47	1.53	1	3.00	11
Fineness	200	2.77	1.81	-1	2.75	10
Firm size (€ m)	200	2236	4996	6	257	27832
MTB	200	2.56	3.50	0.22	1.42	34.44
Herfindahl	200	0.07	0.05	0.03	0.06	0.46
Leverage	200	0.44	0.19	0.01	0.46	0.98
ROA	200	0.069	0.155	-0.483	0.077	0.803

Table 2 presents the descriptive statistics of the variables.

firms report under geographical segments, 37 percent in Panel B versus 32 percent in Panel A. The number of items reported in Australia is 2.57 less than in Europe (11.05 versus 13.62). The Australian firms have a less debt than the European firms, with 43.6 percent leverage of Australian firms versus 56.7 percent leverage of European firms.

Table 3 provides an overview of IAS 14R segment disclosure and IFRS 8 segment disclosure. European companies disclosing geographical segments are addressed in Panel A, European companies disclosing business segments are addressed in Panel B, Panel C gives an overview of the European sample and Panel D gives an overview of the Australian sample. IAS 14R data, as mentioned, is the latest available year that a company reports segments under the previous reporting standard, which can be 2006, 2007 or 2008. IFRS 8 data refers to 2014 segment reporting practices.

Geographical segments under IAS 14R were reported by 99 Companies and 93 companies reported geographical segments under IFRS 8. Segment income and segment items on average are less reported with geographical segments than with business segments. The number of segments disclosed is higher with geographical segments than with business segments. However, the number of reported segments declined significantly (t= 1.837, p = 0.070) after the adoption of IFRS 8. This decline is the only significant difference for geographical segments, since the fineness measure did not differ significantly (t = -0.425, p = 0.672).

Business segments in Panel B were disclosed by 203 firms and after the adoption of IFRS 8 this rose to 209 firms. Firms reporting business segments did not significantly change the disclosure of segment income (t= 0.576, p = 0.565), the number of segment items (t = -0.568, p = 0.571) and the number of segments disclosed (t = -0.755, p = 0.451). The fineness measure for business segments, however, shows a highly significant increase of 1.80 to 2.59 (t = -7.115, p < 0.001). In words, after the adoption of IFRS 8 the average firm reports 0.79 segments more than compared to their pre-IFRS 8 adoption segment disclosure and 2.59 segments more than what can be expected compared to the number of different SIC industries they are operating in.

Overall, from a univariate point of view, the European results show little pre and post adoption changes. For both segment types only one out of four segment disclosure quality measures changed significantly. Moreover, for geographical segments a negative change occurred in the number of segments reported. From a European sample point of view only the variable fineness of segment disaggregation changed significantly (t = -5.208, p < 0.001). The significant effect of the change in the number of segments reported disappeared from a total sample perspective.

Contrary to the European sample, were the number of segments and the fineness changed at least once, they did not change in the Australian sample. This result is also contrary to Kang and Gray (2013), who found an increase in the disclosure of segments by Australian firms. Segment income reported and the number of segments items reported on the other hand did change in the Australian sample. Under IAS 14R 93 percent of the Australian firms reported income at a segment level which declined to 84 percent under IFRS 8 (t = 2.226, p = 0.028). The Wilcoxon signed rank test of the median number of segments items disclosed also gave a significant result (Z = -2.183, p = 0.029).

An interesting kind of information is the correlation between the variables in the analysis. *Table 4* shows how the four dependent variables, the variable of IFRS 8 adoption and the control variables are correlated with each other.

Table 3 – Univariate analysis of IAS 14R versus IFRS 8 segment disclosure

Panel A: Geographical segment European firms						
	IAS 14R (N = 99)		IFRS 8 (N = 93)		Difference	
	Mean	Median	Mean	Median	Mean	Median
Segment income	0.71	1	0.72	1	0.01	0
Segment items	10.72	10	11.01	9	0.29	-1
Number of segments	4.19	4	4.08	4	-0.11*	0*
Fineness	3.94	4.00	3.90	4.00	-0.04	0
Panel B: Business segment European firms						
	IAS 14R (N = 203)		IFRS 8 (N = 209)		Difference	
	Mean	Median	Mean	Median	Mean	Median
Segment income	0.96	1	0.93	1	-0.03	0
Segment items	15.19	13	14.64	12	-0.55	-1
Number of segments	3.38	3	3.43	3	0.05	0
Fineness	1.80	2	2.59	3	0.79***	1***
Panel C: European sample						
	IAS 14R (N = 302)		IFRS 8 (N = 302)		Difference	
	Mean	Median	Mean	Median	Mean	Median
Segment income	0.88	1	0.86	1	-0.02	1
Segment items	13.72	12	13.52	11	-0.20	-1
Number of segments	3.65	3	3.63	3	-0.02	0
Fineness	2.50	2	2.99	3	0.49***	1***
Panel D: Australian sample						
	IAS 14R (N = 200)		IFRS 8 (N = 200)		Difference	
	Mean	Median	Mean	Median	Mean	Median
Segment income	0.93	1	0.84	1	-0.09**	0**
Segment items	11.46	10	10.64	10	-0.82	0**
Number of segments	3.38	3	3.55	3	0.17	0
Fineness	2.815	3	2.716	2.5	-0.099	-0.5

Table 3 gives an overview of the post-adoption differences of the segment disclosure quality variables in the different samples. The significant differences for the means are calculated with a two-sided T-test. The significant differences for the medians are calculated with the Wilcoxon median test. The significance at a 1% level is denoted with ***, the 5% level with ** and the 10% level with *.

Segment disclosure quality is divided in a part with the amount of segment information, with two variables, and a part in the level of segment disaggregation, with also two variables. Under both parts the two underlying variables correlate with each other. The number of items disclosed correlates for 0.26 ($p < 0.001$) with segment income reported. An interpretation can be that if more items are disclosed, it is also more likely that an income measure at a segment level is given. Under the part of segment disaggregation, the number of segments reported correlates

Table 4 – Correlation matrix of segment reporting quality, IFRS 8 and control variables

	Sinc	Nitems	Nseg	Fine	IFRS 8	Firm size	MTB	Herfindahl	Leverage	ROA
Sinc										
Nitems	0.260***									
Nseg	-0.048	-0.017								
Fineness	-0.085**	-0.045	0.663***							
IFRS 8	-0.020	-0.007	-0.006	0.123***						
Firm Size	0.174***	0.200***	0.239***	0.051	0.062					
MTB	-0.153***	-0.088**	0.012	0.003	0.103**	0.065				
Herfindahl	0.003	-0.032	-0.061	-0.045	-0.012	-0.035	0.001			
Leverage	0.149***	0.097**	0.079*	0.071*	-0.032	0.205***	-0.044	-0.054		
ROA	-0.037	-0.142***	0.009	-0.046	-0.057	0.034	0.360***	0.074*	-0.135***	

Table 4 presents the correlations between the four segment quality variables, the variable of IFRS 8 implementation and the five control variables. The correlation given is the two-tailed Pearson correlation for the European sample. The significance at a 1% level is denoted with ***, the 5% level with ** and the 10% level with *.

for 0.663 ($p < 0.001$) with the fineness.[6] A logic behind the correlation can be that if a firm report less segments, the segments will most likely be more aggregated.

There is, however, also a correlation between one of the two variables of the two parts of segment reporting quality. This is a negative correlation of -0.085 ($p = 0.037$) between segment income and the fineness. So, there seems to be a negative trade-off between the fineness of segment disaggregation and segment income reported. Firms might be more willing to disclose segment income information if the segments are more aggregated or, the other way around, are willing to disclose more segments that are specific when segment income is omitted. A similar relation is found by Leung and Verriest (2015), who found that firms with higher foreign sales are more willing to disclose disaggregated geographical segment data, but these firms disclose less about segment income.

The main variable of interest in this study, the IFRS 8 adoption, is only significantly related to one of the four segment reporting quality variables. It is positively related to the fineness of segment disclosure ($R = 0.123$, $p = 0.002$). Hence, it does not correlate with the disclosure of segment income ($p = 0.625$), number of items disclosed ($p = 0.855$) and the number of segments disclosed ($p = 0.874$).

Between the control variables there are four correlations. Between firm size and leverage ($R = 0.205$, $p < 0.001$), between the market to book ratio and ROA ($R = 0.360$, $p < 0.001$) and between leverage and ROA ($R = -0.135$, $p = 0.001$) and between ROA and Herfindahl ($R = 0.074$, $P = 0.068$).

