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*Determinants and Consequences of Integrated
Reporting Adoption*

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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam

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Abstract

This research empirically investigates the determinants and consequences of integrated reporting adoption for the financial performance of European firms. The corresponding central research question is: What is the effect of integrated reporting adoption on the profitability of European firms? The determinants analysis examines which firm characteristics derived from the literature study influence the likelihood of integrated reporting adoption, using a multivariate logistic regression model. The findings include that firm size and complexity of activities positively influence integrated reporting adoption. Next, a sample is obtained through propensity-score matching, with a total of 160 firms and 80 integrated reporting adopters. The consequences analysis consists of univariate tests and multivariate regression, which shows that the hypothesized positive effect of integrated reporting adoption on firm profitability does not hold when analyzed empirically. The discussion provides a potential explanation, namely that the additional revenues generated after integrated reporting adoption are canceled out due to the increased expenditure, e.g. through CSR and ESG related investments. Lastly is argued that future research could examine changes in the investor base or information asymmetry after integrated reporting adoption, as these variables are more likely to be influenced by the new reporting method.

1 Introduction

Integrated reporting is the practice of combining all standalone accounting reports into one main integrated report, which is published periodically. This report covers all of the value-creating activities of firms on different levels and is published as required by the framework of the International Integrated Reporting Council (IIRC). Typically, the reports include the financial statements, corporate governance reports (CSR) and environmental and social governance reports (ESG).

Since its launch in 2013, the integrated reporting framework (IRF) has gained popularity, mainly among European firms. It is said to be the future of accounting reporting, with experts stating that integrated reporting will take over traditional standalone reporting methods (Adams, 2015; Jensen and Berg, 2011). The main benefit of integrated reporting described by the researchers includes that it enhances the integration of reporting departments within firms, making the reporting process more efficient than before. KPMG and the Financial Executives Research Foundation (2011) also argue that the emergence of integrated reporting has allowed firms to grow more by reporting about the firm and its future outlook, as this shows how the organization stands compared with the expectations of all stakeholders, e.g. shareholders but also the society.

Prior research argues that integrated reporting can be an enabler that may improve the profitability of firms, for both accounting profitability (Adams, 2015; Jensen & Berg, 2011) and market profitability (Cheng, Green, Conradie, Konishi & Romi, 2014; Flower, 2015). If this is indeed the case, every company would replace its traditional reporting methods with integrated reporting. As the arguments of prior researchers do not contain evidence to support the arguments in favor of integrated reporting adoption, this study is the first to empirically analyze the effect of integrated reporting adoption on firm profitability. Since it is also unclear which factors determine integrated reporting adoption, this study performs a determinants analysis, investigating the firm characteristics which potentially influence the likelihood of integrated reporting adoption. The following central research question is answered:

What is the effect of integrated reporting adoption on the profitability of European firms?

Preceding the empirical analysis, literature concerning determinants of integrated reporting adoption is studied, in order to form a hypothesis containing the firm characteristics which potentially influence the likelihood of integrated reporting adoption. The first hypothesis of this research states that larger firms with high growth opportunities, stock exchange listing and lower prior reporting quality are more likely to adopt integrated reporting, compared to other firms. The second hypothesis of this research is formed by analyzing literature concerning the consequences of integrated reporting adoption for firm profitability. Prior studies agree on the matter that integrated reporting can improve both the accounting and market profitability of firms. However, this research also argues that only changing the reporting method does not impact firm profitability. For example, it is possible that the additional revenues generated are canceled out by the increased expenditure, due to investments made after publishing the integrated reports. Therefore, the second hypothesis of this research states that integrated reporting adoption either positively impacts firm profitability or has no effect at all.

The sample selection of this research initially contains all integrated reporting adopters. Since only European firms are analyzed, firms of all other regions are not included. Furthermore, the Compustat Global dataset is used in order to obtain data on the integrated reporters, together with additional European firms for the propensity-score matching. The total amount of firms, including integrated reporting adopters and non-adopters, is used for the determinants analysis. The years included in the dataset are 2010-2020, with most firms adopting integrated reporting after its framework launch in December 2013. Furthermore, propensity-score matching is used in order to obtain a sample for the consequences analysis. The final sample includes 80 integrated reporting adopters and 80 non-adopters, with matched pairs based on similar firm characteristics as derived from the literature.

The key findings of this research include that firm size and complexity of activities positively influence integrated reporting adoption ($p < 0.01$). The determinants analysis also shows that prior reporting quality, growth opportunities and whether a firm is publicly traded or privately held do not influence the likelihood of integrated reporting adoption. Related to the consequences analysis, this research finds that integrated reporting adoption does not influence both accounting and market profitability. For the sample containing propensity-score matched firms, there is no significant difference for firm profitability between the treatment and control group. Additionally, the multivariate regression models analyzed over the whole sample of firms show no evidence which supports the hypothesis stating that integrated reporting adoption positively influences firm profitability.

The contribution to prior literature on integrated reporting is threefold. Firstly, this research provides empirical evidence for the arguments of Adams (2015), Cheng et al. (2014) and De Villiers and Hsiao (2017), who suggest that firm size together with the complexity of activities positively determine integrated reporting adoption. This research also shows that the statements of Pistoni et al. (2018) and the IIRC (2012) concerning growth opportunities and prior reporting quality do not hold, as these factors are not associated with the increased likelihood of integrated reporting adoption. For stock exchange listing, no evidence suggests that publicly traded firms are more likely to implement integrated reporting.

Secondly, the consequences analysis does not provide evidence for the arguments of Adams (2015) and Jensen and Berg (2011), who suggest that integrated reporting positively influences accounting profitability. Additionally, the empirical findings of this research are not in accordance with the statements of Cheng et al. (2014) and Flower (2015), who suggest that integrated reporting adoption can positively impact investor value and market profitability.

Lastly, the discussion argues with prior literature that the results found are consistent with the expectation that only changing the reporting method does not directly impact firm profitability. This is mainly due to the additional revenues generated after integrated reporting adoption becoming canceled out by the increased expenditure after publishing integrated reports, e.g. through ESG or CSR-related investments. Integrated reporting is, however, more likely to impact other areas, such as information asymmetry between firms and investors. This is possible because integrated reporting adoption provides the investors with new information about the firm and its future. The investor base of firms is another factor that integrated reporting adoption could influence significantly, because it attracts new investors, potentially increasing trading volume over time.

The limitations of this research include that only the collective profitability figures of firms are analyzed, whereas integrated reporting adoption directly influences the cost of the internal reporting departments at firms. Therefore, future research could analyze specifically the reporting costs before and after integrated reporting adoption. This research is also limited as the sample of integrated reporting adopters is relatively small, even though Europe is the most common region related to integrated reporting adoption. Future research could analyze all regions, including North American, African and Asian firms which have adopted integrated reporting. Additionally, future research could explore areas where integrated reporting is more likely to have a significant influence, e.g. the information asymmetry between firms and investors, together with the investor base of firms.

Following the introduction, a theoretical base is developed in Section 2. Next, data and methodology including obtaining data and research design are presented in Sections 3 and 4. These sections provide the sample selection, propensity-score matching procedure and the regression models in detail. Section 5 is dedicated to presenting the results of the determinants and consequences analysis, preceding the discussion of results. Lastly, Section 6 provides concluding remarks, summarizing the research and its findings, before discussing the limitations and potential areas for future research related to integrated reporting.

2 Theoretical Framework

2.1 Integrated reporting and its background

This section is dedicated to defining integrated reporting and providing background information about its emergence and adoption by firms. Firstly, it is of great importance to define and provide explanations for the most occurring and discussed concepts in this research. This study investigates the potential relationship between the implementation of integrated reporting and firm profitability. Therefore, definitions and explanations for integrated reporting and profitability are provided for the reader, before the literature concerning integrated reporting is studied. This provides a theoretical foundation for the corresponding empirical analysis of the relationship between integrated reporting and firm profitability.

The council that governs the quality of integrated reporting is the International Integrated Reporting Council (IIRC). This is a non-profit organization that has developed the framework for integrated reporting, before its official launch in December 2013 (IIRC, 2013). The IIRC defines integrated reporting as the process of integrated thinking, resulting in a periodic integrated report about the organization's value creation over time and the related communication about this value creation towards stakeholders. The different elements, e.g. sustainability, corporate governance and financials, are combined into an integrated report. The process thereof is known as integrated reporting (IIRC, 2021).

In general, scholars agree on the definition of integrated reporting as stated by the IIRC. Research after the framework launch in 2013, however, elaborates more on the different elements included in the integrated reports. For instance, researchers state that both financial and non-financial activities are reported on by firms, e.g. by the accounting, sales, production or research and development departments. These reports are further combined into an integrated report containing the information about all the activities of a firm in a specific period, usually yearly, or at times, quarterly (De Villiers & Hsiao, 2017; Dumay, Bernardi, Guthrie & Demartini, 2016). An integrated report contains the financial reports, such as the statement of financial position, the income statement and the cash flow statement. Additionally, the non-financial elements include communication on environmental, social and corporate governance (ESG). This section of the integrated report contains information about the economic, social and environmental conditions at the local, regional and global levels (Flower, 2015).

From 2009 onwards, the International Integrated Reporting Council, previously known as the International Integrated Reporting Committee, has developed a framework for the combination of financial and non-financial reports into an integrated report. The council officially launched in 2012 after it was renamed and published its framework for integrated reporting in December 2013 (Dumay et al., 2016). Firms that participate in the practice of integrated reporting and periodically publish integrated reports according to the IIRC framework are listed on the council website. These integrated reports are easily accessible for different stakeholders, e.g. investors or customers.

The framework for integrated reporting has been in development since 2009. After two years, the IIRC had sufficient demand and anticipation to conduct a series of tests under the pilot program in 2011, involving 100 organizations, both businesses and investors (De Villiers & Hsiao, 2017). Due to the extensive nature and complexity of integrated reporting, the pilot

program did not provide valuable insights into the effects of adopting integrated reporting, as only a small number of companies were able to provide an integrated report fully in compliance with the IIRC framework. According to Adams (2015), the practice of integrated reporting has to some extent, replaced the Global Reporting Initiative (GRI). Where the GRI failed to encourage firms to publish reports about value creation besides regular accounting reports, the IIRC came with a solution, namely, to combine the different reports, financial and non-financial, containing all the information about a firm's activities in order to create value over a certain period. This implies that investors would only have to read one report to find out how a firm has created value over a year, with environmental, social and economic information all in one report. This is instead of reading different standalone reports such as financial statements, corporate governance reports, corporate social responsibility (CSR) reports and environmental reports.

Expert opinions include Adams (2015), who claims that the Integrated Reporting Framework (IRF) by the IIRC has replaced the GRI. Jensen and Berg (2011) agree to some extent as they argue that integrated reporting provides a solution to the disadvantages of Traditional Sustainability Reporting (TSR). According to their paper, integrated reporting overcomes one main obstacle of TSR, namely the lack of interrelation between the standalone reports. They claim that it would make sense for reports to be accounted for separately if the different activities, e.g. sustainability reporting and financial reporting occur independently in a firm that wants to maintain separate accounting for activities. Integrated reporting provides an alternative reporting method compared to TSR, as it enables different company departments to become more interrelated, stimulating cooperation and integration of departments within the firm. Additionally, Jensen and Berg (2011) argue that traditional CSR and TSR reporting together with financial reporting is inordinately retrospective, as future risks and targets are not accounted for adequately in traditional reporting. The IRF provides a vast solution to this problem, as the framework includes a separate section for strategic focus and future orientation (IIRC, 2021).

