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Mandatory Nonfinancial Disclosure and Risk Management

A Study of Mandated Nonfinancial Disclosure in the European Union



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Abstract

In this study, we examine how mandated nonfinancial disclosure affects risk management in the European Union. Specifically, we examine the implementation of European law 2014/95/EU, mandating companies within the European Union to disclose nonfinancial information related to environmental, social and governance (ESG) matters. By using a difference-in-difference estimation with matched samples, we predict and find (1) that treatment firms subject to the legislation experience a larger increase in risk (measured in Value at Risk and Expected Shortfall) after the implementation of the mandate compared to control firms not affected by the mandate. In a second step, we use a multiple regression model with an interaction term for different treatment groups depending on their pre-regulatory ESG-performance. We predict and find (2) that treatment firms with a relatively high pre-regulatory ESG-performance are less affected in terms of risk by the mandate. These findings suggest that market participants does not perceive that the benefits of the mandated disclosure outweighs the imposed proprietary effects of increased transparency. Additionally, the findings suggest that firms with a strong nonfinancial disclosure performance prior to the legislation are able mitigate the informational shock and imposed proprietary effects subsequent to the mandate.

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1.0 Introduction

In recent decades, the focus on sustainable economic and environmental nonfinancial reporting have increased significantly. The urge for sustainable reporting have triggered companies and governments to adapt to the new business climate. After several decades of skepticism and “window-dressing-theories” recent research have shown that nonfinancial information not only can be useful internally within companies, but also externally towards stakeholders (Grewal et al. 2018, Chen et al. 2017). As a result of the sustainable focus, the amount of nonfinancial information available for investors today is larger than ever before. Between 1995 and 2015, the number of companies reporting nonfinancial information grew from less than 50 to over 6000 (Ioannou and Serafeim, 2017).

Much of the nonfinancial reporting information available to stakeholders derive from voluntary disclosure, i.e. companies themselves choose whether they should disclose it or not. However, in this study we choose to investigate the effects of mandatory nonfinancial disclosure. Specifically, we study how nonfinancial disclosure legislation affects risk of companies subject to it. We choose to examine the effects of European Law 2014/95/EU enforcing large European companies to disclose nonfinancial and diversity information from January 1, 2018. Previous studies on nonfinancial disclosure, such as Dhaliwal et al. (2011), Goss and Roberts (2011) and Turban, and Greening (1997) mainly focus on the effects of voluntary disclosure. There are however, studies investigating the effects of mandatory reporting as well, but many of these examine the effects on the Chinese market after a mandate on nonfinancial disclosure in 2006 (Chen et al. 2017; Cheng et al. 2014). Since law 2014/95/EU is the first mandatory legislation of nonfinancial disclosure in the European Union, previous research covering the European market is relatively small. To our knowledge, the only study conducted on the European legislative mandate is performed by Grewal et al. (2018), where they study the market reaction to the passing of Law 2014/95/EU and find that firms affected by the mandate experience a negative market reaction.

Since the European legislation only has been in effect since the first 1st of January 2018, there is a caveat regarding of how the implementation of the mandate impacts individual firms. Even though the mandate do not require firms to change its behavior, we assume that the legislation will have an impact

on firm risk due to the increased transparency. Hence, we posit that firms subject to the mandate will experience an increased risk. By using a Difference-in-Difference (DiD) approach, we study the change in risk among firms subject to the legislation, and compare it with control firms not subject to the mandate. We focus on equity firms listed on the main stock exchanges within the European Union, and we use financial data from the pre-regulatory as well as the post-regulatory period. Data from the pre-regulatory period refers to stock returns and company variables from the year of 2017 and data from the post-regulatory period consist of data and stock returns from the year of 2018. The reason why we use stock returns from 2018 is that nonfinancial reports released in 2018 refers to the financial year of 2017. Thus, the stock market reaction is delayed until the disclosure year. In our study, we create two samples consisting of treatment firms, subject to the mandate, and control firms that are not subject to the mandate. These firms are matched using a matching function in line with Grewal et al. (2018) using the same country, industry and the nearest observation in size and market-to-book ratio to run our analyses. Our findings indicate that treatment firms, subject to the legislation, experience an increased risk compared to control firms after the mandate, due to the reduced information asymmetry and proprietary effects.

In a second step, using a multiple regression model, we examine how the treatment firm's ESG – performance prior to the regulation affects the change in risk after the implementation. We posit that firms with high pre regulatory ESG-performance will experience a smaller increase in risk in the period post-regulation compared to firms with a low pre-regulatory ESG-performance. By investigating the relationship of ESG-performance and observable risk, we are able to determine if previous investments in risk management and disclosure affects the firms after the implementation of the mandate. Our results show that treatment firms with a high pre-regulatory ESG-performance experience a lower increase in risk, compared to other firms in the sample.

As an additional analysis, we study the effects of the announcement of 2014/95/EU with an identical approach as to the implementation event. Thus, we contribute to Grewal et al. (2018) research by adding a risk perspective in relation to the announcement of the mandatory legislation. However, in contrary to Grewal et al., (2018) we do not find any significant differences in risk between our control and treatment sample for the announcement. This indicates that the announcement of the mandate did

not affect the observable risk of the two samples differently. Further, we investigate if the ESG-performance prior to the announcement affects the risk in the time after the announcement. We observe no significant differences between groups depending on their ESG-performance.

Our study contributes to existing literature in several aspects. First off, we provide additional findings to the growing body of mandatory legislation research. Second, to our knowledge, no study prior ours have primarily investigated risk management in relation to a mandatory nonfinancial legislation. Third, we add to the literature by investigating the effects of mandatory disclosure regulations in the European Union, which is relatively unexplored. Further, we provide evidence that mandatory regulation mandating nonfinancial disclosure affects risk. We find that increased transparency trigger a negative reaction among investors after the new information is disclosed to the market. In similarity with Grewal et al. (2018) and Chen et al. (2017), we find that the benefits of increased transparency do not outweigh the disadvantage of imposed proprietary effects and political costs. In line with Lee and Faff (2009) the finding also suggest that firms have been able to hide valuable information to external stakeholder prior to the legislation. In addition, we contribute to the research as we show how ESG-performance can influence the impact of mandatory nonfinancial legislations. By providing evidence that ESG-performance influences the risk, we strengthen the findings of Grewal et al. (2018). Additionally, we add to existing literature regarding risk management and its function as a kind of insurance (Godfrey et al. 2005).

Delimitations

The focus of this study is to investigate how the European Union's implementation of nonfinancial disclosure legislation affects firms subject to, it in terms of risk. The rationale behind investigating mandatory nonfinancial disclosure in the EU is because the regulation recently was implemented on the European market. We are solely concentrating on listed firms in the European Union, since we want to research the impact the legislation on European companies. Therefore, the companies in the study must have their main listing in a European country. Hence, we exclude companies with main listings outside of the EU. Further, risk is measured using Value at Risk and Expected Shortfall. The study examines impact and differences among European companies before and after the implementation of the

regulation, consisting of year 2017 and 2018. To enable us to conduct our research, the companies must have been listed on a European stock exchange during the entire event window.

Structure of paper

The study is structured as following. In Section 2, we discuss the development of nonfinancial disclosure and the institutional background of Law 2014/95/EU in the European Union. Section 3 provides a literature review of existing literature related to voluntary and mandatory nonfinancial disclosure and risk management. Additionally, we develop and present our hypotheses. Section 4, presents the research design and elaborates on the data selection, statistical models, variables and considerations. In section 5, we present and discuss our results. Section 6 provides an overview of managerial implications. Section 7 concludes the paper and provides suggestions for further research.

2.0 Background

2.1 Nonfinancial disclosure

2.1.1 The development of nonfinancial disclosure

Social and environmental concerns related to business activities can be traced back to the beginning of trade. The oldest finding of Corporate Social Responsibility (CSR) related activities are believed to be over 5000 years old, and considers laws regarding forest protection. Additionally, brutal examples of CSR can be tied to Ancient Mesopotamia and King Hammurabi who instituted laws meaning that people could risk a death penalty if their negligence behavior caused the death of others, or if it caused major inconvenience to others citizens (Asongu, 2007). Even though these examples might not be in line with a modern definition of CSR they are often highlighted by researchers to illustrate how the history of conducting business and trade is filled with different examples of CSR related activities. To find a contemporary expression for these types of activities, we have to move forward to the 1920s and Harvard Business School. In 1929, Wallace B. Donham, the Dean at Harvard Business School expressed his concerns regarding companies' inability to recognize the responsibilities of their actions and how it would affect future generations (Asongu, 2007).