The size of a firm positively correlates with the disclosure of segment income (R 0.174, $p < 0.001$), with the number of items disclosed and ($R = 0.200$, $p < 0.001$) and with the number of segments disclosed ($R = 0.239$, $P < 0.001$). The positive correlation of firm size and three of the four segment reporting quality variables is in line with prior literature, that larger firms tend to disclose more (Buzby, 1975; Leuz, 2004).

The market to book ratio, the variable to measure firm growth, is negatively related to segment income disclosure ($R = -0.153$, $p < 0.001$) and the number of items disclosed (R -0.088, $p = 0.031$). This negative correlation between growth and segment disclosure quality is the opposite what was found by Easton and Monohan (2005).

The Herfindahl measure of industry competition was not found to be related to any of the four segment reporting qualities. The correlations are calculated with the firms of the European

[6] The correlation of 0.663 is the highest correlation between two variables, but these two variables will not be together in an analysis. The highest correlation between two variables that will be together in an analysis is 0.354, which is small enough to not expect any problems (Hair et al., 2014).

sample, maybe an effect of the European Union can be observed here. However, untabulated correlations test of the Australian sample only show a correlation with the fineness of segment disclosure (R = 0.171, p = 0.015). So, little effect of industry competition on segment reporting quality is observed.

Leverage is positively correlated with all the four segment reporting quality variables. This result is in line with prior literature that predicted an increase in disclosure quality of firms that have larger monitoring costs due to high debt levels (Jensen and Meckling, 1976).

The profitability of a firm, measured with 10 percentile ranks of ROA is negatively related to the disclosure of segment items by firms (R = -0.142, p < 0.001). Segment income reported, the number of segments disclosed and the fineness of segments is not found to be correlated with the profitability of a firm.

5.2 Segment income

The first segment disclosure quality addresses whether firms report income at a segment level. The European sample in *Table 5* shows no significant likelihood (p = 0.928) of an IFRS 8 adoption impact on the disclosure of segment income. Hence, hypothesis 1 can be accepted. IFRS 8 did not significantly change the disclosure of segment income. This conclusion about statistical significance holds for both geographical and business segments.

The control variable firm size is included to capture the relationship between firm size and disclosure. It can be observed that firm size increases the likelihood a firm reporting segment income by 25.2 percent. This effect is observed for the total sample (coeff. 0.252, p = 0.001), but it does not hold for business segment reporting (p = 0.744). Growth is found to be significantly (coeff. -2.273, p = 0.001) related to a negative likelihood in the reporting of segment income. This the opposite of what was expected based on prior literature (Easton and Monohan, 2005). Industry competition, measured with the Herfindahl-Hirschman Index did not affect the likelihood of reporting income at a segment level (p = 0.742). Leverage is, as expected, positively related to the likelihood of the reporting of segment income (coeff. 1.982, p = 0.005), but not for firms disclosing business segments (p = 0.254). Firm profitability is not found to be related to firms' likelihood disclosure of segment income (p = 0.530).

In the Australian sample an effect of IFRS 8 on segment income disclosure can be seen in the total Australian sample (coeff. -0.970, p = 0.051) and under business segment reporting (coeff. -2.128, p = 0.058). IFRS 8 decreases the odds of an Australian firm in the total sample reporting segment income by -0.970 and the odds of an Australian firm under business segment reporting is decreased by -2.128. This in contrast to the European sample, were no influence of

Table 5 – Post adoption impact of IFRS 8 on the disclosure of segment income

Panel A: European sample			
	Geographical segments	Business segments	Total sample
Constant	-2.421	3.925	1.263
	(-0.739)	(1.349)	(0.589)
IFRS 8	0.074	-0.515	-0.023
	(0.204)	(-1.117)	(-0.089)
Size	0.252**	0.041	0.252***
	(2.355)	(0.328)	(3.273)
Growth	-3.283***	-1.074	-2.273***
	(-3.034)	(-1.457)	(-3.309)
Industry competition	-1.021	0.213	0.742
	(-0.250)	(0.058)	(0.330)
Leverage	2.971***	1.330	1.982***
	(2.800)	(1.142)	(2.799)
Profitability	0.042	0.051	0.028
	(0.627)	(0.630)	(0.589)
Number of observations	192	412	604
Number of firms	119	229	302
Log likelihood	197,412	171,329	423,131
Pseudo R^2 (Nagelkerke)	0.224	0.035	0.124
Pseudo R^2 (Cox & Snell)	0.156	0.012	0.067
Panel A: Australian sample			
	Geographical segments	Business segments	Total sample
Constant	12.737**	-4.746	5.504
	(2.039)	(-0.492)	(1.367)
IFRS 8	-0.360	-2.128*	-0.970*
	(-0.552)	(-1.897)	(-1.952)
Size	-0.376*	0.368	0.016
	(-1.679)	(1.343)	(0.110)
Growth	-2.320*	0.636	-1.808*
	(-1.649)	(0.194)	(-1.795)
Industry competition	10.586	16.190	9.132
	(1.054)	(1.005)	(1.270)
Leverage	2.756	-0.929	1.725
	(1.249)	(-0.380)	(1.190)
Profitability	0.030	-0.074	0.003
	(0.248)	(-0.521)	(0.037)
Number of observations	73	127	200
Number of firms	42	69	100
Log likelihood	66.627	50.692	132.155
Pseudo R^2 (Nagelkerke)	0.098	0.183	0.101
Pseudo R^2 (Cox & Snell)	0.154	0.069	0.052

Table 5 presents the logistic regression results to test hypothesis 1 that the adoption of IFRS 8 did not cause a change in the number of firms that reported segment income. The first number per variable is the coefficient and the second number between brackets is the Z-score. The significance at a 1% level is denoted with ***, the 5% level with ** and the 10% level with *.

IFRS 8 on segment income disclosure is found. Based on the European evidence hypothesis 1 was accepted, but it seems that under Australian business segment reporting a trivial effect can be observed. So, the prediction that IFRS 8 did not cause a change in the disclosure of segment income by Australian firms can only partly be supported. Hypothesis 1 can also be accepted for Australian firms reporting geographical segments.

5.3 Number of items disclosed

The second hypothesis stated that the adoption of IFRS 8 caused a decreased in the number of items disclosed. This negative post-adoption impact of IFRS 8 is not observed in the European sample data presented in *Table 6* ($p = 0.607$), also not under one of the types of segment reporting. The opposite effect on the other hand, that IFRS 8 had a positive effect on the number of segments disclosed, can also not be stated. So, hypothesis 2 must be rejected and it can be stated that IFRS 8 did not have a post-adoption impact on the number items reported.

In the European sample the only two variables influencing the number of items disclosed are firm size (coeff. 1.441, $p < 0.001$) and ROA (coeff. -0.584, $p = 0.004$). Leverage had a positive effect of 10.033 ($p = 0.001$) under geographical segment reporting on the number of items disclosed. However, leverage did not have a significant effect in the sample of business segments ($p = 0.821$) and neither in the European total sample ($p = 0.607$).

The sample of Australian firms did show negative effect (coeff. -1.401, $p = 0.091$) of IFRS 8 on the disclosure of items. This effect is also observed with firms reporting business segments (coeff. -1.816, $p = 0.097$). Hence, hypothesis 2 can be accepted for Australian firms disclosing business segments. Firm size under geographical segments had a positive effect (coeff. 1.337, $p < 0.001$) in the European sample, but not in the Australian sample ($p = 0.145$). Furthermore, a positive effect of leverage (coeff. 8.645, $p = 0.027$) on the number of items disclosed is found in the Australian geographical segment sample, while a negative effect (coeff. -6.896, $p = 0.053$) is found in the sample of business segments.

5.4 Number of segments disclosed

The third segment disclosure quality variable is the number of segments disclosed. *Table 7* gives an overview of the results. In section *5.1* a significant univariate decline in the number of segments disclosed under geographical segments was observed, so it is interesting to see if this is due to the adoption of IFRS 8. It was hypothesized in hypothesis 3 that the adoption of IFRS 8 would have a positive effect on the number of segments disclosed. The results in Panel A do not give arguments for a decrease nor an increase due to the adoption of IFRS 8 ($p = 0.625$).