It is in this setting that integrated reporting became increasingly relevant and seen as a solution to the unnecessary extensive and separate accounting for economic, social and environmental activities of firms (Adams, 2015; Cheng et al., 2014; Dumay et al., 2016; Jensen & Berg, 2011). Upon completion of the framework that had been in development for several years, the IIRC published the definitive version in December 2013. The mission of the IIRC with this framework is to "improve the quality of information available to providers of financial capital to enable a more efficient and productive allocation of capital" (IIRC, 2013). The IIRC defines the main reason to develop this framework as the need for "investors to understand how the strategy being pursued creates value over time" (IIRC, 2013). These statements by the IIRC indicate that its mission is to solve the information asymmetry for investors looking to find more information about a firm's different activities, with an emphasis on value creation and not only financial information.

The IIRC itself strongly believes that until the development of the IRF, reporting was inadequate and extensive, with separate accounting reports reaching up to 200 pages in length (KPMG & FERF, 2011). Furthermore, the IIRC stated that value creation is a dynamic concept that undergoes significant changes over time. Where in the 1970s around 80% of company market value could be found as financial and physical assets in the financial statements, this

number is around 20% after 2010 (Adams, 2015; IIRC, 2011). These new insights indicate that only financial statements are inadequate to display a firm's value creation ability, implying the need for other elements in accounting reports published by firms. As of the January 2021 version of the IIRC framework, these other elements are: (1) organizational overview and external environment, (2) governance, (3) business model, (4) risks and opportunities, (5) strategy and resource allocation, (6) performance, (7) outlook and (8) basis of presentation. As can be seen from these different elements, there is a large focus on non-financial reporting, future thinking and additional ways of value creation besides the value of a firm's assets.

In the preceding paragraphs, integrated reporting has been defined and insights into its development over time have been investigated. Further, the second main variable of this research is defined and explained, namely profitability. This is of importance as the consequences of integrated reporting implementation on firm profitability are studied in this research. Profitability is a term that can be interpreted in many different ways. In general and in academic research, the variance in the variables used to measure a firm's profitability is large. Scholars and researchers make use of both ratios and absolute numbers. For instance, in their research, Fama and French (2004) use the ratio of gross profit to sales in order to define profitability. In financial accounting terms, often the net revenue, net profit or earnings before interest and tax are used (EBIT) (Kieso, Weygandt & Warfield, 2017).

In the management accounting and control field, different variables are used to evaluate firm or business unit performance and to make important investment decisions, e.g. choices between projects. Apart from absolute numbers such as the revenue, or EBIT, certain financial ratios are used to obtain valuable insights into the relative performance of an investment against the assets it requires, e.g. the return on assets (ROA) and the return on sales (ROS). Besides accounting profitability, there is also market profitability. This is more relevant to investors and includes stock returns. In the short term, market profitability can deviate from accounting profitability as stock prices respond to news and events instantly to discount future cash flows. In the longer term, the market and accounting profitability are expected to converge.

In summary, this research follows the general definition of integrated reporting by the IIRC according to its framework, as there are no disagreements in prior research upon this matter. As such, integrated reporting is the practice of combining financial and non-financial reports into an integrated report, containing the communication from the firm about its financials as well as the ESG activities, which is published periodically. Additionally, the background of integrated reporting since its launch in 2013 has been provided. For profitability, both absolute numbers and key ratios are used in order to determine firm performance over a certain period. Additionally, both accounting and market profitability are taken into account. As the different variables can give insights from multiple perspectives, no specific measurement of profitability is deemed incorrect. Therefore, multiple ways of measuring firm profitability are explored in this research.

2.2 Determinants of integrated reporting adoption

The literature studied in the definitions section has provided information about integrated reporting in general, together with its background over time. As there is no prior research with empirical analysis into the relationship between the adoption of integrated reporting and firm profitability, it is also unclear what the determinants of implementing

integrated reporting are. Hence, in this study, both determinants and consequences of integrated reporting adoption are investigated. In this section, the determinants of integrated reporting adoption are hypothesized. Determinants of integrated reporting are factors that decisively affect the nature of integrated reporting adoption by firms. To find potential determinants and their type of influence, positive or negative, literature concerning integrated reporting is studied, with an emphasis on the reasons for integrated reporting adoption by firms. Also, the IIRC pilot program yearbook is analyzed to examine which companies participated in the program and the reasoning behind their participation (IIRC, 2012).

Firstly, one of the main potential determinants of integrated reporting adoption is firm size. As prior research into integrated reporting and the IIRC have stated multiple times, integrated reporting has the main mission of supplying investors with information about the different value-creating activities of firms (Adams, 2015; Cheng et al., 2014; De Villiers & Hsiao, 2017; Flower, 2015; IIRC, 2013). This relates to firms with large complex activities as they have more matters subject to communication towards investors and other stakeholders. As firms become larger, the number of activities and their complexity increase. Together with the activities, the influence on stakeholders increases, e.g. the society, but also the environment (ESG). Hence, there is more reason for larger firms to adopt integrated reporting as a reporting method. Moreover, it is also plausible that companies that are publicly traded have more investors than privately held firms and therefore a higher incentive to adopt integrated reporting. As investors require full transparency about firm activities, integrated reporting can cater to investors with their information needs concerning firms and their future (IIRC, 2021).

Secondly, Pistoni, Songini and Bavagnoli (2018) present empirical evidence in their paper which shows that firm performance is positively correlated with integrated reporting adoption. A potential explanation for this is that high-growth firms have an objective to attract new kinds of investors, for whom integrated reporting may aid in order to display a firm and its future outlook in detail. Additionally, as integrated reporting can attract new investors, it is plausible that high-performance firms are interested to invest in this reporting method, as an alternative to traditional standalone reporting, e.g. ESG and TSR. It can be a potentially rewarding opportunity for firms because integrated reporting is said to be the new standard over the long term (Adams, 2015), it helps display a better view of a company's value creation (IIRC, 2013) and it is more concise compared to traditional standalone reporting (Flower, 2015; IIRC, 2021), signaling cost benefits for reporting departments though integrated reporting adoption.

In its pilot program yearbook, the IIRC (2012) reports about the firms that participated in the early adoption of integrated reporting, including 100 organizations that reported their value-creating activities one year before the actual framework was launched in December 2013 (IIRC, 2013). The IIRC states that the pilot program was introduced to increase reporting quality for firms with traditional reporting methods, which do not cover all of the value-creating activities in detail. This suggests that prior reporting quality may influence the adoption of integrated reporting. Pistoni et al. (2018) agree and in their paper, they argue that reporting quality does indeed play a role in the decision of implementing integrated reporting. As firms that wanted to increase their reporting quality participated in the pilot program, it is plausible to state that the lower the prior reporting quality of a firm is, the more incentive it has to adopt the new and potentially very beneficial integrated reporting framework. For firms with high prior reporting quality in place, there is less need to make a transition towards integrated

reporting, as their standalone reporting methods, e.g. ESG and TSR, are already on a relatively high level.

In summary, the literature investigated on the determinants of integrated reporting adoption suggests multiple factors which can potentially influence the likelihood of implementing integrated reporting. Adams (2015), Cheng et al. (2014) and De Villiers and Hsiao (2017) argue that firm size and complexity of activities have a positive influence on integrated reporting adoption. It is also plausible to state that firms which are publicly traded are more likely to adopt integrated reporting, compared to privately held firms, as they tend to deal with a larger number of investors. In addition, Pistoni et al. (2018) argue that firm performance in terms of growth opportunities and profitability can increase the likelihood of integrated reporting adoption. They state that the transition from TSR to integrated reporting can attract new key investors because the new reporting method displays a better future outlook of firms. Lastly, the IIRC 2012 pilot program overview and Pistoni et al. (2018) show that prior reporting quality of firms can have a negative correlation with the adoption of integrated reporting, e.g. firms that have low prior reporting quality are more likely to adopt integrated reporting. The different investigated factors potentially influencing integrated reporting adoption lead to the following hypothesis for the determinant study in this research:

H1. Larger firms with high growth opportunities that are publicly traded and have low prior reporting quality are more likely to adopt integrated reporting.

2.3 Consequences of integrated reporting for profitability

The first part of the literature study has examined the potential determinants of integrated reporting adoption. The second part of this study lays the focus on the consequences of integrated reporting adoption for firm profitability. Hence, this section is dedicated to analyzing literature concerning integrated reporting, with an emphasis on the costs and benefits of integrated reporting adoption, which potentially impact firm profitability. As there is no prior empirical research on the relationship between integrated reporting adoption and firm profitability, the hypothesis related to this section is formed by analyzing different views of scholars and critics about integrated reporting, in order to examine whether the benefits of integrated reporting outweigh the costs. This allows the general impact of integrated reporting adoption to be hypothesized according to the analyzed literature, which is the theoretical foundation of the empirical analysis examining the consequences of integrated reporting adoption related to firm profitability.

Since the introduction of the integrated reporting framework and the integrated reporting practice, this relatively new reporting method has been viewed mainly in a positive manner, as scholars seem to agree that integrated reporting provides to some extent a solution to the problems and disadvantages of traditional standalone reporting (Adams, 2015; Cheng et al., 2014; De Villiers et al., 2014; Dumay et al., 2016; Jensen & Berg, 2011). Firstly, from the background paper about value creation published by the IIRC (2011), it becomes clear that it is the mission of the IIRC to enhance value creation through integrated reporting. According to Flower (2015), a critic of integrated reporting and its framework, there are multiple ways in which this value creation can be interpreted, e.g. value to society, investors, but also value to firms. The last type of value implies that the implementation of integrated reporting could be

beneficial to firms, as it enables more value creation for firms that shift from traditional reporting to integrated reporting. Even though there is a lack of empirical evidence that companies implementing integrated reporting have a change in profitability after its adoption, the pilot program launched by the IIRC in 2011 contained 100 companies that paid a fee to participate in this program (Adams, 2015). For the firms that have goals in terms of profit maximization or cost minimization, it would only be beneficial to participate in the program if the benefits outweigh the costs, indicating that integrated reporting is potentially more financially beneficial than traditional reporting.

Jensen and Berg (2011) also support this claim. In their paper, the researchers argue that integrated reporting is more concise and provides a solution to the excessive length of standalone TSR, ESG and financial reports. Integrated reporting combines all of the different accounting reports into one, using fewer resources than traditional reporting methods. Furthermore, Unilever, one of the many firms that have participated in the 2011 IIRC pilot program, stated in its annual report of 2012 that it faces challenges with climate change and extreme weather patterns. Unilever believes that by reporting about the concerns for the environment and citizens, the company will grow over the long term. Additionally, Unilever states that the embedding of the Unilever Sustainable Living plan into the integrated report has led to “growing evidence that it is also accelerating our growth” (Unilever, 2012).