Despite Donham's early concerns in the 1920s it would take almost 30 years before the basis for what we today call sustainability reporting was formed. During the 1960s, environmental issues were given a prominent role for the first time in history, and the reactions resulted in the foundation of several national environmental protection agencies and the United Nations Environment Programme (UNEP). As climate change and global warming could be attributed to emissions of carbon dioxide and other human related activities, it became clear that requirements for a more sustainable development had to be created (Katsoulakos et al. 2004). As a result of the increased attention of environmental issues the awareness for the concept of CSR grew among companies and countries. During the 1970s environmental and social reporting was promoted for the first time. European countries came to lead the way regarding adoption and reporting practices for CSR activities. French law mandated firms with over 300 employees to produce an employee report, containing information of standards and policies

relating to employee rights. Other European countries followed suit, and in the end of the 1970s, additional countries such as the Netherlands, Switzerland, Austria and Germany introduced voluntary environmental reports (Ioannou and Serafeim, 2017). These reports included information on how operations could affect the environment and disclosed waste management policies. In the United States, the awareness of CSR-related issues rose as well and in the middle of the 1970s the American Council on Economic Priorities (CEP) introduced a public rating of companies based on their environmental and social performance. The CEP-ratings became a new type of KPI for investors and stakeholders for making investment decisions (Katsoulakos et al. 2004).

In the beginning of the 1980s, issues as social inequality, poverty and terms of trade became increasingly important and researchers proposed models for social responsibility accounting. Within the financial sector, the fundamentals of sustainability reporting grew even wider as the expression of “negative screening” became an integrated investment approach within British and American ethical investment funds. The essence of the approach was to exclude investments in firms with a bad social and ethical performance (Ioannou and Serfeim, 2017). The main focus in the 1980s would however be on the Brundtland report released in 1987. The Brundtland report introduced the world to the concept of sustainable development defining it as *“development that meets the needs of the present without comprising the ability of future generations to meet their own needs”* (United Nations, Brundtland Report, 1987; page 5). The report established the principles of sustainable development and for the first time, measures and concepts associated with sustainability emerged (Katsoulakos et al. 2004).

During the 1990s, the principles and concepts of sustainability established in the 1980s developed as its proponents and popularity increased. In 1996, the world’s politicians signed the Kyoto Protocol, creating the framework for a future course of action against climate change. The Kyoto Protocol serves as basis for international cooperation for sustainability (Grubb et al. 1997). Further, the United Nations (UN) and Coalition for Environmentally Responsible Economies (CERES) formed the Global Reporting Initiative (GRI) in 1997. GRI was formed to raise the awareness of nonfinancial reporting and CSR activities. The aim of the GRI was to establish guidelines for not only economic reporting, but environmental and social reporting as well, thus they invented the name “triple bottom line accounting” (Ioannou and Serafeim, 2017). As a result of political action and increased awareness the 1990s would

become the decade of foundation for many CSR related organizations and reporting initiatives such as FairTrade, Business for Social responsibility (BSR) and Corporate Impact Reporting. For the first time discussions regarding corporate sustainability also gained attention in boardrooms and firms started to extend existing environment reports including a wider range of social issues related to the community. The disclosure of nonfinancial information on these aspects was perceived as positive from investors and stakeholders. In addition, universities all around the world saw their obligation to incorporate subjects and thoughts regarding sustainable development and environmental aware attitudes in their education, as their students would be the leaders of tomorrow (Katsoulakos et al. 2004).

Further societal demands of transparency and reliability from consumers, investors and media led to additional growth of voluntarily sustainability reporting in the end of the 1990s and beginning of the 2000s. As questions regarding climate change, waste and water usage has continued to raise awareness and become even more important, disclosure of nonfinancial information has established itself as a key business practice for many firms in today's society. Moreover, as the importance of the disclosure has increased it has become a way for companies to distinguish themselves from competitors. CSR-disclosure can lead to increased sales, and even function as advertising (Ioannou and Serafeim, 2017).

The reasons behind the growth of nonfinancial information disclosure are numerous. One contributory factor is the pressure from external stakeholders, who requires companies to disclose not only financial information, but also information regarding social and environmental impact of companies' operations (Delmas & Toffel, 2008; Red and Toffel, 2009). Some investors perceives the nonfinancial information as important as financial information. This external pressure is believed to be derived from corporate-scandals, where irresponsible corporate actions have caused great damage to different stakeholders in terms of reduced share price, lowered sales and a declining reputation. Corporate scandals affect various stakeholders differently, and the negative effect can have long-term implications on individual companies. An example of this is Nike, which had to struggle with declining sales, stock price and critique for many years after the child labor scandal in 1997 (Dhaliwal et al. 2011). This kind of corporate behavior have created a skepticism and disbelief about individual company's transparency and self-regulatory mechanisms. Kaplan and Norton (1992) argues that a central problem in the discussion regarding traditional reporting standards is that companies primarily tend to report historical

data about past performance rather than future expectations. To increase transparency and meet the new standards of reporting, companies have begun to take different actions. In the last five years, the percentage of companies releasing sustainability reports have risen from around 20% to 80% and the increase of sustainability committees for S&P 500 companies have risen from around 5% to 24% (Ioannou and Serafeim, 2017). It is however not just the fear of corporate scandals that has driven companies towards a more transparent behavior. As investors seek to reduce the information asymmetry in the market, they turn to nonfinancial data (Eccles et al. 2011). Ioannou and Serafeim (2017) report that investors and intermediaries in capital markets have started to integrate Environmental, Social and Governance (ESG) performance in their valuation models, which have increased the importance of sustainability reporting even further.

Since the importance of ESG-performance and disclosure have increased for investors and stakeholders, various financial databases and rating institutes provides ESG-scores for individual companies. According to MSCI (2019), companies with high ESG-performance have demonstrated higher profitability, lower tail risk and lower systematic risk. Thus, some stakeholders argue that the ESG-performance is the most important metric of an organization. Typically, the ESG-scores includes ratings on various nonfinancial metrics relating to environmental, social and governmental aspects of individual businesses. Environmental metrics is based on data on emissions, carbon footprint, environmental impact, water and land use, sourcing of material, pollution, waste management and investments in renewable energy. Social metrics relates to amongst others; human capital management, health and safety, supply chain labor standards, chemical safety, responsible investments, access to health care and other social opportunities. Governance score is based on corporate governance aspects such as board member diversity, ownership, accounting systems, business ethics, corruption and instability, tax transparency and financial system instability. Further, ESG-frameworks includes an overview of how the ratings are subject to change in the future, and what kind of risks the company could be exposed to. If a company is adequately managing an ESG-risk they have to provide substantial data on the policies and procedures that are in effect to mitigate the risks. Since the combined ESG-score provides an overview of ESG-performance, it is used as a variable for choosing responsible investments for investors and stakeholders (MSCI, 2019).

2.1.2 Rationales and trends of nonfinancial disclosure

A recent shift in nonfinancial disclosure and ESG-activities is the incorporation of mandatory disclosures in to legislation. Historically, nonfinancial disclosure efforts have been voluntary, typically for a company to please both investors and stakeholder and to present an image of socio-environmental awareness (Dhaliwal et al. 2012). The actions undertaken by some companies has even been accused of merely being window-dressing, meaning that companies does not undertake in the CSR activities they claim (Taylor et al. 2018). Generally, the components present in a nonfinancial disclosure report as an ESG or CSR-report would be either operational, analytical or forward looking. Operational information relates to measurements or observations disclosing information about 1) the quantity of resources used to for a company's products and/or services, 2) the magnitude of emissions and/or wastewater due to the firms operations. In addition, the operational section could also contain details of operational processes or procedures, and how they are linked to sustainability and social impact. Thus, disclosing the environmental and social impact of a corporations operation. Analytical information assesses and discusses the strategic and financial effects of the company's ESG-activities. Forward-looking information discloses plans for future ESG-activity and the impact these activities will have on the business, i.e. negative or positive effects depending on the business of the corporation. A report often contains indicators that are used to provide evidence for risks related to processes, policies or practices (London Stock Exchange Group, 2018).