Table 6 – Post adoption impact of IFRS 8 on the number of items disclosed

Panel A: European sample

	Geographical segments	Business segments	Total sample
Constant	-6.162	-2.041	-5.510
	(-0.655)	(-0.185)	(-0.660)
IFRS 8	-0.309	-0.873	-0.551
	(-0.302)	(-0.587)	(-0.512)
Size	1.337***	1.241***	1.441***
	(4.790)	(2.993)	(4.941)
Growth	-5.294*	-1.276	-3.227
	(-1.731)	(-0.363)	(-1.215)
Industry competition	-3.852	-5.923	-3.463
	(-0.315)	(-0.483)	(-0.360)
Leverage	10.033***	-0.834	2.351
	(3.473)	(-0.227)	(0.856)
Profitability	-0.304	-0.764***	-0.584***
	(-1.584)	(-2.733)	(-2.910)
Number of observations	192	412	604
Number of firms	119	229	302
Adjusted R^2	0.228	0.017	0.057

Panel B: Australian sample

	Geographical segments	Business segments	Total sample
Constant	24.98**	-14.354	-4.564
	(2.505)	(-1.421)	(-0.626)
IFRS 8	0.108	-1.816*	-1.401*
	(0.094)	(-1.672)	(-1.699)
Size	-0.546	1.669***	1.133***
	(-1.476)	(5.510)	(4.675)
Growth	-4.515*	-0.995	-2.255
	(-1.807)	(-0.290)	(-1.046)
Industry competition	10.943	4.770	6.681
	(0.703)	(0.515)	(0.837)
Leverage	8.645**	-6.896*	-1.477
	(2.261)	(-1.958)	(-0.556)
Profitability	0.400*	-0.163	-0.039
	(1.981)	(-0.902)	(-0.274)
Number of observations	73	127	200
Number of firms	42	69	100
Adjusted R^2	0.059	0.179	0.112

Table 6 presents the linear regression results to test hypothesis 2 that the adoption of IFRS 8 led to a decline in the number of items disclosed. The first number per variable is the coefficient and the second number between brackets is the t-score. The significance at a 1% level is denoted with ***, the 5% level with ** and the 10% level with *.

Table 7 – Post adoption impact of IFRS 8 on the number of segments disclosed

Panel A: European firms			
	Geographical segments	Business segments	Total sample
Constant	-2.188	-1.283	-0.892
	(-0.878)	(-1.062)	(-0.797)
IFRS 8	-0.238	0.049	-0.070
	(-0.882)	(0.303)	(-0.488)
Size	0.274***	0.264***	0.223***
	(3.702)	(5.807)	(5.711)
Growth	0.638	-0.496	-0.029
	(0.787)	(-1.288)	(-0.081)
Industry competition	-1.359	-1.105	-1.710
	(-0.420)	(-0.823)	(-1.324)
Leverage	-0.919	0.764*	0.262
	(-1.202)	(1.897)	(0.710)
Profitability	-0.012	0.014	0.006
	(-0.236)	(0.446)	(0.222)
Number of observations	192	412	604
Number of firms	119	229	302
Adjusted R^2	0.045	0.084	0.052
Panel B: Australian firms			
	Geographical segments	Business segments	Total sample
Constant	2.441	-1.378	-0.987
	(0.842)	(-0.535)	(-0.531)
IFRS 8	0.200	-0.037	0.026
	(0.596)	(-0.133)	(0.122)
Size	0.163	0.331***	0.266***
	(1.513)	4.294	(4.302)
Growth	-0.109	-0.469	0.110
	(-0.150)	(-0.537)	(0.200)
Industry competition	-6.720	1.367	0.111
	(-1.481)	(0.579)	(0.054)
Leverage	-0.837	-0.896	-1.046
	(-0.752)	(-0.998)	(-1.543)
Profitability	-0.190***	-0.059	-0.115***
	(-3.229)	(-1.277)	(-3.198)
Number of observations	73	127	200
Number of firms	42	69	100
Adjusted R^2	0.133	0.114	0.101

Table 7 presents the linear regression results to test hypothesis 3 that the adoption of IFRS 8 led to an increase in the number of segments disclosed. The first number per variable is the coefficient and the second number between brackets is the t-score. The significance at a 1% level is denoted with ***, the 5% level with ** and the 10% level with *.

IFRS 8 did not affect the number of segments disclosed, under both segment types. This result is contrasting to prior literature that found that the adoption of the management approach in segment reporting led to an increase in number of segments disclosed (Nichols et al., 2013).

An interesting question is if IFRS 8 did not cause the significant decline in the number of segments reported is what then is the reason? The only significant variable in the model is firm size. But firm size has, as theoretically might be expected, a positive effect on the number of segments disclosed in the European sample (coeff. 0.223, $p < 0.001$) as well as under geographical segment disclosure (coeff. 0.274, $p < 0.001$). The adjusted R squared of 0.052 gives additional rise to the notion that factors outside the current model also influence segment disclosure.

For business segments the variables firm size (coeff. 0.264, $p < 0.001$) and leverage (coeff. 0.764, $p = 0.059$) are positively influencing the disclosure of the number of segments. For geographical segments the only control variable that influenced the disclosure of segments is firm size (coeff. 0.274, $p < 0.001$).

Panel B shows the Australian firms, were too no effect of IFRS 8 on the number of segments disclosed can be found ($p = 0.903$). In the Australian sample, the only effects come from firm size (coeff. 0.266, $p < 0.001$) and ROA (coeff. -0.115, $p = 0.002$). For the Australian firms reporting business segments the only effect on the number of segments disclosed comes from firm size (coeff. 0.331, $p < 0.001$). However, for the Australian firms reporting under geographical segments firm size is not significant ($p = 0.135$). Firm profitability decreased (coeff. -0.190, $p = 0.002$) the number of segments under geographical segment reporting.

5.5 Fineness of segment disaggregation

The fineness of segment disaggregation is the final segment disclosure quality variable shown in *Table 8*. Geographical segments were measured on a 1 to 5 scale per segment and then averaged per firm-year observation. Business segment fineness is measured as the amount of segments more or less than what can be expected based on the number of industries a company is in. Since both segment types have a different measure it is, arguably, less appropriate to look at the total sample.

To test the post adoption impact of IFRS 8 no formal hypothesis was stated. Under geographical segments there is no significant effect of IFRS 8 on segment disaggregation ($p = 0.819$). What influences the fineness of segment disaggregation under geographical segments positively is leverage (coeff. 1.251, $p = 0.001$) and negatively are firm size (coeff. -0.086, $p = 0.018$), growth (coeff. -1.284, $p = 0.002$) and profitability (coeff. -0.072, $p = 0.004$).

Table 8 – Post adoption impact of IFRS 8 on the fineness of segment disaggregation

Panel A: European firms			
	Geographical segments	Business segments	Total sample
Constant	8.599***	-1.421	1.656
	(7.087)	(-0.948)	(1.313)
IFRS 8	-0.030	0.804***	0.478***
	(-0.229)	(3.988)	(2.955)
Size	-0.086**	0.182***	0.032
	(-2.391)	(3.225)	(0.720)
Growth	-1.248***	-0.437	0.022
	(-3.164)	(-0.916)	(0.054)
Industry competition	-1.425	-0.284	-1.323
	(-0.904)	(-0.171)	(-0.909)
Leverage	1.251***	0.794	0.623
	(3.357)	(1.590)	(1.502)
Profitability	-0.072***	0.018	-0.020
	(-2.915)	(0.487)	(-0.666)
Number of observations	192	412	604
Number of firms	119	229	302
Adjusted R^2	0.179	0.057	0.014
Panel B: Australian firms			
	Geographical segments	Business segments	Total sample
Constant	5.479***	-4.352	-1.181
	(2.968)	(-1.542)	(-0.529)
IFRS 8	-0.400*	-0.020	-0.321
	(-1.872)	(-0.066)	(-1.270)
Size	-0.012	0.300***	0.127*
	(-0.168)	(3.544)	(1.711)
Growth	-0.520	0.409	1.073
	(-1.112)	(0.428)	(1.625)
Industry competition	8.297***	3.396	6.123**
	(2.871)	(1.309)	(2.502)
Leverage	-0.693	-1.413	-3.132***
	(-0.977)	(-1.435)	(-3.846)
Profitability	0.002	-0.054	-0.032
	(0.048)	(-1.080)	(-0.736)
Number of observations	73	127	200
Number of firms	42	69	100
Adjusted R^2	0.157	0.074	0.074

Table 8 presents the linear regression results to test adoption impact of IFRS 8 on the fineness of segment disaggregation. The first number per variable is the coefficient and the second number between brackets is the t-score. The significance at a 1% level is denoted with ***, the 5% level with ** and the 10% level with *.