Related to market profitability, Cheng et al. (2014) state that integrated reporting can have a positive influence on investor value, as it enables investors to assess future risks, sustainability and firm outlook more adequately. It also helps stakeholders including investors to identify key opportunities, which may have a positive impact on investor value. The main reason for this is because financial statements merely display short-term firm performance whereas an integrated report has sections dedicated to future opportunities and risks. Many firms report about their future in traditional reporting, however, firms complying with the integrated reporting framework are obliged to inform their stakeholders and investors about these matters in every report, thoroughly.

Furthermore, where Flower (2015) is critical about integrated reporting by firms in general, in his research he states that the main point of an integrated report is to explain the firm's value creation to providers of financial capital. This is in line with the mission of the IIRC (2013). “The framework refers to ‘value’ this should be interpreted ..., more precisely as ‘value to investors’, given that the primary purpose of the integrated report is to explain value creation to the providers of financial capital” (Flower, 2015). In this situation, Flower is not referring to value for firms, but value for the providers of financial capital, namely investors. This implies that, even though Flower is critical about integrated reporting having value to firms, his opinion is the opposite about investors. Flower states that investors are by nature interested in the financial returns on capital provided and the benefits which can be expected by investing in the firm. By increased and more detailed communication about the future outlook of a company, investors have more information, which allows them to estimate the future cash flows more accurately. This does not directly imply that the investors will estimate the future cash flows higher, but there is less information asymmetry and therefore integrated reporting may be considered of positive value for investors.

In summary, it is the main mission of the IIRC to enhance value creation through integrated reporting, both for firms and investors. For firm profitability, the views of Adams

(2015) and Jensen and Berg (2011) are relevant, as they agree on the matter that the transition from traditional reporting to integrated reporting may lead to lower reporting costs. This is because integrated reporting is more concise in nature. Furthermore, it stimulates the integration of reporting departments within firms while taking over traditional standalone reporting methods. Whereas market profitability is concerned, the statements of Cheng et al. (2014) and Flower (2015) are relevant, as they argue that integrated reporting adoption may lead to higher investor value. The main reason for this is that investors are provided with more information about the firm's key opportunities through integrated reporting. The integrated reporting framework has several parts dedicated to this (IIRC, 2013). Through better communication by the firm about its future outlook and market opportunities, there is less information asymmetry and risk. All in all, the literature studied is in accordance with the main mission of the IIRC, for accounting profitability as well as market profitability. The literature suggests that integrated reporting adoption has a positive correlation with the profitability of firms.

In contrary to the literature analyzed, it is questionable that firm profitability can increase by only changing the method of reporting. Integrated reporting adoption may lead to additional revenues, however, it can also lead to increased investments as a result of publishing the integrated reports, e.g. for CSR and ESG related purposes. The increased expenditure due to these investments may cancel out the additional revenues obtained after integrated reporting adoption. In this case, integrated reporting does not affect firm profitability. Even though integrated reporting adoption may affect both revenues and expenses separately, it is possible that the net effect on profitability is close to zero. Where the literature studied suggests a positive effect of integrated reporting adoption on firm profitability, this research argues that it should be taken into account that there is a possibility of no effect. Hence, the following second hypothesis for the consequences analysis of integrated reporting adoptions for profitability is formed:

H2. The implementation of integrated reporting has a positive or no effect on firm profitability.

3 Data

3.1 Obtaining data

This study analyzes both determinants and consequences of integrated reporting adoption related to firm profitability. For these two analyses, data from different vendors are gathered and merged. Apart from insights into integrated reporting adoption, data on company financials, accounting profitability, market profitability and audits are obtained. As the literature studied on the determinants of integrated reporting has shown, several firm characteristics can influence the likelihood of integrated reporting adoption (Adams, 2015; Cheng et al., 2014; De Villiers & Hsiao, 2017; Pistoni et al., 2018). Therefore, data from company financial statements are gathered. The literature studied on the consequences of integrated reporting for firm profitability has shown that integrated reporting can have a positive influence on both accounting profitability (Adams, 2015; Jensen & Berg, 2011) and market profitability (Cheng et al., 2014; Flower, 2015). For accounting profitability, the financial statements data is sufficient, as it contains income statements data. For market profitability, stock returns data is gathered. Lastly, Pistoni et al. (2018) and the IIRC argue that prior reporting quality plays a role in integrated reporting adoption. Therefore, audit data is gathered.

For integrated reporting data, the IIRC (2021) framework website is used. This contains all the firms in different regions that have adopted integrated reporting. In this research, the focus is laid on European firms, as there are only a few firms that have adopted integrated reporting in North America, with Europe being the most common region for integrated reporting adoption. As such, all firms except European firms are excluded from the dataset. Furthermore, the IIRC only provides the names of the firms that have adopted integrated reporting. To investigate in which year a firm adopted integrated reporting, the yearly reports have to be examined separately per firm. This is realized by screening the investor relations section for every company to find out in which year the first integrated report was published. As the integrated reporting framework was launched in December 2013, this is for many companies the first year of integrated reporting adoption. Most firms have adopted integrated in the years following the framework launch. To form an adequate event window containing all the years in which firms adopted integrated reporting, with additional recent years prior to the launch, all data is gathered for the years 2010-2020. Including 2020 financial statements, this contains 11 years of financial data.

The data on the financial statements of firms is obtained from Wharton Research Data Services (WRDS, 2021). This contains all of the main annual fundamentals for more than 47,000 firms and is provided by Compustat Global. The name of the dataset is “Compustat Global Annual Fundamentals”. From the Compustat Global dataset, the main company fundamentals, including firm characteristics in accordance with the determinants analysis, as well as the accounting profitability data are gathered. The data is obtained for the event window of 2010-2020. Since profitability can be displayed in multiple ways, e.g. Earnings Before Interest and Taxes (EBIT) or Return on Assets (ROA), not only one variable is gathered for accounting profitability. Variables such as *ROA* and *ROS* are not included, however, these are generated manually using return, sales revenue and total assets value.

Apart from company fundamentals and accounting profitability, market profitability

data is also gathered. This includes firms, together with their stock prices and daily returns, obtained from WRDS (2021) for the years 2010-2020. The name of this dataset is “Compustat Daily Securities”. The daily stock prices dataset can incorporate the market profitability of firms into the empirical analysis. This enables the impact of adopting integrated reporting to be investigated on both the accounting and market profitability of firms. The stock returns data is updated daily, however, for this analysis, only the observations at the end of the fiscal year are of importance, as the stock prices at the end of the year are matched with the company fundamentals. These are also brought out at the end of the year, e.g. 31 December. Furthermore, the dataset contains the daily opening and closing price as well as the daily highs and lows. For this research, the closing price is used to compute the yearly stock return.

Lastly, audit data is gathered to incorporate past reporting quality into the empirical analysis. As Pistoni et al. (2018) and the IIRC (2012) state, prior reporting quality can play an important role in integrated reporting adoption. The audit data is a separate datasheet, provided by Audit Analytics and also obtained from WRDS (2021). This data contains firms and restatements made to their accounting reports in the past, e.g. accounting errors or fraudulent cases found by the firm’s auditors. The Audit Analytics file is obtained for the event window of 2010-2020 and then merged with the fundamentals data and the stock returns data.

3.2 Sample selection

Table 1: Sample selection

	<i>(1) Number of firms</i>	<i>(2) Number of Observations</i>
Full sample of integrated reporting adopters	496	5456
Less: Observations with headquarters not in Europe	360	3960
European firms with integrated reporting adoption	136	1496
Less: Observations missing in Compustat dataset	33	899
Subsample of integrated reporting adopters in Europe and available in Compustat	103	597
Less: observations with missing data for propensity-score matching	16	176
Sample of integrated reporting adopters usable for propensity-score matching	87	421
Thereof: Publicly traded firms	68	327
Thereof: Privately held firms	19	94
<i>Non-integrated reporting adopters in Compustat dataset, cleaned for propensity-score matching</i>	<i>10,765</i>	<i>92,390</i>
Total firms available for propensity-score matching	10,852	92,811

Table 1 provides an overview of the sample selection procedure for the propensity-score matching. For these firms is investigated which firm characteristics influence integrated reporting adoption, through a logistic regression model. Column (1) shows the number of firms included and column (2) displays the corresponding observations over all years, e.g. 2010-2020. Table A2 in the Appendix provides a clear overview of all the integrated reporting adopters included in Compustat.

Table 1 outlines the detailed sample selection for the firms adopting integrated reporting and the additional firms in the Compustat dataset for propensity-score matching. Firstly, all the integrated reporting firms are listed and matched with the observations in the dataset. Non-European firms are excluded as this research focuses solely on European firms. Furthermore,

integrated reporting adopters that are not available in the Compustat dataset are removed. Moreover, firms with incomplete data are removed as well, e.g. firms with empty fundamentals data observations or publicly traded firms without stock return data. Also is shown the number of firms that are publicly traded and privately held. From the 87 integrated reporters available in Compustat, 68 firms were publicly traded, suggesting that integrated reporting adoption is relatively more popular among firms listed on the stock exchange. Finally, the non-integrated reporting adopters in the Compustat dataset are added, which together forms the final total of all firms available for propensity score matching.

Table 2 presents an overview of the distribution of European firms adopting integrated reporting over the years following the integrated reporting framework launch by the IIRC (2013). Firms that participated in the IIRC (2011) pilot program are treated as if they adopted integrated reporting in 2013. Furthermore, the total number of European firms in the Compustat Global dataset is displayed as a comparison and to calculate the integrated reporting adoption rate over the years for all firms available in Compustat.

Table 2: Number of integrated reporting adopters by year (European firms)

	2013	2014	2015	2016	2017	2018	2019	2020	2013-2020
Number of integrated reporting adopters	19	11	8	15	14	4	8	8	87
Number of firms with IR - cumulative	19	30	38	53	67	71	79	87	87
Total number of European firms in Compustat	8,867	8,864	8,816	8,674	8,460	8,190	7,772	6,669	66,312
Adoption rate in%	0.21%	0.34%	0.43%	0.61%	0.79%	0.87%	1.02%	1.30%	0.13%

Table 2 displays the number of European firms that adopted integrated reporting between the IRF framework launch in 2013 and 2020. The sample period is 2010-2020, containing 11 years of data. Also presented are the cumulative integrated reporting adopters and the total number of European firms in Compustat. Lastly, the adoption rate is displayed based on the European firms adopting IR vs. the non-adopting firms in Europe. Table A2 in the Appendix provides a clear overview of all the integrated reporting adopters included in Compustat.

The figures show that in the first few years after the IRF launch, more new firms adopted integrated reporting compared to the last few years. This suggests that integrated reporting adoption is becoming increasingly less popular among new firms. For instance, in 2016 and 2017, 15 and 14 firms adopted integrated reporting respectively, whereas in the last two years, only 8 firms implemented this reporting standard in 2019 and 2020. The adoption rate, however, has been increasing from 2013 onwards. It was initially at 0.21% and doubled in two years, after which it has been steadily increasing until 1.30% of all European firms available in Compustat by 2020.