The rationale behind nonfinancial disclosure is that it provides companies and organizations a channel for informing investors and stakeholders about their actions and considerations for conducting responsible business. By providing information of how a company integrates social and environmental concerns in their business, they display transparency (Perrini, 2006). For the individual company, there are various possible positive outcomes for disclosing nonfinancial information. It can influence a firm's competitive advantage, reputation, ability to attract and retain workers and customers, maintenance of employee's morale and productivity, improve the view of both investors and the community of the company and the relationship with other companies, media, suppliers and customers (Global Reporting Initiative, 2014). According to Perrini (2006) the identified stakeholders, or the audience for the nonfinancial disclosure report are defined as the environment, community, customers, suppliers, shareholders, human resources, government and public authorities. The stakeholders are both

external and internal which is seen as one of the strengths of nonfinancial disclosure (World Business Council for Sustainable Development, 2019).

In addition to providing an information channel between stakeholders and a company, the World Business Council For Sustainable Development (WBCSD, 2019) explains that there are several reasons to why a company produces an ESG-report. 1) It could be to satisfy compliance requirements, communicate progress against company commitments, disclose risks and strategic aims, 2) describe how the company creates value or 3) report contribution to international commitments such as the Paris agreement and align with peer practice. In cases where an ESG report is created to satisfy compliance requirements, it is typically because of mandated nonfinancial disclosure laws. The number of countries where nonfinancial reporting is mandated recently increased when the EU passed law 2014/95/EU, which mandates nonfinancial reporting for large European companies. In addition to all European countries, similar legislation is in effect in South Africa, China, Malaysia, Brazil, Hong Kong and India. According to WBCSD (2019), a country typically adopts mandatory disclosure legislation to reduce informational asymmetries among companies and stakeholders, and to force companies to take more responsibility for their business. To simplify mandatory ESG-reporting practices there are several frameworks that companies can rely upon for producing nonfinancial disclosure reports such as: Global Reporting Initiative (GRI), International Organization for Standardization (ISO), Sustainability Accounting Standards Board (SASB) and the United Nations Global Compact framework. These frameworks are created to simplify compliance with regulations and to ensure comparability of nonfinancial disclosure reports (WBCSD, 2019).

2.2 The European Union

2.2.1 Nonfinancial disclosure within the European Union

The European Union have been active in promoting and creating progress in the field of CSR ever since the European Commission published its Green paper, which promoted a European framework for CSR in 2002 (European Parliament, 2002). The next step in the development occurred in 2006 when the European commission created the European Alliance for CSR and adopted eight important action-policies to stimulate CSR-activities on a global scale. Amongst others, the policies included awareness-

raising, best practice exchange, support to multi-stakeholder initiatives, research, education and creating an international dimension of CSR. In the European Union, the importance of CSR increased even further, when three strategic CSR actions was incorporated in the Europe 2020 strategy report (European Commission, 2010). This report contains a strategy for the advancement of the European Union's economy for the period 2010-2020. The actions included in the report relates to employability and inclusion, sustainability in production, transparency and human rights (European Commission, 2011).

During 2011, the European Commission produced a report titled "A renewed EU strategy 2011-2014 for Corporate Social Responsibility". The report emphasized the need to improve the disclosure of social and environmental information in the European Union. Further, the report urged the need for consistency and comparability of nonfinancial information among European companies. Additionally, it urged that companies would need to prepare a statement and report on how they are strategic addressing the following matters: environment, social and employee-related, respect for human rights, anti-corruption and bribery. The commission also submitted a legislative proposal to implement the proposed disclosure changes in to national legislation in the European Union. The proposal was adopted on 25 October 2011, and became the preparatory work of Directive 2014/95/EU on mandatory nonfinancial and diversity reporting. The law on mandatory nonfinancial reporting was approved to allow stakeholders to better evaluate the nonfinancial performance of European companies, and at the same time encourage companies to adopt a more responsible approach in how they conduct business. According to the EU-commissions report, the new legislation is seen as an extension of CSR activities, to help the EU to achieve the goals set in the EU 2020-strategy (European Commission, 2011).

2.2.2 Mandate 2014/95/EU

The initial announcement of the adoption of 2014/95/EU on mandatory nonfinancial reporting was general in wording, and stated that all European companies with a minimum of 500 employees had to prepare a nonfinancial report (See Table 2 and Appendix 1). The press release of the adoption was released on April 15, 2014. The finalized directive included more specified information of the legislation that is in effect from 1st of January 2018 and onwards. This means that companies will start applying the new legislation when disclosing information relating to the 2017 financial year (EUR-Lex,

2014). The European directive was transposed into national legislation, where member states can choose the scope of the legislation by specifying the requirements in form of; average number of employees, balance sheet total and net turnover expressed in numbers (Table 1). The companies within the scope of the national legislation have to publish a nonfinancial statement related to their annual report disclosing their policies in relation to: Environmental protection, Social responsibility, treatment of employees, respect for human rights, anti-corruption, bribery and diversity on company boards (In terms of age, gender, educational and professional background). Companies can use international, European or national guidelines when producing their statements as; European Commissions Guidelines to nonfinancial reporting, The UN Global Compact, the OECD guidelines for multinational enterprises or ISO 26000. According to the European Commission, the number of companies affected by the regulation is approximately 6000 (European Commission, 2017b).

Table 1 - National transposition of 2014/95/EU

Country	Minimum number of employees	Minimum net revenue	Minimum balance sheet total
Austria	500	EUR 40 million	EUR 20 million
Belgium	500	EUR 34 million	EUR 17 million
Bulgaria	500	BGN 76 million	BGN 38 million
Croatia	500	HRK 30 million	HRK 15 million
Cyprus	500	EUR 40 million	EUR 20 million
Czech Republic	500	CZK 1 billion	No req.
Denmark	X	X	X
Estonia	500	No req.	No req.
Finland	500	EUR 40 million	EUR 20 million
France	500	EUR 40 million	EUR 20 million
Germany	500	EUR 40 million	EUR 20 million
Greece	500	No req.	No req.
Hungary	500	HUF 12 billion	HUF 6 billion
Ireland	500	EUR 40 million	EUR 20 million
Italy	500	EUR 40 million	EUR 20 million
Latvia	500	EUR 40 million	EUR 20 million
Lithuania	500	EUR 40 million	EUR 20 million
Luxembourg	500	EUR 40 million	EUR 20 million
Malta	500	EUR 40 million	EUR 20 million
The Netherlands	500	EUR 40 million	EUR 20 million
Poland	500	PLN 170 million	PLN 85 million
Portugal	500	No req.	No req.
Romania	500	No req.	No req.
Slovakia	500	EUR 40 million	EUR 20 million
Slovenia	500	EUR 40 million	EUR 20 million
Spain	500	EUR 40 million	EUR 20 million
Sweden	250	SEK 350 million	SEK 175 million
United Kingdom	500	No req.	No req.

Table 1 - National transposition of 2014/95/EU (Europe 2020, CSR Europe, GRI, 2017)

Table 2 - Requirements of the announcement of 2014/95/EU

Requirements disclosed in the announcement	Minimum number of employees	Minimum net revenue	Minimum balance sheet total	National transposition
European union	500	Unknown	Unknown	EU 2014/95/EU

Table 2 - Requirements of the announcement of 2014/95/EU (European Commission, 2014)

In the report by the European Commission (2017a), the rationale for disclosure of nonfinancial information is the importance for the competitiveness of a company. The benefits identified are in terms of risk management, access to capital, cost savings, human resource management, customer relationships and innovation capacity. According to the commission, by improving their social responsibility, a company can build long-term trusts with employees, consumers and citizens. Besides building trust between companies and society, the European initiative aims to promote social and environmental responsibility in the supply chain. This covers human rights issues, employment and labor practices, environmental issues and preventing bribery and corruption (European Commission, 2011). In addition, an advantage of the mandatory disclosure is to help companies disclose relevant and useful nonfinancial information that is comparable across all economic sectors.

2.2.3 Law requirements

To help European companies with the mandatory disclosure the European Union has created a report on Guidelines of nonfinancial reporting. The report states that the aim of the guidelines is to help companies “disclose high quality, relevant, useful, consistent and more comparable nonfinancial (environmental, social and governance-related) information in a way that fosters resilient and sustainable growth and employment, and provides transparency for stakeholders” (Page 2, Guidelines on nonfinancial reporting, European Commission, 2017a). The disclosure can be provided at either group wide level or individual affiliated company level within a group. The European principles presented build largely on 21 previous reporting frameworks for environmental, social and governmental issues. The nonfinancial report is to be published at the same time as the annual report and can be either included in it, or as a standalone report (European Commission, 2017a).