The fineness of business segments, as reported in section *5.1*, increased significantly. This effect is among other things caused by the adoption of IFRS 8 (coeff. 0.804, $p < 0.001$). The post-adoption impact of IFRS 8 caused an 80.4 percent increase in the fineness of segment disaggregation. Hence, it can be stated that the adoption of IFRS 8 caused the fineness of segment disaggregation to increase for business segments. The other factor influencing business segment disaggregation is firm size (coeff. 0.183, $p = 0.001$).

In contrast to the fineness of European firms, impact of IFRS 8 on the fineness of segment disaggregation is the other way around. The Australian firms' fineness of business segments did not change due to IFRS ($p = 0.206$). Under geographical segment IFRS 8 did have a negative effect of -0.400 ($p = 0.066$) on the fineness of segment disaggregation. The control variable that influenced the fineness of segments for Australian firms was firm size (coeff. 0.300, $p = 0.001$) under business segments. Under geographical segments industry competition had a positive influence on the fineness of segment disaggregation (coeff. 8.297, $p = 0.005$).

5.6 Overall effect

From an ideological standpoint that IFRS 8 was not adopted with the intention to decrease the quality of segment disclosure, the fifth hypothesis is that the adoption of IFRS 8 caused an increase in the quality of segment disclosure. In order to test this hypothesis one aggregated segment reporting quality variable was computed, derived from the four previously addressed segment reporting quality variables. The results are shown in *Table 9.*

In the European sample in Panel A no significant ($p = 0.209$) post adoption impact of IFRS 8 on segment disclosure quality can be observed. Also under geographical segments no significant ($p = 0.725$) effect of IFRS 8 is shown. Under business segment reporting only at an alpha level of 0.10 the result gets significant (coeff. 0.265, $p = 0.084$). Since the introduction of the fineness score for business segments was ambitious, a more generally accepted alpha of 0.05 is an, arguably, more preferred cutoff point. Hence, the overall hypothesis that IFRS 8 has a positive post-adoption effect on the quality of segment disclosure is rejected. It can be stated that IFRS 8 did not have an overall post-adoption impact on segment reporting quality.

In the total European sample, the two factors that influenced segment disclosure were firm size (coeff. 0.235, $p < 0.001$) and leverage (coeff. 0.861, $p = 0.006$), both as expected positive. Under geographical segment reporting the variable growth also influences segment reporting, but opposite to the expected direction, in a negative way of -2.186 ($p = 0.001$). Also, under geographical segment reporting a negative effect of -0.077 ($p = 0.063$) is found. Industry competition is not found to improve segment disclosure.

Table 9 – Post adoption impact of IFRS 8 on the aggregated segment reporting quality

Panel A: European sample			
	Geographical segments	Business segments	Total sample
Constant	5.301***	0.982	1.257
	(2.629)	(0.865)	(1.319)
IFRS 8	-0.077	0.265*	0.154*
	(-0.353)	(1.731)	(1.259)
Size	0.243***	0.230***	0.235***
	(4.062)	(5.400)	(7.069)
Growth	-2.186***	-0.264	-0.380
	(-3.334)	(-0.732)	(-1.255)
Industry competition	-1.209	-0.543	-1.103
	(-0.429)	(-0.430)	(-1.004)
Leverage	2.368***	0.773**	0.861***
	(3.825)	(2.041)	(2.749)
Profitability	-0.077*	-0.013	-0.030
	(-1.873)	(-0.443)	(-1.324)
Number of observations	192	412	604
Number of firms	119	229	302
Adjusted R^2	0.260	0.082	0.108
Panel B: Australian sample			
	Geographical segments	Business segments	Total sample
Constant	11.175***	-1.916	1.732
	(4.288)	(-0.835)	(0.975)
IFRS 8	-0.074	-0.369	-0.391*
	(-0.245)	(-1.497)	(-1.946)
Size	-0.122	0.415***	0.229***
	(-1.257)	(6.024)	(3.885)
Growth	-1.543**	-0.320	-0.174
	(-2.357)	(-0.411)	(-0.332)
Industry competition	4.694	4.692**	5.801***
	(1.150)	(2.228)	(2.982)
Leverage	1.795*	-0.712	-0.827
	(1.792)	(-0.889)	(-1.277)
Profitability	-0.020	-0.041	-0.046
	(-0.383)	(-1.007)	(-1.341)
Number of observations	73	127	200
Number of firms	42	69	100
Adjusted R^2	0.032	0.256	0.102

Table 9 presents the linear regression results to test hypothesis 5 that the adoption of IFRS 8 led to an increase in the quality of segment disclosure. The first number per variable is the coefficient and the second number between brackets is the t-score. The significance at a 1% level is denoted with ***, the 5% level with ** and the 10% level with *.

The Australian sample shows an effect of IFRS 8 on segment reporting quality. IFRS 8 has an effect of -0.391 (p = 0.053) on segment reporting quality. The fifth hypothesis predicted a positive effect on segment reporting quality. The result found is a negative relation, in contrast to the European sample. Hence, from the Australian control group there is additional evidence that the IFRS 8 did not have a clear overall impact in on segment reporting quality. IFRS 8 did influence segment reporting, though only in a few specific settings under different types of segments and for specific quality dimensions.

5.7 Robustness

Several questions with regard to the robustness are addressed in this section. The first question that comes to mind with the sample divided over two geographical areas in Europe is whether there are differences between the two areas. Next, is it correct that Herfindahl measure did not significantly influence segment reporting quality in a European setting? And lastly, did the exclusion of several potential extra control variables matter?

5.7.1 Robustness of the two European sub-samples

The European sample comprises Benelux and Scandinavian companies, so the first question that is addressed in this section is of the results are robust to these two settings. Leuz (2010) found that there are clusters of countries around the world with regulation and institutional dissimilarities. Furthermore, he argues, that regardless the adoption of one reporting framework, IFRS, the reporting practices will most likely not converge globally due to these dissimilarities.

Table 10 columns “Benelux” and “Scandinavia” give an overview of the two areas. The most notable result is that the adoption of IFRS 8 in the Benelux sample did not affect the aggregated segment reporting quality variable (p = 0.927), but it does in the Scandinavian sample (coeff. 0.302, p = 0.059). Since the overall effect of IFRS 8 in the European sample is not significant and with the previous results in mind the general conclusion can be sharpened. There is no overall post-adoption impact of IFRS 8 in the European sample on segment reporting quality, apart the fineness of business segments within the Scandinavian sample.

With regard to the control variables the variable growth is only significant (coeff. -0.921, p = 0.015) in the Scandinavian sample. This negative effect on segment reporting quality can be interpreted in the way that the Scandinavian sample is the sole contributor of the negative variable, where a positive effect of growth on segment disclosure was expected. The positive effects of leverage and firm size are robust under both geographical areas in the sample.

Table 10 – Robustness tests

	Benelux	Scandinavia	European sample	European sample - PCM	New control variables
Constant	0.982	2.150*	1.257	0.704	1.686
	(0.589)	(1.700)	(1.319)	(0.596)	(1.555)
IFRS 8	-0.017	0.302*	0.154*	0.310**	0.163
	(-0.092)	(1.893)	(1.259)	(2.056)	(1.149)
Size	0.186***	0.252***	0.235***	0.311***	0.190***
	(3.582)	(5.577)	(7.069)	(7.660)	(4.636)
Growth	0.053	-0.921**	-0.380	-0.841**	-0.409
	(0.088)	(-2.438)	(-1.255)	(-2.148)	(-1.331)
Industry competition	-2.945	-0.852	-1.103	-0.020	-0.127
	(-1.570)	(-0.634)	(-1.004)	(-0.151)	(-0.096)
Leverage	0.954*	1.155**	0.861***	0.780**	1.086***
	(1.853)	(2.596)	(2.749)	(1.972)	(3.042)
Profitability	0.662	-0.031	-0.030	-0.035	
	(0.676)	(-1.019)	(-1.324)	(-1.1908)	
Abnormal profitability					-0.299
					(0.707)
Loss					-0.049
					(-0.278)
Entry barriers					0.126
					(0.386)
Firm age					0.002
					(1.642)
Number of observations	252	352	604	401	460
Number of firms	126	176	302	204	230
Adjusted R^2	0.074	0.147	0.108	0.166	0.093

Table 10 presents the results of the linear regression analyses of the several robustness tests. The first number per variable is the coefficient and the second number between brackets is the t-score. Industry competition is measured with the Herfindahl measure, apart from column "European sample – PCM" were industry competition is measured with the Price Cost Margin. Profitability is discarded in the rightmost column due to a correlation of 0.801 ($p < 0.001$) between abnormal profitability and profitability. The significance at a 1% level is denoted with ***, the 5% level with ** and the 10% level with *.