Table 3 shows the descriptive statistics for all the obtained and generated variables, including firm characteristics, accounting and market profitability, integrated reporting and auditing data. These variables are used in the determinants analysis and/or the consequences analysis. For the determinants analysis, all the firm characteristics influencing integrated reporting are included. For the consequences analysis, profitability, integrated reporting and

control variables are included. All of these variables are employed in either the regressions on the probability of adopting integrated reporting or the effect of integrated reporting adoption on firm profitability. For variable names, descriptions and data sources, Table A1 in the Appendix provides a clear overview of all the employed variables and their computation. Furthermore, Table A2 in the Appendix shows for which firms the integrated reporting variables are applicable.

Table 3: Descriptive statistics

	(1) Mean	(2) Std. dev.	(3) Min	(4) Median	(5) Max
<u>Integrated reporting variables</u>					
<i>Integrated reporter</i>	0.010	0.098	0.000	0.000	1.000
<i>Integrated reporting</i>	0.005	0.067	0.000	0.000	1.000
<u>Firm-specific variables</u>					
<i>Cash return</i>	0.032	0.226	-2.000	0.049	1.985
<i>Market capitalization</i>	14.995	7.836	0.000	17.834	29.094
<i>Public</i>	0.799	0.400	0.000	1.000	1.000
<i>R&D</i>	0.001	0.071	0.000	0.000	8.108
<i>Sales growth</i>	0.001	0.067	-3.487	0.000	8.723
<i>Soft assets</i>	0.451	0.339	0.000	0.506	1.000
<i>Total assets</i>	5.510	2.893	-6.908	5.287	17.399
<u>Accounting profitability variables</u>					
<i>EBIT</i>	2.348	2.789	-6.908	1.743	14.529
<i>ROA</i>	-0.013	0.276	-1.997	0.008	9.377
<i>ROS</i>	0.076	0.612	-2.000	0.014	9.908
<u>Market profitability variables</u>					
<i>Stock return</i>	0.096	0.711	-0.999	0.000	10.000
<i>Tobin's Q</i>	0.698	1.269	0.000	0.211	9.994
<u>Audit variables</u>					
<i>Past restatement</i>	0.003	0.006	0.000	0.000	1.000
<i>Restatements</i>	0.000	0.041	0.000	0.000	3.000
<i>Number of observations</i>	92,811				

Table 3 presents descriptive statistics for all the obtained and computed variables for the determinants and/or consequences analysis. These variables include integrated reporting, firm characteristics, accounting profitability, market profitability and prior reporting quality. Table A1 in the Appendix describes all the variables, with the data source. Out of the 92,811 observations, 855 belong to firms that have adopted integrated reporting and 421 belong to the actual years in which integrated reports were published. The IR observations belong to the European firms included available in the Compustat dataset, for which Table A2 in the Appendix provides an overview. Columns (1) and (2) display the mean and standard deviation, respectively. Columns (3), (4) and (5) display the smallest observation, median and largest observation for every variable.

4 Methodology

4.1 Research design

This research examines both the determinants of integrated reporting adoption (H1) and the consequences of its implementation for the profitability of firms (H2). The methodology of this research follows to some extent the paper of Erkens, Gan and Yurtoglu (2018) in both the determinants and consequences analysis. Firstly, the determinants analysis is performed using a multivariate logistic regression model. This model allows to assess the probability of integrated reporting adoption by a firm and is therefore relevant for the first hypothesis of this research. The model is additionally used for propensity-score matching as performed by Erkens et al. (2018).

Propensity-score matching (PSM) is used to match firms based on their characteristics as derived from the literature. Firms that have adopted integrated reporting are matched with an equal amount of firms that have not adopted integrated reporting, to generate a sample for the consequences study, which is a Difference in Differences (DiD) analysis. The sample contains the matched pairs of firms that have similar firm characteristics, e.g. firm size and growth opportunities, all according to the first hypothesis. This sample is then used for the consequences analysis, for which the effect of integrated reporting adoption on firm profitability is studied. This part is relevant for the second hypothesis of this research and is performed by a series of multivariate regression models, to explore the impact of integrated reporting adoption on firm profitability variables.

Since the outcomes of the regression models can be influenced by omitted variable bias, i.e. through non-included variables that are correlated with integrated reporting adoption and have an effect on firm profitability, the approach of propensity-score matching to generate a sample for the DiD analysis is of great importance. As Erkens et al. (2018) point out, this methodology mitigates concerns that the outcome variables results are influenced by unobserved time-invariant variables or macroeconomic factors. Propensity-score matching enables to generate a sample where an equal amount of firms is matched with each other based on their characteristics, reducing the risk of selection bias and therefore better meeting the requirements of the econometric conditional mean independence assumption (Bago d'Uva, 2020) for multivariate regression models.

4.2 Propensity-score matching and H1

For the propensity-score matching model and the determinants of integrated reporting analysis, several firm characteristics that influence integrated reporting adoption are included in the multivariate logistic regression model. These factors are all based on the analyzed literature for the determinants of integrated reporting adoption and together form the first hypothesis of this research. Firstly, Adams (2015), Cheng et al. (2014) and De Villiers and Hsiao (2017) find that firm size and complexity of activities can influence integrated reporting implementation. Furthermore, whether a firm is publicly traded or privately held can influence the likelihood of integrated reporting adoption. Additionally, Pistoni et al. (2018) suggest that firm performance and growth opportunities play a role in integrated reporting adoption. Lastly,

the IIRC (2012) and Pistoni et al. (2018) also suggest that prior reporting quality can also impact the likelihood of integrated reporting adoption.

Drawing on the suggestions from the literature about the variables influencing integrated reporting adoption, a logistic multivariate regression model with integrated reporting adoption as the main dependent variable is constructed. The independent variables include proxies for the different hypothesized firm characteristics and correspond, to some extent, with the variables used by Erkens et al. (2018) in their propensity-score matching model, e.g. for prior reporting quality and complexity. As a result, the PSM model in this research includes proxies for the size of firms (*Total assets*, *Market capitalization*), the complexity of activities (*R&D*, *Soft assets*), publicly traded or privately held (*Public*), growth opportunities (*Tobin's Q*), firm performance (*EBIT*, *ROA*) and prior reporting quality (*Restatements*, *Past restatement*). Also included are variables from previous studies (Erkens et al., 2018; Jensen & Berg, 2011; Pistoni et al., 2018), which are *Cash return*, *ROS*, *Sales growth* and Industry fixed effects (*Industry*). This leads to the estimation of the following multivariate logistic regression model:

$$\begin{aligned} \text{Model 1: Pr}(\textit{Integrated reporting}) &= \beta_0 + \beta_1 * \textit{Total Assets} + \beta_2 * \textit{Market capitalization} + \beta_3 * \textit{R\&D} + \beta_4 \\ &* \textit{Soft assets} + \beta_5 * \textit{Public} + \beta_6 * \textit{Tobin's Q} + \beta_7 * \textit{EBIT} + \beta_8 * \textit{ROA} \\ &+ \beta_9 * \textit{Restatements} + \beta_{10} * \textit{Past restatement} + \beta_{11} * \textit{Cash return} \\ &+ \beta_{12} * \textit{ROS} + \beta_{13} * \textit{Sales growth} + \beta_k * \textit{Industry} + \varepsilon_i \end{aligned}$$

Table A1 in the Appendix provides an overview of all the employed variables and their descriptions. *Integrated reporting* is the dependent variable and is equal to zero when a firm has not adopted integrated reporting and one if the firm has adopted integrated reporting in a specific year. The value is also equal to one for the years following its implementation. Table A2 in the Appendix provides a clear overview of the European integrated reporting adopters included in the empirical analysis. The model used for the propensity-score matching is estimated separately for each pre-adoption year of integrated reporting. The reason for this is that the determinants precede integrated reporting adoption. Therefore, the year before implementation is investigated for each firm. Table 4 presents a total overview of the propensity-score matching to generate a sample for the DiD analysis, using Model 1. The estimates of the coefficients related to the firm characteristics are provided in the results and discussion section in order to present evidence for the first hypothesis, which covers the determinants analysis. Firstly, in Panel A the descriptive statistics of all firm characteristics included in the propensity-score matching model (Model 1) are presented. Column (1) is related to the full sample and columns (2) and (3) cover the IR adopters and non-IR adopters, respectively.

Panel B shows the results of the matched firm pairs by selecting firms that have adopted integrated reporting and matching those with firms that have not adopted integrated reporting. This is performed by selecting non-integrated reporting adopters based on similar firm characteristics. For the matching procedure, a maximum propensity-score caliper of 0.03 is used, corresponding with the analysis of Erkens et al. (2018). A propensity-score caliper is the difference between the propensity scores of the matched firms. A lower caliper suggests a better

Table 4: Propensity-score matching

Panel A: Descriptive statistics for propensity-score matching						
	<i>(1) Full sample</i>		<i>(2) IR adopters</i>		<i>(3) Non-IR reporters</i>	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
<i>Cash return</i>	0.032	0.227	0.111	0.083	0.037	0.244
<i>EBIT</i>	2.348	2.789	6.759	2.180	2.328	2.775
<i>Market capitalization</i>	14.995	7.836	23.064	1.585	18.741	2.477
<i>Past restatement</i>	0.003	0.058	0.036	0.186	0.003	0.057
<i>Public</i>	0.799	0.400	0.777	0.417	0.799	0.400
<i>R&D</i>	0.001	0.071	0.000	0.000	0.005	0.138
<i>Restatements</i>	0.001	0.041	0.007	0.109	0.001	0.041
<i>ROA</i>	-0.013	0.276	0.043	0.068	-0.013	0.277
<i>ROS</i>	0.076	0.612	0.093	0.196	0.076	0.613
<i>Sales growth</i>	0.001	0.067	0.000	0.000	0.002	0.073
<i>Soft assets</i>	0.451	0.339	0.593	0.220	0.598	0.255
<i>Tobin's Q</i>	0.698	1.269	1.017	1.148	1.180	1.469
<i>Total assets</i>	5.510	2.893	1.003	1.777	5.490	2.881
Number of observations	92,811		421		92,390	

Panel B: Differences in propensity scores for matched pairs						
	<i>(1) Pairs matched</i>	<i>(2) Mean</i>	<i>(3) Std. dev.</i>	<i>(4) Min.</i>	<i>(5) Median</i>	<i>(6) Max</i>
IR adopter vs. non-IR adopter	160	0.000	0.001	0.000	0.000	0.003

Panel C: Covariate balance between the matched pairs of IR adopters and non-IR adopters						
	<i>(1) Mean IR adopter</i>	<i>(2) Mean non-IR adopter</i>	<i>(3) Median IR adopter</i>	<i>(4) Median non-IR adopter</i>	<i>(5) Mean diff. IR and non-IR adopters</i>	<i>(6) t-test difference p-value</i>
<i>Cash return</i>	0.063	0.119	0.044	0.099	-0.056	0.782
<i>EBIT</i>	6.352	6.667	6.138	6.822	-0.315	0.306
<i>Market capitalization</i>	19.550	17.535	23.269	22.452	2.015	0.836
<i>Past restatement</i>	0.000	0.052	0.000	0.000	-0.052	0.957
<i>Public</i>	0.833	0.771	1.000	1.000	0.062	0.898
<i>R&D</i>	0.000	0.000	0.000	0.000	0.000	0.952
<i>Restatements</i>	0.000	0.013	0.000	0.000	-0.013	0.328
<i>ROA</i>	0.023	0.053	0.017	0.033	-0.030	0.472
<i>ROS</i>	0.049	0.058	0.036	0.051	-0.009	0.330
<i>Sales growth</i>	0.000	0.000	0.000	0.000	0.000	0.222
<i>Soft assets</i>	0.758	0.505	0.800	0.564	0.253	0.327
<i>Tobin's Q</i>	0.436	0.756	0.374	0.328	-0.320	0.787
<i>Total assets</i>	10.158	9.888	10.063	9.888	0.270	0.613