The first key principle for the nonfinancial report is that it should disclose material information. This means that the report has to include information necessary to understand the development, performance, position and impact of the company’s activities. The second principle is that the nonfinancial statement should be fair, balanced and understandable. Therefore, the information should be presented in an unbiased way and taking into account the diverse information needs of different stakeholders. The third principle states that the information presented should be comprehensive but concise. This is to help stakeholders understand the activities of a company in the reporting year. By

not allowing companies to include too much information, the reports can be easily be interpreted by various stakeholders. Additionally, as a fourth principle the report should be strategic and forward-looking. The consequence of this principle is that the statement should provide insights into the business model and explain the short, medium and long-term implications and risks of the information reported. The fifth principle relates to the stakeholders, the company should present information relevant to all stakeholders, rather than focusing on preferences of a certain type of stakeholders. The group of stakeholders presented in the report includes consumers, investors, workers, customers, suppliers, local communities, public authorities, social partners, vulnerable group and civil society. The final principle is the one of consistency and coherence, the statement is expected to be consistent with the rest of the management report. This includes explaining linkages between the information presented in the nonfinancial report and other information disclosed in the management report (European Commission, 2017a).

The content of the nonfinancial report is specified and divided in to thematic aspect to ensure that the report includes not only what a company does, but also what risks and circumstances they are facing, and how the company plans to manage those potential risks. The nonfinancial statement must include information about the business model of the undertaking, explaining how it generates long-term value through services or products. This should describe what a company does, how and why it does it. Further on, it is required to disclose the policies and due diligence methods to address the aspects in the nonfinancial report, their main objectives and how they aim to reach them. This section can include management responsibilities, resource allocation to objectives, governance aspects and risk management. The third requirement is that the report should specify a useful and balanced view of policy outcomes, to help investors and stakeholders to understand the company's performance in relation to the nonfinancial goals. The fourth requirement is that the company should disclose information on their primary risks and their way to manage them. In addition, the company should explain how the risks might affect their operations, financial performance and business model. The risk aspect should be considered throughout the entire supply and subcontracting chain. As a fifth requirement the statement has to incorporate key performance indicators (KPIs) that are important to understand the development, performance, position and impact of a company's activities. According to the European Commission the use of KPIs makes the disclosure more useful, improves transparency

and comparability. It is of importance that the KPIs are recurring and not changed since it helps stakeholder's measure progress, check consistency and make over time comparisons (European Commission, 2017a).

The final requirement states which aspects the report has to incorporate, that are of importance to the European Union. Environmental matters, relate to information on how the current and future operations affects the environment, and how environmental matters might affect the performance, position or development of the company. The second theme is social and employee matters, which amongst others includes issues on diversity, equal treatment in employment and occupational aspects such as age, gender, religion, disability, ethnic origin and sexual orientation. The company should also disclose of employment and working conditions, relationships with labor organizations and health and safety at work. The third theme that companies are required to disclose of is the commitment to respecting human rights. This defines what the company expects from employees, business partners and managers in terms of respect of human rights, including the rights of children, women, indigenous peoples, local communities, persons with disabilities, trafficking victims, right of workers under temporary contracts, migrant workers and workers in the supply chain or of sub-contractors. In addition, they should disclose their commitment to human rights in due diligence process, contract negotiations and in the supply chain. The fourth theme to be addressed in the report is anti-corruption and bribery matters, whereas efforts on decision-making, management instruments, organizational efforts and resources devoted to fighting corruption and bribery can be disclosed. The fourth theme is only applicable to companies with supply chains outside their control, or trading with conflict minerals. If the undertaker has a supply chain outside their control, they must include information required for understanding how nonfinancial matters are treated and controlled within the supply chain. Companies with supply chains of minerals as tin, tantalum and gold from conflict areas must disclose information on due diligence efforts to ensure responsible supply of the minerals. These companies must follow and include the OECD Due Diligence Guidance for Responsible Supply Chains from Conflict and High-Risk areas in their nonfinancial report (European Commission, 2017a).

In addition, companies are obliged to disclose information on their efforts on board diversity. It relates to the diversity policy used in the undertakings administrative, supervisory and management bodies

with respect to age, gender, professional background and educational background. It is not mandatory to have implemented a diversity policy, but if there is no diversity policy applied the statement must include an explanation to why this is the case. The board diversity report has to include how the company will work with diversity on board and employee level, and the reason for using this. In addition, the company should disclose measurable targets for diversity, and implementation and results of these objectives. This should include the status of the implementation of diversity aspects. It should disclose if the objectives will be reached and how the company intends to meet the objectives within a specified timeframe (European Commission, 2017a).

3.0 Literature review

3.1 Voluntary nonfinancial disclosure

3.1.1 Economic effects of voluntary nonfinancial disclosure

A large number of studies have investigated the link between voluntary nonfinancial disclosure, risk and economic effects for companies. Several studies have found that CSR-disclosure raises firms costs, thus putting the company in a worse position compared to its competitors (Friedman, 1970; Aupperle et al., 1985; Jensen, 2002). Brammer and Millington (2008) argues that allocating resources to engage in CSR-activities only provides significant managerial benefits, rather than financial benefits for the company's shareholders. Boyle et al. (1997), Vance (1975) and Brammer et al. (2006) have found a negative association between ESG-performance, financial performance and valuation. Additionally, there is a body of empirical research that suggests that the relationship between ESG-performance, financial performance and valuation is ambiguous, or insignificant (Alexander and Buchholz, 1978; McWilliams and Siegel 2000; Horvathova, 2010).

In contrast to these findings, numerous studies have shown that CSR disclosure has a positive impact on financial performance and valuation of a company. According to Waddock and Graves (1997) corporate social performance is positively associated with both prior and future financial performance. In addition, it allows companies better access to important resources (Dimson et al. 2015; Eccles et al.; 2014; Ge and Liu, 2015). Turban and Greening (1997) shows that CSR disclosure enables companies to attract and retain high quality employees. Further, Gardberg and Fombrun (2006) finds that CSR disclosure generates a better reputation, and permits better marketing of services and products (Moskowitz, 1972; Turban and Greening, 2000). Multiple studies have shown that CSR disclosure have a similar impact on consumers as advertising, thus reducing consumer price sensitivity and/or increasing demand for services and products (Dorfman and Steiner, 1954; Navarro, 1988; Sen and Bhattacharya, 2001; Milgrom and Roberts, 1986). Even though nonfinancial disclosure are claimed to be value-irrelevant in some studies (Friedman, 1970; Aupperle et al. 1985; Jensen, 2002), Dhaliwal et al. (2011) compares the mechanisms of financial and nonfinancial disclosure and claim that they are

equivalent important for stakeholders and investors. This finding is confirmed by several previous studies on the informational value of nonfinancial disclosure (Margolis and Walsh, 2001; Orlitzky et al. 2003; Al-Tuwajari et al. 2004).

Another economic effect of voluntary nonfinancial disclosure is the improved access to finance. Research by Goss and Roberts (2011) have showed that banks tend to be more willing to finance firms with an extensive record of good nonfinancial reporting. Further, Cheng et al. (2014) find that firms with superior corporate social responsibility performance faces significantly lower capital constraints from banks. The authors hypothesize and show that this is due to a higher level of engagement from stakeholders and transparency around CSR performance. Additionally, Goss and Roberts (2011) compares debt costs among companies with different CSR-scores, and find that the companies with the lowest CSR-scores, pay a premium of their bank debt between 7 and 18 basis points. Dhaliwal et al. (2011) investigate the topic further. They elaborate on the relationship with voluntary disclosure of corporate social responsibility (CSR) activities and firms 'cost of capital. In their study, they find a positive connection between greater social responsibility performance and reduction in the cost of equity capital. Further, the authors identify that firms with a historic high cost of capital equity tend to initiate disclosure of activities related to CSR to lower their costs. In addition, El Ghoul et al. (2011) find that US firms with higher CSR scores has lower cost of equity capital.