5.7.2 The effect of industry competition on segment reporting quality

The Herfindahl-Hirschman Index measure was used to measure industry competition. Though, the effect of industry competition on segment reporting has not been significant in the different analyses of the European sample. To check whether this finding is robust a different measure of industry competition will be used, namely the Price Cost Margin (PCM) measure. The Herfindahl measures industry concentration and a high industry concentration should imply a high industry competition (Botosan and Stanford, 2005). The PCM takes a different approach, that is when the industry competition rises a firms' price cost margin declines and vice versa (Boone et al., 2013). To measure industry competition with PCM the following definition is used;

$$PCM = \frac{S - P - COGS}{S}$$

where S stands for net sales, P for payroll and COGS for cost of goods sold.

Column "European sample – PCM" in *Table 10* shows the regression results with the PCM measure instead of the Herfindahl measure. Note that due to unavailability of the needed data in the ORBIS database to calculate the PCM only 401 observations of the original 604 remain. The distribution of Benelux-Scandinavian firms changes from approximately 5:7 to 1:2, giving the Scandinavian firms more weight in the subsample.

The effect of industry competition, measured with the PCM, remains insignificant (p = 0.880). Untabulated results of the different segment reporting quality tests under business segments and geographical segments with the PCM instead of Herfindahl gives no relevant changes in the results. Since the subsample in column five shifts its weight to the Scandinavian companies the effect of IFRS 8 on the aggregated segment reporting quality variable becomes significant (p = 0.040). Further tests (not tabulated) show that this effect is most likely completely attributable to the shift in the subsample distribution. Furthermore, the inclusion of PCM increases of the different R squared values, under both geographical and business segments.

5.7.3 Additional control variables

Several voluntary factors are hypothesized by prior literature to influence segment disclosure, as addressed in section *2.4*. Abnormal profit, entry barriers, firm age and loss, however, did not have enough evidence or the right evidence in prior literature to include them in the main analyses. This section will check if that decision was correct. The following list discusses the influence of the four additional control variables on segment disclosure and how they are calculated;

Abnormal profit

Abnormally profitable firms have an incentive to disclose less information so that they do not attract new competitors. Abnormal profit is calculated as the firms' ROA minus the average ROA in firms' 3 digit SIC industry (Pardal et al., 2015). The industry ROA is calculated as the winsorized average of all the available ROA's in the ORBIS database for a certain 3 digit SIC industry. Industry ROA's are winsorized at the fifth and 95th percentile based on 2014 data, or lowest and highest ROA if less than 20 firms are available in an industry, in order to discard extreme value's.

Entry barriers.

If an industry has high entry barriers, firms might be less afraid of the threat of new competitors and are more willing to disclose segment information. Entry barriers is measured with the capital intensity ratio, which is net property, plant and equipment divided by total assets (Pardal et al., 2015).

Firm age

Older firms might have a good reputation to maintain and are more willing to disclose segment information. Another relation might be that younger firms are willing to give more segment disclosure in order to tackle the uncertainty that surrounds younger firms. Firm age is measured by the year of the annual report (2014, 2008, 2007 or 2006) minus the year of incorporation (Blanco et al., 2015).

Loss

Loss making firms most likely face agency problems and might therefore have a reason to limit segment disclosure (Leung and Verriest, 2015). Loss is measured using a dummy variable where negative net profits get the value 1 and positive net profits the value 0.

Column "New control variables" in *Table 10* gives an overview of the results. As can been seen in the table, the regression including the four additional control variables shows no large differences. Abnormal profit, capital intensity, loss and firm age all did not significantly ($p = 0.480$, $p = 0.700$, $p = 0.781$, $p = 0.101$ respectively) influence the aggregated segment reporting quality variable. The control variables leverage (coeff. 1.091, $p = 0.003$) and firm size (coeff. 0.186, $p < 0.001$) remain significant. Hence, the exclusion of these control variables seems to be justified.

6 Conclusion

Prior literature has looked into the "immediate" adoption impact of IFRS 8 on segment disclosure (Bugeja et al., 2015). The post-adoption impact of IFRS 8, however, has not been looked into before. Using segment disclosure data from firms' latest IAS 14R year and comparing that to 2014 IFRS 8 data, this study looked at the post-adoption impact of IFRS 8 on segment disclosure quality. The research setting comprised a sample of Scandinavian countries (Denmark, Norway and Sweden), Benelux countries (Belgium, The Netherlands and Luxembourg) and a control sample of Australian firms. The data included 302 firms and 604 firm-year observations from Europe and 100 firms and 200 firm-year observations from Australia. The distribution of segment types in the European (Australian) sample is 32 (37) percent reported geographical segments and 68 (63) percent reported business segments.

The descriptive statistics of the European sample gave a first overview of the results. An income measure at a segment level was reported by 87 percent of the companies. The average number of items disclosed per segment was 13.62 and the average number of firms disclosed 3.6 segments. Under geographical segment reporting the number of segments reported declined significantly. No other segment reporting quality measures changed significantly under geographical segments. The significant change under business segment reporting was an increase in the fineness. Segment reporting quality can be divided in a part of segment information and a part of segment disaggregation. The segment information variables number of items reported and income reported correlated with each other. So did the segment disaggregation variables number of segments reported and segment fineness. I find a third correlation, a negative correlation, between segment fineness and the disclosure of segment income. A possible interpretation of this negative trade-off can be that firms might be more willing to disclose segment information if the segments are broadly aggregated, and vice versa.

The univariate statistics of the European sample showed significant changes is in the number of segments disclosed and the fineness of segments. For the Australian sample it is the other way around. The percentage of firms that disclosed segment income declined significantly from 93 percent to 84. The Wilcoxon signed ranks test gave a significant change in the median of the number of items per segment.

I predicted in hypothesis 1 a no change situation in the number of firms that reported segment income after the IFRS 8 adoption. Segment income is defined as EBIT, segment result, operating result or more narrowly defined. Furthermore, I predicted with hypothesis 2 that the post adoption impact of IFRS 8 caused a decline in the number of items disclosed. The results

give evidence for the first hypothesis in the European sample, but there is no evidence for the second hypothesis in the European sample. IFRS 8 did not affect the segment information disclosed by firms. For the Australian sample, however, there is evidence that IFRS 8 had a positive effect on the disclosure of segment income under business segments. Also, for the second hypothesis there is some Australian evidence. Namely, a negative post-adoption impact on the disclosure of segment items under business segments.

In hypothesis 3 I predicted that the post-adoption impact of IFRS 8 would cause an increase in the number of segments disclosed. The results show, also for this hypothesis, no evidence that IFRS 8 effected the number of segments disclosed. A result that is observed in the European sample as well as the Australian sample. No formal hypothesis was stated to test the influence of IFRS 8 on segment disaggregation. The fineness of segment disaggregation increased due to the adoption of IFRS 8, but not in the geographical segments sample. In the sample of business segments, though, an increase of the fineness of segment disaggregation is observed. Further analysis reveals that this effect is only observable due to the Scandinavian firms included in the sample. In the sample of Australian firms a different result is observed. IFRS 8 has a negative post-adoption impact on the fineness of segment disaggregation under geographical segments.

The fourth hypothesis says that, from an ideological point of view, IFRS 8 increased the overall segment reporting quality. To test the overall effect an equally distributed aggregated segment reporting quality variable was computed from segment income, number of segment items disclosed, number of segments disclosed and the fineness measure. The European sample shows a small effect of IFRS 8 on segment disclosure quality, but it does not in the geographical segment sample. In the sample of business segments and in the total European sample this effect is only significant at an alpha level of 0.10, the effect of the fineness measure. Since we have to be cautious with the business segment fineness measure and an alpha level of 0.05 is more generally accepted the overall hypothesis is rejected. It can be stated that IFRS 8 did not have a post-adoption impact on segment reporting. Not positive, but neither negative. The Australian sample gives an extra diffuse result, since it can be seen that IFRS 8 had a negative post-adoption impact on segment disclosure under business segment disclosure.