Table 4 is related to the propensity-score matching conducted through Model 1, in order to obtain a sample containing a treatment and control group for the DiD analysis. Panel A reports the descriptive statistics of all the firm characteristics hypothesized in H1. The descriptive statistics are presented for the full sample, integrated reporting adopters and the remaining firms in the dataset in columns (1), (2) and (3) respectively. For each column,

the mean and standard deviation of each covariate is reported. Variable names and descriptions are included in Table A2 of the Appendix. Panel B shows the statistics on the differences in propensity scores related to the matched pairs of integrated reporting adopters and non-adopters. Column (1) shows the number of pairs matched, which is the number of integrated reporting adopters and the non-adopters matched together. There is only one observation per integrated reporting adopter, which is the year preceding adoption. Columns (2), (3), (4), (5) and (6) present the mean, standard deviation, smallest observation, median and largest observation of the differences in propensity scores between the matched pairs, respectively. Panel C relates to the covariate balance between the matched pairs. For every firm characteristic, the means are reported in columns (1) and (2) for IR adopters vs non-adopters. Columns (3) and (4) show the medians for both groups. Column (5) is related to the mean difference, e.g. column (1) - column (2) and column (6) presents the results of the parametric *t*-test for each covariate. The *p*-values corresponding to the *t*-statistic are provided. Significance levels are denoted by * if $p < 0.10$, ** if $p < 0.05$ and *** if $p < 0.01$.

match based on the logistic regression model, which decreases the likelihood of poor matches and improves covariate balance. The results show that for the 160 matched pairs of firms, out of which 80 have adopted integrated reporting and 80 are non-adopters, the mean (median) difference in propensity score is 0.000 (0.000). The largest propensity-score difference is 0.003 which is lower than the maximum caliper assigned. Due to a large number of observations available for matching, the difference in propensity scores is small, suggesting strong matches between pairs. There are initially 87 integrated reporting adopters in the sample and 7 unmatched firms.

Furthermore, covariate balance test statistics for the matched firm pairs are presented in Panel C. Column (1) shows the mean of the treatment group, which are the integrated reporting adopters. Column (2) is related to the means of the control group, which are the non-integrated reporting adopters. Column (5) shows the mean difference between columns (1) and (2). A parametric *t*-test is conducted per covariate to test whether the differences between the matched pairs are insignificant ($p > 0.10$) for all 13 covariates. An insignificant difference implies that the paired firms have similar characteristics, which suggests that the propensity-score matching has been efficient in pairing firms together, as their characteristics are statistically equal to each other. This implies a potential reduction of selection bias. The results of Panel C show there are no significant differences for each covariate between the matched firm pairs, as column (6) reports no significant *p*-values for the parametric *t*-tests. All *p*-values are larger than 0.10, implying that economic differences in covariates are negligible. This suggests that it is not likely for differences in covariates between the treatment and control group to influence the average treatment effects estimated in the consequences analysis.

4.3 Multivariate regression and H2

After completion of the propensity-score matching, a sample of firms has been generated containing a treatment group and a control group. The sample is used for the consequences analysis in which the effect of integrated reporting adoption on firm profitability is investigated. This part of the methodology is related to testing the second hypothesis of this research. It is examined with a DiD design as performed by Erkens et al. (2018). For the consequences analysis, a multivariate regression model (Model 2) is estimated, with profitability as the main dependent and outcome variable. The different outcome variables investigated for profitability are *EBIT*, *ROA*, *ROS* and *Stock return*. Unlike the PSM model, these models are tested over all years in the sample, including pre-adoption and post-adoption

years of integrated reporting adopters. These variables take into account both absolute numbers and important ratios to investigate accounting profitability (Drury, 2012; Kieso et al., 2017). The share return covers the market profitability.

Model 2: *Outcome variable (profitability)*

$$= \beta_0 + \beta_1 * \text{Integrated reporter} + \beta_2 * \text{Integrated reporting} + \beta_3 * \text{Integrated reporter} * \text{Integrated reporting} + \sum \beta_i * \text{Control variables} + \sum \beta_j * \text{Industry} + \sum \beta_k * \text{Year} + \varepsilon_i$$

For independent variables, the regressor *Integrated reporter* is included. This variable holds value one if a firm has implemented integrated reporting and zero if it has never published an integrated report. Coefficient β_1 belongs to this variable and captures the effect on profitability for firms that implement integrated reporting. Additionally, the effect of the years after integrated reporting adoption is studied as well (*Integrated reporting*). This variable holds value one for every year that a firm has published integrated reports and zero if this is not the case. Coefficient β_2 belongs to this variable and captures the effect of the time trend for the control group of non-integrated reporting adopters. Furthermore, an interaction effect between *Integrated reporter* and *Integrated reporting* is included, contained by β_3 . This is the main DiD estimator and the coefficient of interest which captures the incremental effect of integrated reporting adoption, compared to before adoption and firms that are non-integrated reporters.

Lastly, a series of control variables are included based on the outcome variable, captured by $\sum \beta_i$. It is of importance, as Erkens et al. (2018) describe, that there is at least two years of pre- and post-adoption data available on these variables to ensure a reliable analysis. Additionally, industry fixed effects are included in all models, contained by $\sum \beta_j$. These are based on Fama-French industry classification codes and are matched with and generated from the SIC codes provided by Compustat. To account for macroeconomic changes and influences, year fixed effects are also included, through $\sum \beta_k$. Every model is regressed with robust standard errors in order to obtain unbiased standard errors for OLS coefficients, dealing with potential heteroskedasticity (Bago d’Uva, 2020). Table A1 in the Appendix provides a clear overview of all the variables employed in the models, together with their descriptions, computations and data sources. Table A2 in the Appendix shows the firms for which the integrated reporting variables hold value one.

As an additional analysis, Model 2 is estimated not only for the propensity-score matched sample but also for the whole European sample of firms. This sample is initially used in order to provide firms to match together with the integrated reporting adopters. The additional analysis examines the whole sample of 92,811 observations, presented in Table 1. This analysis investigates the results in a situation where propensity-score matching is not applied, implying that these results can deviate from the results obtained from the propensity-score matched sample. There are two ways in which this additional analysis contributes to the preceding results. Firstly, it provides insight into the effect of integrated reporting adoption on firm profitability for the whole sample, which does not only include the propensity-score matched firms. Secondly, the additional analysis shows results when selection bias is not reduced, e.g., there can be influence from time-invariant variables or macroeconomic factors on the results which is not accounted for (Erkens et al., 2018). Therefore, this analysis also illustrates the importance of propensity-score matching.

5 Results and Discussion

5.1 Determinants analysis

The first hypothesis of this research (H1) investigates whether firm size paired with complexity of activities, growth opportunities, publicly traded shares and prior reporting quality influence the likelihood of firms adopting integrated reporting. This is also the determinants analysis of this research. To investigate the first hypothesis, Model 1 is used and estimated for the firms in their pre-adoption year of integrated reporting. This is a logistic model with IR adoption as the main dependent variable and firm characteristics derived from the literature and prior studies as the independent variables, which include proxies for the factors included in the first hypothesis. Table 5 presents the multivariate logistic regression results estimated through the model, which are used to investigate the first hypothesis and the propensity-score matching.

Table 5: Multivariate logistic regression results for H1 and propensity-score matching

	(1) <i>Predicted sign</i>	(2) <i>Average coefficient</i>	(3) <i>Aggregate z-statistic</i>	(4) <i>Average marginal probability</i>	(5) <i>Years with pos. coef.</i>	(6) <i>Years with neg. coef.</i>
<i>Cash return</i>	+	0.950	0.339	0.616	5	3
<i>EBIT</i>	+	0.319	1.212	0.575	6	2
<i>Market capitalization</i>	+	0.495**	2.378	0.618	8	0
<i>Past restatement</i>	+	-0.216**	2.025	0.624	7	1
<i>Public</i>	+	-10.159**	-2.177	0.136	1	7
<i>R&D</i>	+	-134.838	-0.848	0.000	0	8
<i>Restatements</i>	+	3.596	0.000	0.562	8	0
<i>ROA</i>	+	-0.154	0.187	0.463	3	5
<i>ROS</i>	+	-1.346	-1.678	0.283	3	5
<i>Sales growth</i>	+	-13.347	-0.491	0.013	0	8
<i>Soft assets</i>	+	2.423**	2.742	0.824	7	1
<i>Tobin's Q</i>	+	-0.209	0.760	0.464	4	4
<i>Total assets</i>	+	0.536***	2.505	0.626	8	0
Constant		-23.943				
Industry fixed effects		Yes				
Observations (over all years)		92,811				
Pseudo/Adjusted R ²		18.90%				

Table 5 presents the logistic regression results using Model 1. The model is estimated for every year between 2013-2019, pre-adoption of integrated reporting for each firm. Column (1) shows the predicted sign of the variable according to the analyzed literature in Chapter 2. Column (2) reports the average coefficient estimated by the model for each year. Column (3) reports the aggregated z-statistic, this is calculated by adding all the individual z-scores and then dividing this number by the square root of the number of years for which the PSM model is estimated, e.g. 8 years between 2013-2020. This method assumes independence between individual estimates (Erkens et al., 2018). Column (4) displays the average marginal probability corresponding to the coefficients. Lastly, columns (5) and (6) report the number of years for which a coefficient is estimated positive or negative, respectively. Apart from covariates derived from the literature and other papers, industry fixed effects are included in the model estimated for each year. The number of observations over all years is also presented, together with the adjusted pseudo R-squared, which is the average McFadden's [2000] pseudo R-squared. Significance levels are denoted by * if $p < 0.10$, ** if $p < 0.05$ and *** if $p < 0.01$.

The first column of Table 5 shows the hypothesized effect of the variables included in the model, according to the literature analyzed. Column (2) presents the average coefficient over all the years between 2013-2020. Columns (3) and (4) provide the aggregated z-statistic (divided by the square root of the number of years for which the model is estimated, assuming independence) and the corresponding average marginal probability, corresponding with the PSM model of Erkens et al. (2018). Furthermore, the number of years for which the coefficients estimated are positive and negative are shown in columns (5) and (6) respectively.

The results suggest that firm size, prior reporting quality, whether a firm is traded publicly or privately held and complexity of activities are associated with integrated reporting adoption. The coefficients for these variables are at least significant at the 5% level ($p < 0.05$). Furthermore, the model adequately fits the data as its adjusted pseudo R-squared is 18.90%. The hypothesis suggests that market capitalization, past restatements (as restatements suggest low prior reporting quality), stock exchange listing, sales growth, soft assets and total assets have a positive influence on the likelihood of integrated reporting adoption.