Plumlee et al., (2015) investigate if there is a connection between firms ESG-disclosures quality and the components of firm value. They find that the quality of voluntary environmental disclosure have an impact on the relationship of the disclosure and firm value components. Higher quality disclosure leads to an increased impact. Margolis et al., (2011) conducts a meta-analysis on 251 individual empirical studies and finds a small positive association between ESG-activities and both financial performance and valuation. The findings of Margolis et al., (2011) suggests that the relationship of ESG-performance, financial performance and valuation has weakened over time. In addition, various empirical studies have found a positive relationship between different types of CSR disclosure and firm value. El Ghoul et al., (2017) investigates the association of ESG-performance and firm value in 53 countries, their findings suggests that ESG-performance has a positive impact on firm value, especially on markets with weaker institutions.

3.1.2 Information asymmetry

The question of whether information asymmetry and voluntary nonfinancial disclosure has a relationship is thoroughly investigated by Cheng et al. (2014). They find that increased nonfinancial disclosure has the same effect as greater disclosure of financial information; it reduces the information asymmetry between investors, lenders and managers and a more adequate relationship appears. As investors are more informed about the companies, they become more willing to trade, resulting in increased liquidity and smaller transaction costs (Verecchia, 2001). Previous studies suggests that CSR disclosure increase the availability and quality of data about the firm, thus reducing the asymmetry of information between the firm, investors and stakeholders (e.g. Botosan, 1997; Khurana and Raman, 2004). According to Cheng et al., (2014) CSR disclosure lowers agency costs and increases transparency through a positive two-mechanism feedback loop: 1) CSR reporting increases transparency of a company's social and environmental impact, and how their governance functions and 2) can change the internal compliance system that improves the reporting's future reliability and alignment with regulations.

3.1.3 Implications for analysts

The fact that nonfinancial disclosure activities may affect firms' financial performance in various aspects such as risk, financing, sales, costs and operational efficiency has made it a useful tool for analysts, since it can have an impact on valuation and forecasts (Dhaliwal et al. 2012). In a survey conducted by CSR Europe, EuroNext and Deloitte in 2003, almost half of the respondents, 400 fund managers, answered that they frequently used CSR or ESG-reporting provided by management for analyzing purposes. In the same study around 80% also responded that they believe that CSR reporting and CSR related activities had a positive impact on the market value in the long term (Deloitte, CSR Europe and EuroNext, 2003). Additionally, Dhaliwali et al., (2012) examine the relation between forecast accuracy and CSR-related reporting by studying firm-level data from 31 countries. When firms disclose nonfinancial information the forecasts are more accurate compared to forecasts of firms with no disclosure. Additionally, Ioannou and Serfeim (2010) find that CSR disclosure has a positive impact on sell side analysts' recommendations, further providing evidence of nonfinancial reporting impact on forecasts.

3.2 Mandatory nonfinancial disclosure

3.2.1 Economic effects of mandatory nonfinancial disclosure

In some markets, nonfinancial disclosure is not voluntary, but rather mandatory and a company is obliged to disclose nonfinancial information (Hung et al. 2015; Chen et al. 2017). Easley and O'hara (2004) claim that investors can expect informational benefits and reduced cost of capital from mandatory disclosure regulation. Informational benefits refers to the disclosure of information that can be used by investors and stakeholders to predict the company's future performance and provide better insights on firm specific risks. This can lead to a more correct valuation of a company. In addition, Ioannou and Serafeim (2017) suggests that mandated disclosure can improve operational efficiency and improve the effectiveness of external monitoring. In a study by Chen et al., (2017) they find empirical evidence that Chinas 2006 mandate requiring companies to disclose CSR activities led to altered firm behavior and generated positive externalities at the expense of shareholders. Further, Delmas et al., (2010) find that mandatory disclosure programs forces companies to improve environmental impact.

In contradiction with the benefits of mandatory disclosure mandates, the regulatory change can lead to internal proprietary costs and political costs (Grewal et al. 2018). Proprietary costs arises if the regulation demands disclosure of information harmful to a company's competitiveness. Political costs can arise if the mandated disclosure enables regulators, governments and interest groups to pressure companies to undertake projects with negative net present value (Jensen and Meckling 1978; Watts and Zimmerman 1948; Healy and Palepu, 2001). Further on, investors may expect new sources of costs for preparing, disseminating and assuring the new nonfinancial information (Ioannou and Serfeim, 2017). However, an EU-impact assessment study conducted on the mandatory nonfinancial disclosure in the European Union suggests that costs of fulfilling the mandatory reporting requirements are small (European Commission, 2011a).

In 2006, China launched a mandatory regulation requiring reporting on CSR related activities. The regulation stated that Chinese firms listed on the two main stock exchanges, Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) had to incorporate social responsibility actions in their

business operations. The mandatory directive included among all; tying a firm's CSR performance to their access to bank financing, placing highly polluting firms on an official black list, officially publish CSR performance rankings and distribution of CSR awards. (Zhu et al. 2015; Chen et al. 2017) The implementation of the law allowed researchers to examine effects that may arise from the implementation of the regulation. One of the aspects researched by Chen et al., (2017) is how the mandatory regulation impacts a firm's financial performance. By using a difference-in-difference study where they match and compare treatment firms affected by the regulation with control firms not affected by the mandate, they discover a difference in the two groups' performance before and after the regulation. Affected firms experience a decrease in profitability, measured in return on assets (ROA) and return on equity (ROE). Further, the treatment firms experience higher costs related to impairment changes and operating activities as well as decreased sales revenues and capital expenditures after the mandate. In addition, they notice that firms affected by the mandatory legislation experience a more negative market reaction than the control firms. The authors argue that investors anticipate a decrease in firm performance as the compliance costs and CSR spending increase after the regulation (Chen et al. 2017).

3.2.2 Information asymmetries

In similarity with this study, Hung et al., (2015) research the effects of mandatory disclosure regulation. By measuring high-frequency trade and quote data from a sample of A-share (local share) listed companies in China between 2006 and 2010 they find that firms subject to mandatory CSR reporting experience a reduction in information asymmetry compared to benchmark firms after the regulation. Firms with a palpable political or social risk are more affected by the mandatory reporting requirements, and the reduced information asymmetry is more distinct in this group compared to conventional firms (Hung et al. 2015). Additionally they find that the increased transparency from the mandatory requirements leads to a higher level of analyst coverage, which also becomes a mechanism in the reduced information asymmetry.

As a result of the reduced information asymmetries, firms can enjoy the effects of increased sales numbers and financial performance, as consumers aware of social responsibility are ready to pay a premium for responsible firms' products and services (Richardson and Welker, 2001). Further potential

short-term gains from a more transparent behavior include reduction of pollution cleaning costs and boost of employee's morale (Grewal et al. 2018). According to Mervelskemper and Streit (2016) the market's reaction to mandatory ESG-reporting is positive when a firm publish an ESG-report since capital investors value ESG-activities and reporting as it minimizes information asymmetries.

3.2.3 Reactions to mandatory regulations within the European Union

Bearing the above mentioned findings in mind, a mandatory regulation seems to have an impact for firms and capital markets. However, due to the weak legal institutions, high manipulation, poor protection of property rights and stock return synchronicity, critics argue that findings in the Chinese market cannot be compared to other markets with more stable legal institutions such as the European Union (Morck et al. 2000; Chen and Yuan, 2004).

Since law 2014/95/EU was recently implemented, there is not much research covering its impact on the European market. However, Grewal et al., (2018) study the impact of the passing of the law 2014/95/EU. They examine the capital market reactions for European Companies as the proposal and adoption of the mandatory ESG disclosure regulation 2014/95/EU pass through the different EU instances. They investigate the aggregated impact on the three following event dates:

- ***“April 16, 2013, The European Council proposes an amendment to accounting legislation to improve the transparency of certain social and environmental matters,***
- ***February 26, 2014, The European Parliament and the European Council agree on an amendment to existing legislation to improve the transparency of certain large companies on social, environmental and diversity matters and***
- ***April 15, 2014, The European Parliament adopts the directive of disclosure of nonfinancial information.” (Grewal et al., 2018; page 21-22)***

By matching treatment firms, that will be affected by the regulation, with control firms that are outside the scope of the legislation they compare the firm's five-day abnormal stock return around the chosen event dates. In their study, they observe a difference in the markets reaction between treatment firms and benchmark firms. Aggregated over the three event dates, the treatment firms shows an average

negative market effect of -0,79% compared to benchmark firms. Furthermore, the authors detect those firms with an already existing nonfinancial disclosure agenda and high ESG-performance prior to the announcement are less affected by the announcement of the new rules. They hypothesize that the market reacts differently depending on if the individual equity are “good guys” defined as firms with high pre-announcement ESG-performance, or “bad guys” defined as companies with low ESG-performance prior to the announcement. These findings suggest that investors tend to anticipate that the potential benefits of the mandatory disclosure might be overshadowed by the implied increased proprietary costs the treatment sample will be exposed to. Other potential explanations of the on average negative market reaction might derive from the fear of further and stricter regulations in the future, thus imposing future political costs (Grewal et al. 2018).