All in all, it seems that IFRS 8 did not have a clear overall post-adoption impact on segment disclosure. Instead, four specific effects are found. In the Australian sample a negative effect of IFRS 8 on segment income disclosure is found under business segment reporting. IFRS 8 had a negative effect on the disclosure of segment items of Australian firms disclosing under business segments. Also, a negative effect of IFRS 8 on the fineness of segment disaggregation

under Australian geographical segments is found. And lastly, IFRS 8 had a positive effect on the segment disaggregation of Scandinavian firms reporting under business segments.

The overall conclusion is in line with Aleksanyan and Danbolt who "cast doubt on the effectiveness of IAS 14R and IFRS 8 in improving investors' information environment" (2015, p. 55). Leung and Verriest (2015) also doubted if IFRS 8 reached its goal, because there appears to be a limited economic and disclosure impact due to IFRS 8. Lastly, the results found did indeed vary between countries and institutional settings (Kvaal and Nobes, 2012; Soderstrom and Jialin Sun, 2007).

The control variables firm size and leverage were the two control variables that had the most influence. As prior literature predicted, both control variables had, almost always, a positive effect on segment disclosure quality. Prior literature found a positive effect of growth on segment disclosure, the results nevertheless indicate a negative effect of growth on segment disclosure. Industry competition, measured with the Herfindahl-Hirschman Index, did not influence segment disclosure quality often in the analyses. An alternative industry competition measure, the Price Cost Margin, did not give different results. The exclusion of the potential control variables abnormal profitability, loss, entry barriers and firm age was justified after a test in the European sample.

There are two limitations with regard to the method, variables and the results. First, the Orbis database only provides one "static" number of SIC industries. That is, there are no specific 2008 SIC codes and 2014 SIC codes available. The fineness measure for business segments is calculated with this static number of SIC industries. Assume for example that a firms has three business units, three corresponding SIC codes and each business unit forms a business segment. If a firms sells one of the business units it will report one segment less, but it still has the full three SIC codes assigned to it. In this case the fineness measure will report a negative change, while in practice all the business units are business segments and the measure should ideally report no change. Vice versa, if a firm decides to buy a new business unit/segment, this will indicate a higher score where a no change situation should ideally be reported. So, the effect of a "static" number of SIC codes is unknown and could be in both directions.

Secondly, the different adjusted R squared values are less than 0.3. This does not affect the conclusion about the effectiveness of IFRS 8 on segment disclosure. But it does tell us that the current model is not able to predict most of the change in the dependent variables. The low adjusted R squared values are, however, also found in prior studies (Bugeja et al., 2015; Leung and Verriest, 2015)

Further research might look into the low R-squared values to see what factors do influence segment disclosure. As for example major take-overs, disinvestments or improved reporting technologies might influence segment disclosure over time. Improved reporting technologies, or Information Technology in general, certainly evolved in the period 2008-2014 and this might simplify the gathering of data that is needed in segment reporting and thereby potentially influence segment reporting quality. Apart from Crawford et al. (2012), research in the field of IFRS 8 is mainly based on quantitative analysis. A further research can look into the IFRS 8 adoption with a qualitative analysis. How do managers of a firm for example judge the adoption of IFRS 8? Thirdly, this study uses two geographical areas, seven countries, in looking into the post adoption impact of IFRS 8. Further research might want to look into the post-adoption impact of IFRS 8 in other countries. And lastly, further research can also look into the post adoption impact of IFRS 8 on the fineness of segment disaggregation under business segments to see how solid this relation is.

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Appendices

Appendix A - List of abbreviations

AASB	– Australian Accounting Standards Board
ASRB	– Accounting Standards Review Board
Benelux	– Belgium, The Netherlands and Luxembourg
CEO	– Chief Executive Officer
CODM	– Chief Operating Decision Maker
EBIT	– Earnings Before Interest and Taxes
EU	– European Union
FASB	– Financial Accounting Standards Board
GAAP	– Generally Accepted Accounting Principles
Herf (-indahl)	– Herfindahl-Hirschman Index
IAS	– International Accounting Standards
IASB	– International Accounting Standards Board
IASC	– International Accounting Standards Committee
IFRS	– International Financial Reporting Standards
Lev	– Leverage
LOB	– Lines Of Business
Log	– Natural Logarithm
MTB	– Market To Book
Nitems	– Number of items
Nseg	– Number of segments
PCM	– Price Cost Margin
ROA	– Return On Assets
Scandinavia	– Denmark, Norway and Sweden
SFAS	– Statement of Financial Accounting Standards
SIC	– Standard Industrial Classification
Sinc	– Segment income
Size	– Firm size
SRQ	– Segment Reporting Quality
US	– United States

Appendix B - Firms in the sample

Australia

AJ Lucas Group Limited
Altium Limited
Amcor Limited
AP Eagers Limited
APN News & Media Limited
APN Property Group Limited
Ariadne Australia Limited
Aristocrat Leisure Limited
Aspen Group
Ausenco Limited
Awe Limited
Blackmores Limited
Bluescope Steel Limited
Brambles Limited
BSA Limited
Buderim Group Limited
Cardno Limited
Carnarvon Petroleum Limited
Charter Hall Retail Reit
Clarius Group Limited
CMI Limited
Coca-Cola Amatil Limited
Cochlear Limited
Codan Limited
Comet Ridge Limited
Computershare Limited
Coventry Group Limited
Credit Corp Group Limited
Cromwell Property Group
CUE Energy Resources Limited
CVC Limited
Downer EDI Limited
Ellex Medical Lasers Limited
Far Limited
Folkestone Limited
Gazal Corporation Limited
Gbst Holdings Limited
GPT Group
GUD Holdings Limited
GWA Group Limited
HFA Holdings Limited
Hills Limited
Icon Energy Limited
Incitec Pivot Limited
Infomedia Limited
Integrated Research Limited
Investa Office Fund
Lakes Oil NL
Macmahon Holdings Limited
Macquarie Telecom Group Limited
Maxitrans Industries Limited
Metcash Limited
Mirvac Group (The)
MMA Offshore Limited
Netcomm Wireless Limited
Nufarm Ltd
Orica Limited
Origin Energy Limited
Otto Energy Limited
Pacific Brands Limited
Pan Pacific Petroleum NL
Peet Limited
Perpetual Limited
Petsec Energy Limited
Platinum Capital Limited
PMP Limited
Qantas Airways Limited
RCR Tomlinson Limited
REA Group Ltd
Reckon Limited
Redflex Holdings Limited
SAI Global Limited
Salmat Limited
Samson Oil & GAS Limited
Santos Ltd
SDI Limited
Seek Limited
Select Harvests Limited
Servcorp Limited
Silex Systems Limited
Sirtex Medical Limited
Sonic Healthcare Limited
Stockland
Sun Resources NL
Sunland Group Limited
Tabcorp Holdings Limited
Tap Oil Limited
Telstra Corporation Limited
Ten Network Holdings Limited
TPG Telecom Limited
Transurban Group
UGL Limited
Waterco Limited
Watpac Limited
Webster Limited
Wesfarmers Limited
Westfield Group
White Energy Company Limited
Woodside Petroleum Limited
Worleyparsons Limited

Belgium

Abo-Group Environment
Accentis NV
Ackermans EN Van Haaren Nv/Sa
Aedifica
Agfa Gevaert NV
Alliance Developpement Capital Siic
Anheuser-Busch InBev
Atenor S.A.
Banimmo
Barco NV
Befimmo S.C.A./C.V.A.
Bekaert Sa/Nv
Campine N.V.
Cofinimmo SA - Sicaf Immobiliere
Coil S.A./N.V.
Compagnie d'entreprises CFE SA
Compagnie Immobilière de Belgique
Connect Group
Deceuninck
Delhaize Group SA
s.a. D'Ieteren n.v
Econocom Group SA
Etablissementen Franz Colruyt N.V. -
Etablissements Franz Colruyt S.A.
Exmar
Fluxys Belgium
Galapagos
Gimv NV
Greenyard Foods
Hamon & CIE (International)
Home Invest AS
IBA ION Beam Applications SA
Intervest Offices & Warehouses
Keyware Technologies NV
Kinepolis Group Sa/Nv
Leasinvest
Miko