The results, however, show to some extent correspondence as well as deviations from the hypothesis. Firstly, indeed firm size (*Market capitalization*, *Total assets*) is positively associated with integrated reporting adoption, corresponding with the hypothesis. The coefficients are positive and significant ($p < 0.05$ for *Market capitalization*, $p < 0.01$ for *Total assets*). Additionally, the complexity of activities (*Soft assets*) is positively associated with integrated reporting adoption as hypothesized, since the coefficient is positive and significant ($p < 0.05$).

The deviations from the hypothesis include that growth opportunities (*Sales growth*, *Tobin's Q*) are hypothesized to have a positive influence on integrated reporting adoption, however, both variables have no significant effect at all, indicating that they do not positively associate with integrated reporting adoption as derived from the literature. Also, whether a firm was publicly traded is hypothesized to have a positive association with integrated reporting adoption, however, the results show a significant ($p < 0.05$) negative effect for 7 out of 8 years in which the coefficient for this variable is estimated. This implies that integrated reporting adoption is relatively more popular among privately held firms. Furthermore, lower prior reporting quality (*Past restatement*) is hypothesized to have a positive association with integrated reporting adoption, however, the coefficient is negative and significant ($p < 0.05$). Lastly, complexity (*R&D*) and prior reporting quality (*Restatements*) are hypothesized to have a positive association with integrated reporting adoption, however, both coefficients are insignificant. The results do not suggest any form of association between these variables and the likelihood of integrated reporting implementation.

To summarize, the first hypothesis of this research related to the determinants study states that firm size, the complexity of activities, growth opportunities, stock exchange listing and low prior reporting quality are positively associated with integrated reporting adoption. For these firm characteristics, the results from the logistic regression model (Model 1) in Table 5 suggest that only firm size and complexity of activities are positively associated with integrated reporting adoption. This is in accordance with the literature studied on determinants of integrated reporting adoption (Adams, 2015; Cheng et al., 2014; De Villiers & Hsiao, 2017). Prior reporting quality, firm growth opportunities and whether a firm is publicly traded do not associate with integrated reporting adoption as derived from the literature (Pistoni et al., 2018;

IIRC, 2012). Therefore, the results are partially consistent and partially inconsistent with the predictions of firm characteristics determining integrated reporting adoption (H1).

5.2 Consequences analysis

The second hypothesis of this research is related to investigating the effect of integrated reporting adoption on firm profitability (H2). It is hypothesized that integrated reporting adoption is positively associated with profitability or that integrated reporting has no effect on profitability at all. Firstly, all of the profitability variables are examined with univariate tests, which investigate for integrated reporting adopters whether the profitability has changed after adopting integrated reporting, compared to the years preceding adoption. Table 6 presents the univariate test results. The profitability variables analyzed are *EBIT*, *ROA*, *ROS* and *Stock return*.

Table 6: Univariate tests for H2

		<i>EBIT</i>		
		Before adoption	After adoption	$\Delta (2 - 1)$
	N	475	421	896
<i>Integrated reporting</i>	896	6.927	6.759	-0.168
<i>t</i> -statistic				-1.177
		<i>ROA</i>		
		Before adoption	After adoption	$\Delta (2 - 1)$
	N	475	421	896
<i>Integrated reporting</i>	896	0.047	0.043	-0.004
<i>t</i> -statistic				-0.510
		<i>ROS</i>		
		Before adoption	After adoption	$\Delta (2 - 1)$
	N	475	421	896
<i>Integrated reporting</i>	896	0.095	0.093	-0.002
<i>t</i> -statistic				-0.131
		<i>Stock return</i>		
		Before adoption	After adoption	$\Delta (2 - 1)$
	N	358	327	685
<i>Integrated reporting</i>	685	0.043	0.086	0.043
<i>t</i> -statistic				1.066

Table 6 presents the univariate test results for differences in means of the profitability variables, between before and after integrated reporting adoption by the firms listed in Table A2 of the Appendix. The test statistics are two-tailed. The first column shows the number of observations for years in which integrated reports are published. The second and third columns display the means of the analyzed profitability variable for before and after integrated reporting adoption. The last column shows the mean difference between the previous columns and the corresponding *t*-statistic. Significance levels are denoted by * if $p < 0.10$, ** if $p < 0.05$ and *** if $p < 0.01$. Observations for *Stock return* are lower compared to other variables, as privately held firms are not included.

The test results in Table 6 suggest that firms that did not adopt integrated reporting initially, but later in time, do not experience a significant increase in profitability. For all of the accounting profitability variables (*EBIT*, *ROA*, *ROS*) the difference in means is small and

negative. Furthermore, the differences in means are insignificant at all significance levels ($p > 0.10$). These findings suggest that implementing integrated reporting by firms that did not report according to this reporting standard initially, has not significantly increased accounting profitability for these firms. For market profitability, there is also no evidence suggesting that the profitability has increased after implementing integrated reporting. The difference is positive but not significant ($p > 0.10$) for variable *Stock return*. The findings of the univariate tests are therefore partially inconsistent with the hypothesis, which states that integrated reporting adoption positively impacts firm profitability, or that there is no effect.

Next, the multivariate results for the second hypothesis (H2) are presented in Table 7. The regression results are obtained through Model 2, which is a multivariate regression model with different firm profitability variables (*EBIT*, *ROA*, *ROS*, *Stock return*) as the outcome variable and integrated reporting adoption as the main regressor. Integrated reporting adoption is included in three ways. Firstly, coefficient β_1 is related to *Integrated reporter*, which covers firms that have adopted integrated reporting. Secondly, coefficient β_2 is related to *Integrated reporting* and covers the time trend for the control group of non-integrated reporting adopters. Thirdly, coefficient β_3 is related to *Integrated reporter * Integrated reporting*, which is the main DiD estimator and the coefficient of interest which captures the incremental effect of integrated reporting adoption, compared to before adoption and firms that are non-integrated reporters.

The regression model used to obtain the results in Table 7 is executed for the sample that has been obtained after propensity-score matching. Columns (1), (2), (3) and (4) show the different models estimated for the variables *EBIT*, *ROA*, *ROS* and *Stock return*, respectively. The first three columns are related to accounting profitability and the last column is related to market profitability. The results from the multivariate regression model suggest that integrated reporting does not influence the accounting profitability of firms. For all three models concerning accounting profitability, no coefficient β_1 , β_2 or β_3 is significant, e.g. $p > 0.10$ for every estimated coefficient. The explanatory power of the models, however, is high for both the first and second model and adequate for the third model, with adjusted R-squared values of 36.99%, 58.38% and 20.48% respectively. Included control variables, e.g. *Cash return* and *Sales growth* are highly significant in every model for accounting profitability, with p-values lower than 0.01 in at least two of three models.

Related to market profitability, the results of the model estimated in column (4) of Table 7 present that all three included integrated reporting variables, namely, *Integrated reporter*, *Integrated reporting* and the interaction effect between the two variables, do not influence the market profitability of firms. Compared to the accounting profitability models, the coefficients of *Integrated reporter* and the interaction effect are positive. However, for the market profitability model, no coefficient β_1 , β_2 or β_3 is significant, e.g. $p > 0.10$ for every estimated coefficient. The explanatory power of the model is low, as the adjusted R-squared equals 1.81%. This is plausible as intuitively, many factors influence firm stock returns which are not included in the models presented in Table 7. The included control variables show a highly significant effect for *R&D* ($p < 0.01$) and significant effects for *Tobin's Q* and *Total assets* ($p < 0.05$ and $p < 0.10$, respectively).

Table 7: Multivariate regression results for H2

	<i>EBIT</i>	<i>ROA</i>	<i>ROS</i>	<i>Stock return</i>
<i>Integrated reporter</i>	0.148 (0.170)	0.000 (0.007)	0.007 (0.030)	0.090 (0.056)
<i>Integrated reporting</i>	0.114 (0.122)	0.002 (0.007)	0.009 (0.016)	-0.142 (0.116)
<i>Integrated reporter · Integrated reporting</i>	-0.149 (0.184)	-0.032 (0.008)	-0.022 (0.023)	0.107 (0.125)
<i>Cash return</i>	6.087*** (1.423)	0.633*** (0.116)	0.499*** (0.108)	0.139 (0.258)
<i>Market capitalization</i>	0.382 (0.062)	0.008* (0.004)	0.027** (0.012)	0.028 (0.037)
<i>Past restatement</i>	-0.150*** (0.472)	0.005 (0.006)	-0.046 (0.041)	0.078 (0.112)
<i>Public</i>	-8.303*** (1.381)	-0.172* (0.093)	-0.576** (0.231)	-
<i>R&D</i>	6.061 (4.076)	-1.499 (0.964)	-4.811 (2.989)	-10.856*** (4.106)
<i>Restatements</i>	0.226 (0.183)	0.006 (0.006)	0.080 (0.057)	-0.152 (0.118)
<i>Sales growth</i>	0.247** (0.112)	0.481*** (0.104)	0.771*** (0.154)	0.063 (0.043)
<i>Soft assets</i>	0.116 (0.645)	0.020 (0.025)	-0.122* (0.071)	0.049 (0.108)
<i>Tobin's Q</i>	-0.063 (0.087)	0.001 (0.005)	-0.007 (0.010)	0.057** (0.027)
<i>Total assets</i>	0.673*** (0.067)	-0.004 (0.003)	-0.014 (0.013)	-0.065* (0.034)
Constant	-0.099 (0.909)	0.003 (0.032)	0.214 (0.122)	0.000 (0.000)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	1,558	1,558	1,558	1,144
Pseudo/Adjusted R ²	36.99%	58.38%	20.48%	1.81%

Table 7 presents the multivariate regression results investigating whether integrated reporting adoption influences different accounting profitability variables and market profitability. For accounting profitability, the models in columns (1), (2) and (3) are estimated, with *EBIT*, *ROA* and *ROS* as the dependent variables. For market profitability, the model in column (4) is estimated with *Stock return* as the dependent variable. The main regressor is integrated reporting, for which three variables are included. *Integrated reporter* is one if a firm has adopted integrated reporting and zero otherwise. *Integrated reporting* is one for every year in which a firm publishes an integrated report. Furthermore, the interaction effect between the two integrated reporting variables is contained by *Integrated reporter · Integrated reporting*. For control variables, the same variables are used which are employed in the determinants analysis. Furthermore, year and industry fixed effects are included. Next, the total number of observations is shown. These belong to the 160 firms that are matched together based on the propensity-score matching. Lastly, the pseudo/adjusted R-squared is reported. Significance levels are denoted by * if $p < 0.10$, ** if $p < 0.05$ and *** if $p < 0.01$. Observations for *Stock return* are lower compared to other variables, as privately held firms are not included.

Model 2, which is estimated for both accounting and market profitability to obtain the results of Table 7, has not provided evidence that supports the hypothesis stating that integrated reporting adoption increases firm profitability. It does, however, provide evidence that supports the expectation of no effect after integrated reporting adoption. This model is estimated for the propensity-score matched sample containing 160 firms, of which 80 are integrated reporting adopters. The results from Table 7 suggest that there is no significant increase in firm profitability after integrated reporting adoption. As an additional analysis, Model 2 is estimated for the whole sample of firms as well. The detailed sample selection is presented in Table 1. The regression is performed over the whole sample, including all 92,811 observations over all years. This additional analysis provides insights into the results if there is no propensity-score matching, implying that the estimated results are likely to be biased. In this case, time-invariant or macroeconomic effects can influence the results, for which is not accounted in the model.