Previous research on mandatory legislation within the European Union include Bernard et al. (2018). In their study, they investigate the effects of mandatory disclosure related to financial and audit information. In similarity to Law 2014/95/EU, firms are enforced to disclose various amount of financial and audit information depending on their size. The size is decided upon three firm specific variables: Average number of employees during the fiscal year, annual sales and year-end total assets (Bernard et al. 2018). Depending on these measures, firms are classified into size categories of small, medium or large depending on how many thresholds they fulfill. The size determination is a key aspect to many firms, since it affects the extent of disclosure.

According to Bernard et al., (2018) firms associate disclosure with proprietary costs, i.e. costs that occur when a firm reveal sensitive information, which can be exploited by competitors and harmful to the firm. Hence, there is a fear of large disclosure. In their study, they find that the costs associated with disclosure are so large that European firms actively engage in downsizing activities. For instance, firms downsize their assets by selling receivables at a discount and use the proceeds to pay off debt. Bernard et al. (2018) conclude that at least 8% of firms close to thresholds actively manage their size downward. In addition, they conclude that companies involved in downward management on average sacrifice more than 6% of their total assets. Thus, the imposed proprietary costs of disclosing sensitive information are large enough to sacrifice substantial amount of assets, which on average corresponds to

7-9 % of annual income. Consequently, mandatory regulations affect firm behavior and firms actively act to avoid regulations (Bernard et al. 2018).

3.3 Risk management

In literature, a firm's total risk is defined as the risks inherent to firm's operations, because of both external and internal factors. Further, the external and internal risk factors can be divided in to systematic and unsystematic risk. Systematic risks are events that arise from outside the corporate structure and therefore these external events are neither controllable nor possible to forecast properly for an individual company (Jo and Na, 2012). Systematic risks are known as undiversifiable risk, since it is not possible to reduce the associated risk factors and they affect the entire market. Several external risk factors affects the systematic risks of specific company, amongst others, economic, natural and political factors. Economic risks factors includes changes in market conditions, as an economic downturn, which affects the profitability of the entire financial market. Natural factors can be natural disasters that affects a market segment or a specific region, these events are very hard to predict, thus very hard to be diversified from. Political risks relates to factors as political changes and policy interventions on national or international level that will affect a large number of individual companies (Jo and Na, 2012).

Unsystematic risks also referred to as idiosyncratic risk. It is defined as risks unique to a specific company or industry. The main difference of systematic risk and unsystematic risk is that the latter can be reduced by risk management procedures. For a single asset, the unsystematic risk can be mitigated by reducing internal risk factors. Internal risk factors arises under normal business operations, therefore they can be forecasted with some reliability and it is possible to reduce them (Godfrey, 2009). There are multiple reasons behind idiosyncratic risk, amongst others internal factors such as; Human factor, technological risks and physical risks. Human factor risks can include union strikes, ineffective management or failure by subcontractors. This can include risks within the supply chain or operations, which is not taken in to consideration of management. These risks can be mitigated by having internal risk management systems in action. Technological risks relates to unforeseen changes in the value creation chain of a company's product or service. Physical risks is defined as risks to the assets of a

company, this could be because of loss or damage. These factors can be reduced by forecasting or hedging (Montgomery and Singh, 1984).

To mitigate the risks inherent to firms operations, enterprise managers and financial managers utilize risk management tools. Risk management relates to the process of systematically investigating, analyzing and reducing different types of risks (Nocco and Stultz, 2006). According to Nocco and Stultz (2006), risk management has seen a dramatic increase of importance in organizations. Previously, risk management was mostly related to insurance and hedging of financial exposure. Today, the role of risk management has expanded further to include a variety of risks, such as operational risks, strategic risks and reputational risks. Generally, a corporation manages risks by 1) one risk at a time, where every department manages their own specific risks or 2) combining all the risks together and creating a strategic framework (Jo and Na, 2012). Risk management procedures are important for managers to quantify and manage risks inherent to the operations. By defining the risks, it is possible for employees at all levels to mitigate them, which is an important aspect of risk management (Godfrey, 2005). The importance of risk management procedures on a macroeconomic level is not to reduce the systematic risk part of the total risk, but rather to reduce the diversifiable risks of a company. An example could be an unexpected spike in currency or commodity prices, which can have costs that goes beyond the cash flow and earnings. These costs are referred to as “deadweight” costs and comprises amongst others of lost investment opportunities or raising costly equity to be able to invest in new opportunities. Thus, by investing in risk management systems a firm can decrease exposure to both systematic and idiosyncratic risks. A higher level of risk within a company can end up reducing value because of costs derived from not investing in valuable projects or disrupting normal operations. Therefore, it is important for a company to understand how various decisions influences the total level of risk (Nocco and Stultz, 2006).

One challenge that a company faces when implementing risk management measures is to determine what the optimal amount of risk for the specific company. Determining the risk level is an important aspect for defining the size of the buffer of equity needed to handle negative reactions. Some risks are hard to manage, thus there are limits to the advantages of risk management systems. According to Opler et al., (1999) excess cash holdings can be valued by the market at as little as 60 cent per dollar.

Therefore, by reducing risk a company can limit the equity capital needed handle potential risks and increase the valuation of the company. By incorporating a risk management system in an organization managers can limit the probability of negative reactions. When optimizing firm risk, it is a tradeoff between the costs that it would incur, and the gains from increasing or decreasing risk. According to Nocco and Stultz (2006) a company can use standardized risk measures as Value at Risk or Expected Shortfall for calculating the potential costs of risk in the organization.

3.3.1 The link between nonfinancial disclosure and risk

Historically, the types of risks included in risk management procedures has been financial risks, such as currency risks, commodity risks and asset price collapses. However, according to the 2018 World Economic Forum's global risks report, ESG-risks account for the largest economic risks for businesses in 2018. Additionally, a report by Sustainalytics (2019) on systematic risk trends defines that there exists a management gap between the ESG-risk exposure and the risk management systems in many firms. They claim that the largest risk facing individual companies is unmanaged ESG-risks, which can have large implications on stock price, future sales, public scrutiny and reputation. Examples of where ESG-risks arise are often in the supply chain or in unmanaged or dangerous environments.

Environmental risks is more prone to arise in firms that emits toxics, greenhouse emissions and wastewater. Social risks are more likely to impact companies with unmanaged supply chains, or unsafe working environment. Governance risks faces all types of organizations with low transparency on its reporting, diversity and anti-corruption policies.

Previous literature defines CSR and ESG-reporting activities as corporate actions made with the intent to improve social conditions beyond firm specific interest (Mackey et al. 2007; Godfrey et al. 2009). Voluntary CSR related activities can thus be seen as gifts or grants from firms to external stakeholders. It is a way for firms to act altruistically and signal awareness and social responsibility. Godfrey et al. (2009) claim that this signal of altruistic behavior can create a moral capital among stakeholders, which can be utilized when negative events affect the firm. The moral capital is present in the form of intangible goodwill serving as a buffer facing negative events. By conducting an event-study for over 160 firms, Godfrey et al., (2005) find that firms with an extensive moral capital derived from CSR-disclosure are less punished by the market in the case of a negative event. Hence, investments and

disclosure of CSR-activities create an “insurance-like” risk protection, thus reducing total firm risk (Friedman, 1953; Godfrey 2005).

Further, research from Hutton et al. (2009), Jim and Myers (2006) and Kim and Zhang (2010) shows that information transparency and risk is coupled. Firms with lower information transparency exhibits a higher possibility of a future stock price crash risk. Stock price crash risk, defined as extremely negative returns, is central for risk management and investment decisions. According to Jim and Myers (2006) the stock price crash risk arises due to information asymmetries between managers, investors and stakeholders. It occurs when managers are able to hide bad news, until the amount of bad news crosses a tipping point when all bad news are released at the same time. A survey on the literature of causes of stock price crash risk by Habib et al., (2017) suggests that stronger external monitoring mechanisms such as mandate nonfinancial disclosure mitigates stock price crash risk.