Mobistar S.A./N.V.
Montea SCA
Umicore N.V.
Roularte Media Group NV
Option N.V.
Picanol NV
Proximus SA
Realdolmen NV
Recticel SA
Resilux Nv/Sa
Rosier Nv/Sa
Sapec SA
Sioen Industries
Société Internationale de Plantations et de Finance
Softimat
Solvay SA
Spadel Nv/Sa
TER Beke Nv/Sa
Tessenderlo Chemie Sa/Nv
Texaf SA
UCB Nv/Sa
Van De Velde Nv/Sa
Vastned Retail Belgium
Warehouses De Pauw
Warehouses Estates Belgium S.C.A.
Wereldhave Belgium C.V.A./S.C.A.
Zenitel
Zetes Industries

Denmark

A.P. Möller - Maersk A/S
Alk-Abello A/S
Ambu A/S
Atlantic Petroleum P/F
Bang & Olufsen A/S
Boconcept Holding A/S
Carlsberg A/S
Coloplast A/S
Copenhagen Airports A/S
Dalhoff Larsen & Horneman A/S
Dampskibsselskabet Norden A/S
Dantherm A/S
DSV De Sammensluttede Vognmaend AF 13-7 1976 A/S
Flsmidth & CO. A/S
GN Store Nord As
Greentech Energy Systems A/S
H. Lundbeck A/S
Harboes Bryggeri A/S
IC Group A/S
NKT Holding A/S
North Media A/S
Novo Nordisk A/S
Novozymes A/S
Roblon A/S
Rockwool International A/S
Royal Unibrew A/S
RTX A/S
Santa FE Group A/S
Schouw & CO A/S
Simcorp A/S
SP Group A/S
TDC A/S
Topsil Semiconductor Materials A/S
Vestas Wind Systems A/S
William Demant Holding A/S

Luxembourg

Arcelormittal S.A.
Eurofins Scientific SE
Logwin AG
Millicom International Cellular SA
RTL Group SA
SES S.A.
Subsea 7 S.A.
Sword Group SE
Ternium S.A.

The Netherlands

Aalberts Industries NV
Accell Group NV
Airbus Group SE
Akzo Nobel NV
Amsterdam Commodities N.V.
Asml Holding N.V.
Batenburg Techniek N.V.
BE Semiconductor Industries NV
Brunel International NV
C/Tac NV
Corbion N.V.
Docdata N.V.
Eurocommercial Properties N.V.
Fugro NV
Funcom N.V.
Heijmans NV
Heineken Holding N.V.
Heineken NV
Holland Colours NV
Hunter Douglas N.V.
Hydratec Industries N.V.
ICT Group N.V.
Kardan N.V.
Kendrion N.V.
Koninklijke Bam Groep NV
Koninklijke Boskalis Westminster N.V.
Koninklijke DSM N.V.
Koninklijke KPN NV
Koninklijke Philips N.V.
Koninklijke Vopak N.V.
Nedsense Enterprises N.V.
NSI N.V.
Oranjewoud N.V.
Ordina N.V.
Pharming Group N.V.
Plaza Centers N.V.
Randstad Holding NV
Relx NV
Ronson Europe NV
SBM Offshore N.V.
Sligro Food Group N.V.
Stern Groep N.V.
Stmicroelectronics N.V.
Telegraaf Media Groep N.V.
TKH Group N.V.
Tomtom NV
Unilever NV
USG People N.V.
Vastned Retail N.V.
Wereldhave NV
Wessanen NV
Wolters Kluwer NV
X5 Retail Group N.V.

Norwegian

AF Gruppen ASA
Agasti Holding ASA
Aker ASA
Akva Group ASA
Atea ASA
Belships ASA
Bergen Group ASA
Bonheur ASA
Data Respons ASA
DNO ASA
DOF ASA
Eidesvik Offshore ASA
Ekornes ASA
Farstad Shipping ASA
Fred. Olsen Energy ASA
Ganger Rolf ASA
Goodtech ASA
Grieg Seafood ASA
Hafslund ASA
Havila Shipping ASA

Hexagon Composites ASA
I.M. Skaugen SE
Interoil Exploration & Production ASA
Kongsberg Automotive ASA
Kongsberg Gruppen ASA
Leroy Seafood Group ASA
Marine Harvest ASA
Norske Skogindustrier ASA
Norwegian Air Shuttle ASA
Norwegian Energy Company ASA
Odfjell ASA
Orkla ASA
Q-Free ASA
REC Silicon ASA
Salmar ASA
Sevan Marine ASA
Solstad Offshore ASA
Solvang ASA
Statoil ASA
TGS Nopec Geophysical Company ASA
Tomra Systems ASA
TTS Group ASA
Veidekke ASA
Yara International ASA

Sweden

AAK AB
AB Electrolux
AB Volvo
Acando AB
Addtech AB
ÅF AB
Alfa Laval AB
Assa Abloy AB
Atlas Copco AB
Axfood AB
Axis AB
BE Group AB
Beijer Alma AB
Beijer REF AB
Betsson AB
Bilia AB
Billerudkorsnäs AB
Biogaia AB
Bjorn Borg AB
Boliden AB
BTS Group AB
Bure Equity AB
Castellum AB
Catena AB
Clas Ohlson AB
Consilium Aktiebolag
Duni AB
Elanders AB
Electra Gruppen AB (Publ)
Eniro AB
AB Fagerhult
Fastighets AB Balder
Fingerprint Cards AB
Getinge AB
Gunnebo AB
Haldex AB
Hennes & Mauritz AB
Hexagon AB
Hexpol AB
HIQ International AB
Holmen AB
Hufvudstaden AB (Publ)
Husqvarna AB
Industrial & Financial Systems AB
Indutrade AB
Intrum Justitia AB
Investment Ab Kinnevik
Investment AB Latour
Investor AB
JM AB
Karo Pharma AB
Kungsleden AB
L E Lundbergföretagen AB
Lagercrantz Group AB
Lindab AB
Lundin Petroleum AB
Meda AB
Mekonomen AB
Modern Times Group AB
NCC AB
Nederman Holding AB
New Wave Group AB
Nibe Industrier AB
Nobia AB
Nolato AB
OEM International AB
Opcon AB
Orexo AB
Peab AB
Poolia AB
Pricer AB
Proact IT Group AB
Proffice Aktiebolag
Ratos AB
Raysearch Laboratories AB
Rejlers AB
Saab AB
Sandvik AB
SAS AB
Sectra AB
Securitas AB
Semcon AB
Skanska AB
SKF AB
Skistar AB
Ssab AB
Studsvik AB
Svenska Cellulosa AB SCA
Sweco AB
Swedish Match AB
Tele2 AB
Telefonaktiebolaget LM Ericsson
Teliasonera Ab
Trelleborg AB
VBG Group AB
Wihlborgs Fastigheter AB
Xano Industri AB

Appendix C - Definition of variables

Segment income (Sinc)

An indicator variable set to 1 if a firm reports income at a segment level in its annual report, otherwise the variable is set to 0. Income at a segment level is defined as EBIT, segment result, operating result or more a more refined segment income measure.

Number of items (Nitems)

The number of financial items disclosed.

Number of segments (Nseg)

The number of segments disclosed. In line with prior literature segments labeled "headquarters", "corporate" and alike will be excluded from the study, since these segments are not real operating segments under IFRS 8 (Berger and Hann, 2003; Leung and Verriest, 2015).

Fineness of segment disaggregation (Fineness) of geographical segments

Measured using the fineness measure of Doupnik and Seese (2001) and refined by Leung and Verriest (2015). Each segment is given a value and then the average is taken for each firm. Segments will be given the following values;

1, for geographical segments labeled as "foreign" or "other"

2, for geographical segments labeled as multiple continents

3, for geographical segments labeled as a single continent

4, for geographical segments labeled as a group of countries within a continent

5, for geographical segments labeled as a single country or areas within a country.

Fineness of segment disaggregation (Fineness) of business segments

The number of 4-digit Standard Industrial Classification (SIC) codes assigned by the ORBIS database to a company. Then, for every segment that a company has less (more) than the number of segments assigned by the ORBIS database one point is subtracted (added up).