Table 8 shows the results of the additional analysis. In relation to Table 7, the models estimated are the same, except the sample is different. This can be seen from the number of observations included in the analysis. Firstly, for accounting profitability, there are significant coefficients estimated for *ROA* and *ROS*. For the model with *ROA* as the dependent variable, coefficient β_1 contains a negative effect which is significant at the 5% level ($p < 0.05$). The magnitude of the coefficient is relatively small compared to the *ROS* model, for which all three coefficients β_1 , β_2 and β_3 are significant at the 10%, 1% and 5% level, respectively. *Integrated reporter* and *Integrated reporting* contain a negative effect when viewed independently, however, the interaction effect which measures the incremental effect of integrated reporting adoption, compared to before adoption and firms that are non-integrated reporters, is positive. The net effect of integrated reporting adoption on profitability is estimated to be slightly negative, as the *ROA* model contains a negative coefficient for β_1 (-0.01) and the *ROS* model estimates that integrated reporting adopters have a 3.5 percentage points lower return on sales compared to non-adopters.

For market profitability, the model estimated in Table 8 contains no significant coefficients for β_1 , β_2 and β_3 , suggesting similarity to the accounting profitability models, which also did not provide evidence supporting the hypothesis which states that integrated reporting adoption increases both market and accounting profitability of firms. The coefficients are negative, however, they are insignificant at the 10% level ($p > 0.10$) for all estimated integrated reporting variables. Significant control variables in all models include *Cash return*, *Market capitalization*, *Public*, *Tobin's Q* and *Total assets*, with highly significant coefficients in at least three of the four models ($p < 0.001$). All in all, even though the results estimated using Model 2 vary between Table 7 and Table 8, the results do not provide evidence for an effect of IR adoption on firm profitability. In Table 7, which relates to the propensity-score matched sample, there is no significant coefficient for the integrated reporting variables. In Table 8, which is related to the whole sample, there are significant coefficients for the integrated reporting variables, however, they are negative and hence not in support of the hypothesis.

Lastly, the explanatory power of the models estimated in Table 8 is high for *EBIT*, with an adjusted R-squared of 50.27%. For *ROA* this value is adequate, at 21.02%. For *ROS* and the *Stock return*, the models estimated explain less of the variation in the data, with adjusted R-squared values of 6.07% and 1.08%, respectively.

Table 8: Multivariate regression without PSM

	<i>EBIT</i>	<i>ROA</i>	<i>ROS</i>	<i>Stock return</i>
<i>Integrated reporter</i>	0.044 (0.147)	-0.010** (0.004)	-0.038* (0.021)	-0.036 (0.029)
<i>Integrated reporting</i>	0.047 (0.340)	-0.010 (0.007)	-0.063*** (0.022)	-0.060 (0.049)
<i>Integrated reporter · Integrated reporting</i>	-0.050 (0.380)	0.010 (0.007)	0.066** (0.028)	-0.021 (0.062)
<i>Cash return</i>	1.387*** (0.047)	0.818*** (0.010)	0.522*** (0.020)	0.254*** (0.021)
<i>Market capitalization</i>	0.203*** (0.007)	0.003*** (0.001)	0.018*** (0.002)	0.077*** (0.004)
<i>Past restatement</i>	0.340 (0.293)	-0.014* (0.008)	-0.033 (0.033)	0.069 (0.055)
<i>Public</i>	-3.930*** (0.125)	-0.053*** (0.015)	-0.033*** (0.031)	-
<i>R&D</i>	-0.035 (0.028)	-0.011 (0.007)	0.051*** (0.012)	-0.010 (0.035)
<i>Restatements</i>	-0.037 (0.089)	-0.004 (0.026)	0.047 (0.059)	-0.049 (0.050)
<i>Sales growth</i>	-0.132 (0.114)	0.025 (0.019)	0.053 (0.041)	-0.023 (0.019)
<i>Soft assets</i>	-0.208*** (0.044)	0.009* (0.005)	-0.014 (0.011)	-0.002 (0.015)
<i>Tobin's Q</i>	0.040*** (0.006)	-0.003*** (0.001)	0.001 (0.002)	0.030*** (0.004)
<i>Total assets</i>	0.523*** (0.009)	0.000 (0.001)	-0.004*** (0.001)	-0.072*** (0.004)
Constant	-0.975 (0.146)	-0.001 (0.008)	-0.022 (0.026)	-1.107 (0.055)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	92,811	92,811	92,811	74,055
Pseudo/Adjusted R ²	50.27%	21.02%	6.07%	1.08%

Table 8 presents the multivariate regression results investigating whether integrated reporting adoption influences different accounting profitability variables and market profitability. For accounting profitability, the models in columns (1), (2) and (3) are estimated, with *EBIT*, *ROA* and *ROS* as the dependent variables. For market profitability, the model in column (4) is estimated with *Stock return* as the dependent variable. The main regressor is integrated reporting, for which three variables are included. *Integrated reporter* is one if a firm has adopted integrated reporting and zero otherwise. *Integrated reporting* is one for every year in which a firm publishes an integrated report. Furthermore, the interaction effect between the two integrated reporting variables is contained by *Integrated reporter · Integrated reporting*. For control variables, the same variables are used which are employed in the determinants analysis. Furthermore, year and industry fixed effects are included. Next, the total number of observations is shown. These belong to the Compustat dataset, of which the sample selection is presented in Table 1. Lastly, the pseudo/adjusted R-squared is reported. Significance levels are denoted by * if $p < 0.10$, ** if $p < 0.05$ and *** if $p < 0.01$. Observations for *Stock return* are lower compared to other variables, as privately held firms are not included.

5.3 Discussion

To summarize the findings of this research, the determinants analysis has shown partial support for the first hypothesis. The effects estimated by Model 1 for firm size and complexity of activities are all as expected before conducting the analysis. The model therefore provides evidence that larger firms with more complex activities have an increased likelihood of integrated reporting adoption compared to other firms. However, for stock exchange listing, prior reporting quality and growth opportunities, the hypothesis is not supported as the related coefficients are not found to be significant, or their sign is not according to the expectations (H1). Therefore, the first hypothesis of this research is rejected. Firms that have publicly traded shares do not seem to have an increased likelihood of implementing integrated reporting compared to privately held firms. Also, firms that have more growth opportunities do not seem to have an increased probability of integrated reporting adoption, compared to firms with less growth. Lastly, according to the results, prior reporting quality also does not influence the adoption of integrated reporting, as restatements do not have an association with the likelihood of integrated reporting adoption. The findings of this research are therefore in accordance with the literature of Adams (2015), Cheng et al. (2014) and De Villiers and Hsiao (2017), but not in accordance with the literature of Pistoni et al. (2018) and the IIRC (2012).

Intuitively, it is plausible to state that publicly traded companies might not always prefer reporting integrated, as many investors, e.g. retail investors, in some cases care more about the financial performance of a firm, instead of the total firm outlook and all of the other value creation activities mentioned in an integrated report. Therefore, keeping standalone reporting or leaving the reporting method unchanged may be a better option for these firms. For growth opportunities, a potential explanation for the lack of influence on integrated reporting adoption is that integrated reports are mainly read by the stakeholders of a firm. Growth implies reaching new industries, fields, investors and consumers. This is not impacted by the method of reporting. Even though integrated reporting might show stakeholders a better outlook of a firm currently and for its future, it does not mean that the firm will also grow only by using this reporting method. More factors are relevant such as the firm's products, diversification and its mission. Additionally, a potential reason for prior reporting quality not influencing integrated reporting adoption is that past restatements do not incorporate prior reporting quality as a whole. Restatements solely look at errors in accounting reports whereas prior reporting quality also depends on factors such as the internal auditing and integration of different business departments.

Furthermore, the findings of this research for the second hypothesis are summarized, which is related to the consequences study and states that integrated reporting adoption positively influences the accounting and market profitability of firms, or that there is no effect at all. The univariate analysis, which compares the before and after adoption profitability for integrated reporters, shows no evidence suggesting that integrated reporting adoption by firms leads to higher accounting or market profitability. Firms that did not adopt integrated reporting initially, but at a later point in time, do not experience higher *EBIT*, *ROA*, *ROS* and *Stock return* after integrated reporting adoption. The mean difference between after and before integrated reporting adoption is not significant at any significance level. As such, the univariate analysis results are only consistent with the predictions of no effect of IR adoption on profitability (H2).

The multivariate regressions investigate whether the integrated reporting variables are significant and positive for the sample obtained after propensity-score matching (Table 7) and

the whole dataset containing European firms (Table 8). The regression results do not provide any statistical evidence which suggests that integrated reporting positively impacts both accounting and market profitability. For the propensity-score matched sample, there is no significant difference in profitability between the treatment and control groups. For the additional analysis on the whole sample, including potential bias, there are significant coefficients for integrated reporting in the *ROA* and *ROS* models. These coefficients, however, are not in line with the hypothesis, as they have a negative sign. As such, the multivariate regression results do not provide evidence supporting the positive effect from the second hypothesis, implying that the findings are partially inconsistent with the predictions (H2).

From the analyzed literature is derived that integrated reporting adoption positively impacts both accounting profitability (Adams, 2015; Jensen & Berg, 2011) and market profitability (Cheng et al., 2014; Flower, 2015). The results from the univariate tests and multivariate regressions do not hold for both types of profitability, as there is no significant statistical evidence that suggests that integrated reporting positively impacts firm profitability. Therefore, the findings of this research are not in accordance with the prior studies of Adams (2015), Jensen and Berg (2011), Cheng et al. (2014) and Flower (2015).

Intuitively, a possible explanation for the findings obtained in this research is that the reporting method itself has no direct influence on the financial performance of a firm. The effect of integrated reporting adoption on firm financial performance is plausible when there are actions taken following the publishing of the integrated report. The literature analyzed suggests increased value creation for firms and investors (Flower, 2015; IIRC, 2013), however, these are not directly visible from the financial statements in the first few years after integrated reporting adoption. Indeed, there may be factors influenced by integrated reporting such as ESG, sustainability and firm reputation, but it takes several years for these factors to be translated into financial figures. It can be, for instance, that the growth of a firm over a longer period is driven by its initial integrated reporting adoption, as it enabled more investors and other stakeholders to have more information about a firm, decreasing the information asymmetry.

Even though the analysis shows that there is no significant positive effect of integrated reporting adoption on firm profitability, this does not imply that integrated reporting adoption does not affect firm revenues and expenditure. It is most likely that the additional revenues generated after integrated reporting adoption are canceled out by increased expenditure, due to investments made by the firm after publishing the integrated report, e.g. for ESG or CSR purposes. As a result, the net effect on firm performance is close to zero, which is the main result of the empirical analysis conducted in this research.

Compared to firm profitability, the investor base of a firm is a potential area where integrated reporting may have increased influence. After implementing the new integrated reporting method and its framework, firms are able to reach out to new investors, implying that the total number of investors is likely to increase after integrated reporting adoption. Another area where integrated reporting adoption may affect is transparency. As argued in Section 2, integrated reporting informs investors about all the value creation of firms, which is not only fulfilled by providing the financial statements. The new reporting method caters to investor needs with more and new information, potentially decreasing the information asymmetry between firms and investors. Therefore, transparency is another area where integrated reporting adoption can have a significant influence.