Lee and Faff (2009) examines the link between voluntary nonfinancial disclosure and stock price crash risk. They find that companies with leading (lagging) corporate social performance experience a lower level of (higher) idiosyncratic risk. They conclude that nonfinancial disclosure reduces idiosyncratic risk. Additionally, Kim et al., (2014) find that companies with a high level of transparency in their CSR activities are negatively associated with future crash risk. The positive effect of ESG-disclosure is stronger for firms with less effective corporate governance or a lower level of institutional ownership. Further, Lee and Lee (2016) use a sample of firms on the Taiwan stock exchange and show that nonfinancial disclosure mitigates stock price crash risk.

Furthermore, firm size is considered as an important aspect when it comes to the inference between risk and CSR-related activities. Larger firms, with a bigger market presence are exposed to more risk in comparison with smaller firms (Godfrey, 2007). Larger firms are not only more exposed, but they are also suspects to greater scrutiny from stakeholders, media and special interests than their smaller counterparts (Rindova et al. 2006). Thus, the probability of negative outcomes in relation to negative events is higher for larger firms and as result, they should be more eager to invest and engage risk management activities related to CSR (Kimberley, 1976). In addition, industry belonging is also considered an important aspect as different industries are exposed to various amounts of risk (Jo and

Na, 2012). Firms operating in industries closely watched by media and various stakeholder groups are likely to engage in more ESG-activities than firms in less controversial industries. Jo and Na (2012) examine the relationship between firm risk and ESG-activity in controversial industry sectors such as tobacco, gambling and alcohol and confirm a negative relationship, which implies that ESG-activities reduces risk. Thus, they strengthen Godfrey's (2005) finding regarding an "insurance-like protection" from CSR-related activities.

3.3.2 Risk measures

Risk management is a central competence within financial institutions and companies, where the ability to measure and manage risk is of great importance. Emmer et al., (2013) define the properties of a risk measure as measurement of risk expressed in numeric form. Historically, Cramér (1928) introduced the ruin theory, to describe an insurer's exposure to insolvency, and was one of the first researchers on capital risk. After the contribution of modern portfolio theory by Markowitz (1952), the variance of the Profit and Loss became the leading risk measure in the field of corporate finance. The mathematics underlying modern portfolio theory was used to derive the first generally accepted risk measure, Value at Risk (VaR), in the early 1990's. Originally, VaR was a service created by J.P. Morgan to measure risk exposure, and quickly found an audience among both commercial banks and regulatory authorities. The U.S Securities and Exchange Commission (SEC) adopted Value at Risk for calculating capital requirements of banks, which became the standard within the financial sector (Hopper, 1996). After this, several additional risk measures have been tested, of which Expected Shortfall (ES) has been most popular and in some instances replaced VaR. The Basel Committee on Banking Supervision (2013) recommends substituting VaR for ES in risk models and systems, since it has the important property of coherence. According to Emmer et al., (2013) the most well-used and accepted risk measures for the financial markets are Value at Risk and Expected Shortfall.

3.4. Hypothesis development

Market reaction to implementation of EU-regulation

Previous research implies that ESG-disclosure affects individual companies in various ways, and that investors nowadays seek nonfinancial data to reduce information asymmetries (Eccles et al. 2011; Hung et al. 2015). In addition, Cheng et al., (2014) find that increased nonfinancial disclosure has the similar impact as increased financial disclosure to reduce informational asymmetries. From an economic perspective, banks tend to be more willing to finance companies with an extensive nonfinancial disclosure, as increased transparency lead to better insight and understanding of firm risk. Another important aspect is from employees' perspective. Firms with a good disclosure record tend to be a more attractive employer, boost employee's morale and even increase safety for their employees. These effects tend to arise regardless if the nonfinancial disclosure is voluntary or mandatory by regulation (Dhaliwal et al. 2012; Chen et al. 2017).

However, a mandatory regulation may have different effects on market participants. As transparency increases, investors, in similarity to lenders, are given further insight into firms' risks and future performance, which can be applied in valuation models (Ioannou and Serafeim, 2017). The European Commission's Guidelines on nonfinancial reporting (2018) requires companies to follow a thorough framework, which requires disclosure on multiple matters, presented in an understandable manner. The information to be disclosed in the report will have an impact on a company's transparency level and risk disclosure. However, whilst mandated disclosure could lead to improved operating efficiency, better product quality and as mentioned better recruitment it is also plausible to believe that it impose costs upon the treatment firms affecting firm risk. Imposed costs related to the implementation of the mandate could be traced to proprietary effects, political costs and costs related to prepare and disseminate new information (Jensen and Meckling, 1978; Healy and Zimmerman, 2001; Grewal et al. 2018).

We believe that we will observe a similar effect of mandatory nonfinancial disclosure on the European market as previous findings on the Chinese market. After the implementation of the Chinese mandate, Chen et al., (2017) observe positive externalities at the expense of shareholders and profitability.

Further, findings on the European market by Grewal et al., (2018) show that as 2014/95/EU passed through different EU instances, the companies subject to it experienced a negative market reaction, suggesting that the market perceives the mandatory regulation as negative.

Based on the above findings, we believe that the implementation 2014/95/EU will have a negative impact in terms of risk on the companies affected by it. The findings from similar events suggests that markets participants see that either the costs of nonfinancial disclosure outweighs the benefits, and/or that disclosing new information is negative for individual companies. Consistent with the above argumentation our first hypothesis is stated as follows:

Hypothesis 1. Treatment firms experience an increased risk after the implementation of the mandatory regulation compared to control firms.

Impact of pre-regulatory ESG-performance

As mentioned, empirical findings suggest that nonfinancial disclosure have implications on financial performance, financing and valuation (Margolis et al. 2011; Plumlee et al. 2015; El Ghouli et al. 2015). Further, research have shown that an extensive record of ESG-reporting reduces information asymmetries (Dhaliwal et al. 2012; Hung et al. 2015). Therefore, databases such as Thomson Reuters and MSCI have developed ESG-performance ratings for individual companies, which can be used for comparing firms. The performance ratings quantifies how individual companies incorporates ESG-matters and the level of disclosure related to such activities (Thomson Reuters, 2019; MSCI, 2019). In a study by Grewal et al. (2018), the performance ratings are used to investigate if there are differences in the stock market's reaction to 2014/95/EU depending on prior ESG-performance. They find that treatment firms with high ESG-performance prior to the announcement of 2014/95/EU had a significantly smaller negative stock reaction by the announcement of the regulation. The explanation of this finding is that firms with an already high transparency can mitigate the informational shock and therefore reduce the political and proprietary costs related to the mandated disclosure of nonfinancial information. In similarity to Grewal et al., (2018) we therefore posit that firms with a higher level of disclosure in the pre-regulatory period will have less informational asymmetries and that the expected

and actual costs related to the implementation of the mandate will be lower. Consequently, high quality pre-regulatory disclosure mitigates the increase of risk.

With the above-mentioned serving as a fundament, we believe that treatment firms with a high ESG-performance prior the implementation of 2014/95/EU will be less affected by risk after the implementation of the mandate. Our hypothesis is stated as following:

Hypothesis 2. Firms with a relatively high pre-regulatory ESG-performance will experience a lower increase in risk compared to firms with a relatively low pre-regulatory ESG-performance after the implementation of the mandate.