Aggregated segment reporting quality

Each of the four segment reporting qualities will be transformed into 10-percentile-ranked variables to give each quality an equal weight. Each of these percentile-ranked variables contributes for 25 percent in the aggregated segment reporting quality variable.

IFRS 8

A variable set to 0 for IAS 14R data and 1 for IFRS 8 data.

Firm size (Size)

The natural logarithm of total assets.

Growth (MTB)

Log of the market to book ratio plus 10, calculated by the market value of equity divided by the book value of equity. The natural logarithm cannot handle the 4 negative market to book ratio's in the total sample. Therefore, the value 10 is added to make sure all the values are at least one before computing the natural logarithm.

Industry competition (Herfindahl)

Measured using the Herfindahl-Hirschman Index, as in Blanco et al. (2015);

$$\text{Herf}_j = \sum_{i=1}^{N} (S_{ij} / S_j)^2$$

where S_{ij} is firm $_i$'s percentage sales in industry $_j$ as defined by the three-digit SIC code, S_j is the sum of relative percentage of sales for the top 50 firms in industry j and N is 50, the number of firms in industry j included in the Herfindahl-Hirschman Index. Higher values of *Herf* indicate larger levels of industry concentration and lower levels of industry competition.

Industry competition (PCM)

$$\text{Price Cost Margin (PCM)} = \frac{S-P-COGS}{S}$$

Where S stands for net sales, P for payroll and COGS for cost of goods sold (Boone et al., 2013).

Leverage

The book value of total debt divided by the book value total assets.

Profitability (ROA)

Measured with ten percentile ranks of return on assets, ROA in short. ROA is calculated as operating income, EBIT, divided by total assets.

Abnormal profit

Firm ROA minus the average ROA of the 3 digit SIC industry. Industry ROA is calculated as the winsorized average all the available ROA's in the ORBIS database for a certain 3 digit SIC industry. The ROA's are winsorized at the fifth and 95th percentile based on 2014 data, or the highest and lowest value when less than 20 ROA's are available for a certain industry.

Entry barriers.

The capital intensity ratio, which is net property, plant and equipment divided by total assets.

Firm age

The year of the annual report (2014, 2008, 2007 or 2006) minus the year of incorporation.

Loss

A dummy variable where negative profits get the value 1 and positive net profits get the value 0

Appendix D - Overview of IFRSs

Standard	Adoption	About
IFRS 1 – First-time Adoption of International Financial Reporting Standards	1-7-2009	"IFRS 1 … sets out the procedures that an entity must follow when it adopts IFRSs for the first time as the basis for preparing its general purpose financial statements. The IFRS grants limited exemptions from the general requirement to comply with each IFRS effective at the end of its first IFRS reporting period." (IAS Plus, 2016)
IFRS 2 – Share-based Payment	1-1-2005	"IFRS 2 … requires an entity to recognise share-based payment transactions (such as granted shares, share options, or share appreciation rights) in its financial statements, including transactions with employees or other parties to be settled in cash, other assets, or equity instruments of the entity. Specific requirements are included for equity-settled and cash-settled share-based payment transactions, as well as those where the entity or supplier has a choice of cash or equity instruments." (IAS Plus, 2016)
IFRS 3 – Business Combinations	1-7-2009	"IFRS 3 … outlines the accounting when an acquirer obtains control of a business (e.g. an acquisition or merger). Such business combinations are accounted for using the 'acquisition method', which generally requires assets acquired and liabilities assumed to be measured at their fair values at the acquisition date." (IAS Plus, 2016)
IFRS 4 – Insurance Contracts	1-1-2005	"IFRS 4 … applies, with limited exceptions, to all insurance contracts (including reinsurance contracts) that an entity issues and to reinsurance contracts that it holds. In light of the IASB's comprehensive project on insurance contracts, the standard provides a temporary exemption from the requirements of some other IFRSs, including the requirement to consider IAS 8 Accounting Policies, Changes in Accounting Estimates and Errors when selecting accounting policies for insurance contracts." (IAS Plus, 2016)
IFRS 5 – Non-current Assets Held for Sale and Discontinued Operations	1-1-2005	"IFRS 5 … outlines how to account for non-current assets held for sale (or for distribution to owners). In general terms, assets (or disposal groups) held for sale are not depreciated, are measured at the lower of carrying amount and fair value less costs to sell, and are presented separately in the statement of financial position. Specific disclosures are also required for discontinued operations and disposals of non-current assets." (IAS Plus, 2016)
IFRS 6 – Exploration for and Evaluation of Mineral Resources	1-1-2006	"IFRS 6 … has the effect of allowing entities adopting the standard for the first time to use accounting policies for exploration and evaluation assets that were applied before adopting IFRSs. It also modifies impairment testing of exploration and evaluation assets by introducing different impairment indicators and allowing the carrying amount to be tested at an aggregate level (not greater than a segment)." (IAS Plus, 2016)
IFRS 7 – Financial Instruments: Disclosures	1-1-2007	"IFRS 7 … requires disclosure of information about the significance of financial instruments to an entity, and the nature and extent of risks arising from those financial instruments, both in qualitative and quantitative terms. Specific disclosures are required in relation to transferred financial assets and a number of other matters." (IAS Plus, 2016)
IFRS 8 – Operating Segments	1-1-2009	See literature review.

IFRS 9 – Financial Instruments	1-1-2018	"IFRS 9 issued in July 2014 is the IASB's replacement of IAS 39 Financial Instruments: Recognition and Measurement. The Standard includes requirements for recognition and measurement, impairment, derecognition and general hedge accounting. The IASB completed its project to replace IAS 39 in phases, adding to the standard as it completed each phase." (IAS Plus, 2016)
IFRS 10 Consolidated Financial Statements	1-1-2013	"IFRS 10 … outlines the requirements for the preparation and presentation of consolidated financial statements, requiring entities to consolidate entities it controls. Control requires exposure or rights to variable returns and the ability to affect those returns through power over an investee." (IAS Plus, 2016)
IFRS 11 – Joint Arrangements	1-1-2013	"IFRS 11 … outlines the accounting by entities that jointly control an arrangement. Joint control involves the contractually agreed sharing of control and arrangements subject to joint control are classified as either a joint venture (representing a share of net assets and equity accounted) or a joint operation (representing rights to assets and obligations for liabilities, accounted for accordingly)." (IAS Plus, 2016)
IFRS 12 – Disclosure of Interests in Other Entities	1-1-2013	"IFRS 12 … is a consolidated disclosure standard requiring a wide range of disclosures about an entity's interests in subsidiaries, joint arrangements, associates and unconsolidated 'structured entities'. Disclosures are presented as a series of objectives, with detailed guidance on satisfying those objectives." (IAS Plus, 2016)
IFRS 13 – Fair Value Measurement	1-1-2013	"IFRS 13 … applies to IFRSs that require or permit fair value measurements or disclosures and provides a single IFRS framework for measuring fair value and requires disclosures about fair value measurement. The Standard defines fair value on the basis of an 'exit price' notion and uses a 'fair value hierarchy', which results in a market-based, rather than entity-specific, measurement." (IAS Plus, 2016)
IFRS 14 – Regulatory Deferral Accounts	1-1-2016	"IFRS 14 … permits an entity which is a first-time adopter of International Financial Reporting Standards to continue to account, with some limited changes, for 'regulatory deferral account balances' in accordance with its previous GAAP, both on initial adoption of IFRS and in subsequent financial statements. Regulatory deferral account balances, and movements in them, are presented separately in the statement of financial position and statement of profit or loss and other comprehensive income, and specific disclosures are required." (IAS Plus, 2016)
IFRS 15 – Revenue from Contracts with Customers	1-1-2018	"IFRS 15 specifies how and when an IFRS reporter will recognise revenue as well as requiring such entities to provide users of financial statements with more informative, relevant disclosures. The standard provides a single, principles based five-step model to be applied to all contracts with customers." (IAS Plus, 2016)
IFRS 16 – Leases	1-1-2019	"IFRS 16 specifies how an IFRS reporter will recognise, measure, present and disclose leases. The standard provides a single lessee accounting model, requiring lessees to recognise assets and liabilities for all leases unless the lease term is 12 months or less or the underlying asset has a low value. Lessors continue to classify leases as operating or finance, with IFRS 16's approach to lessor accounting substantially unchanged from its predecessor, IAS 17." (IAS Plus, 2016)