6 Conclusion

To conclude, this research investigates the determinants and consequences of integrated reporting adoption for European firms. For the theoretical foundation of this analysis, literature concerning potential firm characteristics influencing the likelihood of integrated reporting adoption is studied, in order to form a hypothesis for the determinants study. The first hypothesis of this research states that larger firms with more growth opportunities, stock exchange listing and lower prior reporting quality, are more likely to adopt integrated reporting compared to other firms. The second hypothesis states that integrated reporting adoption either positively impacts or has no effect on both accounting and market profitability. Preceding this hypothesis, literature concerning the potential consequences of integrated reporting adoption for firm performance is studied.

The determinants of integrated reporting adoption are analyzed through a multivariate logistic regression model, estimating the effect of firm characteristics derived from the literature on the likelihood of integrated reporting adoption. This analysis not only investigates which firm characteristics influence integrated reporting adoption but is also used as a propensity-score matching model to obtain a sample of firms with similar covariates for the consequences analysis. Next, the consequences analysis is performed first over the sample of 80 integrated reporting adopters matched together with 80 non-integrated reporting adopters, with multiple yearly observations per firm. The analysis itself is conducted through a multivariate regression model with profitability variables as the dependent variables, integrated reporting as the main regressor and control variables derived from the literature.

Related to the determinants analysis, the findings of this research reveal that indeed, the size of firms and complexity of activities positively influence the likelihood of integrated reporting adoption. The results also reveal that prior reporting quality, growth opportunities and stock exchange listing do not influence integrated reporting adoption. Hence, there is partial support for the first hypothesis. Related to the consequences analysis, the findings of this research do not reveal any evidence suggesting that integrated reporting adoption influences firm profitability. For the sample obtained after propensity-score matching, the coefficients for integrated reporting adoption are insignificant, but when the whole sample is analyzed, the coefficients are significant and negative for the return on sales (*ROS*) model. Therefore, the results of this research only partially support the second hypothesis (H2) in terms of no effect of integrated reporting adoption on firm profitability.

The findings of this research contribute to the literature on integrated reporting. The determinants analysis is in accordance with the arguments of Adams (2015), Cheng et al. (2014) and De Villiers and Hsiao (2017), however, the analysis also shows that the statements of Pistoni et al. (2018) and the IIRC (2012) concerning determinants influencing integrated reporting adoption do not hold when analyzed empirically. Furthermore, the consequences analysis is not in accordance with the prior literature of Adams (2015) and Jensen and Berg (2011) who suggest that accounting profitability is positively impacted after integrated reporting adoption. For market profitability, the empirical findings of this research are not in line with the statements of Cheng et al. (2014) and Flower (2015), who suggest that integrated reporting adoption increases the market profitability of firms. As the prior literature studied on the consequences of integrated reporting adoption contains no empirical evidence to support

the arguments made about the relationship between integrated reporting adoption and firm profitability, this research is the first to empirically investigate this relationship. Hence, this research contributes to prior research and literature on integrated reporting adoption.

The limitations include that both the accounting and market profitability are collectively investigated. To find out more about the consequences of integrated reporting adoption for accounting profitability of individual firms, an alternative is to analyze the costs of the reporting departments. This research solely investigated profitability, whereas integrated reporting adoption can bring certain reporting cost benefits (Jensen and Berg, 2011) which are not analyzed specifically in this research.

Secondly, the sample of integrated reporting adopters is relatively small. After propensity-score matching, only 80 firms remain for the consequences analysis. This research solely investigates European firms as in the rest of the world, integrated reporting adoption is less common. Furthermore, many privately held firms have adopted integrated reporting but are not included in the Compustat dataset. This is a limitation of this research, as not all integrated reporting adopters are analyzed. However, the firms analyzed in this research still provide significant statistical evidence for firm characteristics influencing integrated reporting adoption.

Drawing on the limitations of this research, future research could examine the effect of integrated reporting adoption, specifically analyzing the cost of the reporting departments within firms. As lower reporting cost and integration of reporting departments after integrated reporting adoption are suggested by multiple researchers (Adams, 2015; Jensen & Berg, 2011), it is important to analyze the claims made by the scholars, empirically. Furthermore, future research could include the North American, African and Asian integrated reporting adopters, to include more firms and different regions in the empirical analysis.

Apart from firm profitability, future research could examine potential areas where integrated reporting adoption may have increased influence. As pointed out in the discussion of Section 5, the firm investor base and transparency of information are likely to change after integrated reporting adoption. For the investor base, future research could analyze whether the total number of investors changes after integrated reporting is adopted, as integrated reporting adoption may attract new investors. An alternative to the number of investors could be the trading volume, which may increase after implementing the new reporting method. Related to transparency, future research could examine whether the information asymmetry decreases after integrated reporting adoption, as integrated reporting can provide investors with new information. This can potentially influence the transparency of information between firms and investors. For instance, future research could examine whether the bid-ask spread decreases for firms after integrated reporting adoption, signaling that there is increased transparency and less information asymmetry between firms and investors.

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8 Appendix

Table A1: Variables definition

<i>Variable</i>	<i>Description</i>	<i>Data Source</i>
<u>Integrated reporting</u>		
<i>Integrated reporting</i>	1 for the first year and following years after integrated reporting adoption, 0 if not	IIRC, firm investor relations, own computation
<i>Integrated reporter</i>	1 when a firm uses integrated reporting, 0 if not	IIRC, own computation
<u>Firm-specific variables</u>		
<i>Total assets</i>	Natural logarithm of total assets	Compustat Fundamentals
<i>Market capitalization</i>	Natural logarithm of market capitalization, calculated by outstanding shares on last day of month 12 * closing price of the same day	Compustat Fundamentals, Compustat Securities
<i>R&D</i>	Research and development expenditure divided by total sales	Compustat Fundamentals
<i>Soft assets</i>	Soft assets divided by total assets, where soft assets are calculated as total assets - total net property, plant, equipment - cash and short-term investments	Compustat Fundamentals
<i>Public</i>	1 if a firm is publicly traded and 0 if a firm is privately held or otherwise	Compustat Fundamentals
<i>Cash return</i>	Earnings before interest and taxes, depreciation and amortization divided by lagged total assets	Compustat Fundamentals
<i>Sales growth</i>	One year growth in total sales	Compustat Fundamentals
<i>Industry</i>	Indicator for Fama-French industries	Compustat Fundamentals
<i>Year</i>	The fiscal year of the financial statements	Compustat Fundamentals
<u>Accounting profitability variables</u>		
<i>EBIT</i>	Natural logarithm of earnings before interest and taxes	Compustat Fundamentals
<i>ROA</i>	Total net income before extraordinary items divided by lagged total assets	Compustat Fundamentals
<i>ROS</i>	Total net income before extraordinary items divided by lagged total net sales revenue	Compustat Fundamentals
<u>Market profitability variables</u>		
<i>Stock return</i>	Yearly stock return, calculated by (Stock closing price last day of month 12 this year - Stock closing price last day of month 12 last year) / Stock closing price last day of month 12 this year	Compustat Securities
<i>Tobin's Q</i>	(Book value of long-term debt and current liabilities + market capitalization of the firm) / total book assets	Compustat Fundamentals, Compustat Securities
<u>Audit variables</u>		
<i>Restatements</i>	1 for the fiscal year in which a firm had a restatement due to inadequate accounting, which had to be corrected. Value 0 otherwise	Audit Analytics
<i>Past restatement</i>	1 if a firm has had an accounting restatement in the past, 0 if otherwise	Audit Analytics

Table A2: Integrated reporting adopters

<i>Firm Name</i>	<i>Adoption Year</i>	<i>Firm Name</i>	<i>Adoption Year</i>
A2A SPA	2020	IBERDROLA SA	2014
ABENGOA SA	2019	ICA GRUPPEN AB	2017
ABN AMRO BANK NV	2018	INDRA SISTEMAS SA	2013
ACCIONA SA	2019	ING GROEP NV	2016
AEGON NV	2018	INTERCONTINENTAL HOTELS GRP	2014
ANGLO AMERICAN PLC	2019	INTERSERVE PLC	2013
ANTOFAGASTA PLC	2020	JOHNSON MATTHEY PLC	2013
ARCELORMITTAL	2019	KESKO OYJ	2017
ARM HOLDINGS PLC	2013	KGHM POLSKA MIEDZ SA	2014
ASSICURAZIONI GENERALI SPA	2017	KIER GROUP PLC	2016
ASTRAZENECA PLC	2013	KINGFISHER PLC	2013
ATLANTIA SPA	2013	KONINKLIJKE AHOLD DELHAIZE	2019
ATLAS COPCO AB	2014	KONINKLIJKE BAM GROEP NV	2015
ATOS SE	2018	KONINKLIJKE DSM NV	2015
AXA KONZERN AG	2017	KONINKLIJKE KPN NV	2016
BAE SYSTEMS PLC	2017	KONINKLIJKE PHILIPS NV	2017
BANCO POPULAR ESPANOL	2020	LLOYDS BANKING GROUP PLC	2017
BASF SE	2013	MARKS & SPENCER GROUP PLC	2013
BAYER AG	2017	MELIA HOTELS INTL SA	2016
BOLIDEN AB	2015	MONDIAL PECHE SA	2019
BP PLC	2016	NATWEST GROUP PLC	2020
BRITISH LAND CO PLC	2020	NN GROUP N.V.	2020
BT GROUP PLC	2019	NOVO NORDISK A/S	2016
CAIXABANK SA	2014	OJSC OTCPHARM	2013
CAPGEMINI SE	2017	PALFINGER AG	2019
CARGOTEC OYJ	2016	PEARSON PLC	2013
CEMEX LATAM HOLDINGS SA	2017	RANDSTAD NV	2013
CENTAMIN PLC	2016	ROSNEFT OIL COMPANY	2017
CLARIANT AG	2017	SABAF SPA	2015
CREDITO VALTELLINESE S.P. A	2014	SAGE GROUP PLC	2014
CREST NICHOLSON HOLDINGS PLC	2016	SAINSBURY (J) PLC	2013
CREST NICHOLSON PLC	2016	SCOTTISH & SOUTHERN ENERGY	2013
DEUTSCHE BAHN AG	2014	SGS SA	2014
DIAGEO PLC	2016	SNAM SPA	2016
ENBW ENERGIE BADEN	2015	SOLVAY SA	2016
ENI SPA	2013	TELEFONICA SA	2013
EWE-ENERGIEVERSORGUNG WESER	2013	TELEPERFORMANCE	2020
FERROVIAL SA	2014	TERNA SPA	2013
FORTUM OYJ	2018	UNICREDIT SPA	2017
FRESNILLO PLC	2014	UNILEVER PLC	2013
G4S PLC	2015	UNIPOL GRUPPO SPA -ADR	2017
GECINA	2015	UNITED UTILITIES GROUP PLC	2020
GIVAUDAN SA	2016	URALKALI PJSC	2016
GTS CHEMICAL HOLDINGS PLC	2015		