4.0 Research design

4.1 Difference-in-difference study

There is no single method for measuring how regulatory disclosure interventions affects risk of individual companies, but previous studies have used difference-in-difference approaches to capture the effects of disclosure interventions (Chen et al. (2017; Ioannou and Serafeim, 2017). Differences-in-differences estimation (DiD) is a quasi-experimental method for studying effects from a common type of event on a population that receives treatment i.e. the treatment group, and a population that does not i.e. the control group. A DiD method is intended to mitigate impact of external factors, and selection bias. The overall idea behind a DiD estimation is to observe the two groups during two time-periods, where neither of the groups are exposed to a treatment in the first period, but one of the groups are exposed to a treatment in the second period (Ashenfelter and Card, 1985). According to Athey and Imbens (2006) a DiD estimation is suitable for observing effects from events that includes regulatory intervention, policy changes and large-scale program implementation. DiD requires repeated cross-sectional data or panel data, on individual or group level from pre and post the intervention. By comparing the treatment and control group, pre and post intervention the approach eliminates potential biases in the post intervention period that could be the outcome from fixed differences between those groups. Additionally, DiD removes biases in the treatment group since it eliminates differences that could be the result of trends from other causes than the dependent variable (Abadie, 2005). The use of a DiD estimation makes it possible to isolate the effect implementation of Directive 2014/95/EU has on firm specific risk. The generic DiD model for cross sectional analyses of any group can be expressed as:

$$y = \beta_0 + \beta_1 dB + \delta_0 d2 + \delta_1 d2 \times dB + \beta_3 X2 \dots + u$$

Equation 1 – Difference-in-Difference regression

In the equation, y is the dependent variable, the output term, which we use the independent variables to explain. The independent variables $d2$ and dB are expressed as a dummy for denoting differences in

time periods (pre or post regulatory) and treatment or control sample. The dummy variables captures factors causing changes in y even if y was unaffected of the changes. The variable dB is a dummy that captures differences between the two groups prior to the external treatment. The term δ_1 is an interaction term that multiplies $d2 \times dB$. In the difference-in-difference model this is the most interesting term since it denotes if there are any significant differences between the treatment and control sample in the treatment period that were not apparent in the pre-regulatory period (Ashenfelter and Card, 1985). The estimate of the interaction term in the difference-in-difference is expressed as:

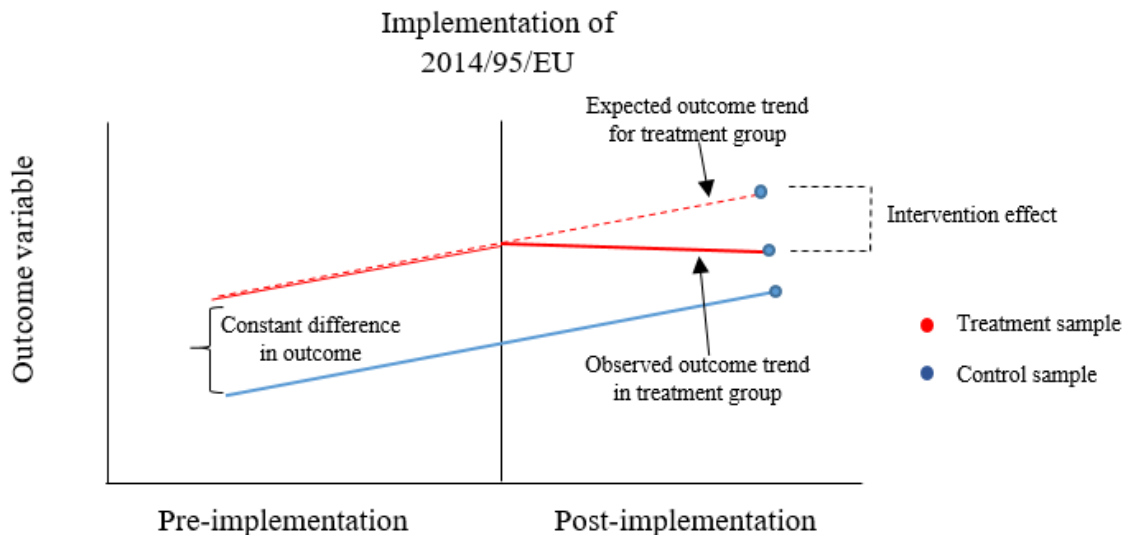
$$\hat{\delta}_1 = (\bar{y}_{B,2} - \bar{y}_{B,1}) - (\bar{y}_{A,2} - \bar{y}_{A,1}).$$

Equation 2 – Difference-in-difference interaction term

4.1.1 Application and timeline of difference-in-difference study

By applying a difference-in-difference research design, we are able to observe and compare the change in risk (measured in VaR and ES) among treatment firms subject to the mandate, and control firms not subject to the mandate. In the model, we will match treatment and control firms based on country of origin and industry as a first step. In the second step, firms will be paired by using the closest control firm based on market value and market-to-book ratio. Hence, we are able to make our treatment and benchmark firms comparable. The DiD model will be able to identify if there are any differences between the treatment firms and benchmark firms when comparing the difference in firm specific risk pre and post implementation of regulation.

In the regression model, the sample will be divided into four groups where the matched firms will be paired before and after the implementation. The DiD regression will then pick up differences in risk between the two paired samples before and after the regulatory change. The difference will be observable in the interaction term between the two groups. To be able to conduct this study it is important to be able to define the date for the regulatory intervention. The timeline of the event will be further developed on in section 4.1.2 below. The following graph (Graph 1) provides information of how the difference-in-difference estimator functions.



Graph 1 – Difference-in-difference estimation

The first step in our research design will be choosing the event date for the implementation of the 2014/95/EU mandatory disclosure legislation. By selecting a date, we can measure the risk impact of nonfinancial disclosure. Further, we will be able to observe if the market rewards companies for disclosure of new information, or if the new information increases the observable risk of individual companies. The second step will be the matching of treatment and control firms that are comparable on various characteristics, especially important are the country and industry affiliation. The third step will be creating and dividing the sample in to groups to construct dummy variables for making the DiD-estimation possible.

4.1.2 Event date

To be able to perform a difference-in-difference study it is important to define the event where the differences may arise between the two groups (Henderson, 1990). According to Henderson, (1990) the timing of an event may not necessarily defined as of when it occurred, but rather the time when the most informed segments of the market anticipated the news. We therefore choose the implementation of regulation 2014/95/EU as our event date.

The timing of the event is determined as January 1, 2018 stated in the European Commission's guidelines on nonfinancial reporting "Companies concerned will start applying the Directive as of 2018, on information relating to the 2017 financial year" (European Commission, Communication from the Commission Guidelines on nonfinancial reporting, 2017a; Page 2). Hence, the possible dates for a nonfinancial report to be published is between the January 1st, 2018 to the 31st of December 2018. Since the nonfinancial disclosure is to be published together with the annual report and the fact that European Companies may release annual reports during the entire year of 2018, the post regulatory period must include the entire year. For the difference-in-difference regression to function, we must also include a time period pre-regulatory implementation. Otherwise, it is not possible to observe any differences in risk of the two samples before and after the external treatment. According to Henderson (1990), the two estimation windows in an difference-in-difference study should be identical pre and post intervention. Therefore, the event window for the implementation of 2014/95/EU is defined as January 1, 2018 +/- 365 days. See image 1 for the selected event window for the event.

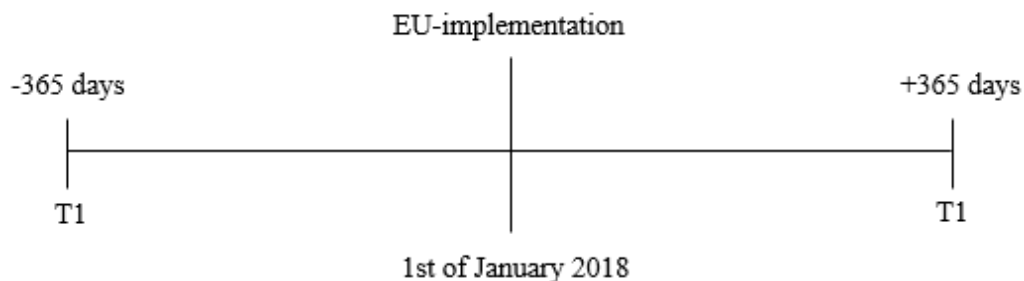


Image 1 – EU implementation date

4.2 Sample and data selection

4.2.1 Sample selection

Treatment sample

To be able to conduct the difference-in-difference regression we need to define a sample of companies that are affected by the implementation of 2014/95/EU. The companies affected by the regulation will become our treatment sample. The companies in the treatment sample are the companies that are in the scope of the requirements stated in the legislative transposition in table 1. In the following section, we will describe the requirements for the observations in the treatment sample:

1. The company must be publicly listed
2. The listing must be the main listing (country of origin)
3. The company has to be listed during the full time span of the event window (see 4.1.2).
4. Specific data for the event must be available on company level. We need this to be able to distinguish if the company is affected by the legislation or not. The following is required: *Number of employees, Net sales and Total Assets*.
5. Company specific data for matching must be available; *listing country, Industry-affiliation, market-to-book ratio and market value*.

First, the choice of only using publicly listed companies enables us to track daily movements in stock prices, a requirement to conduct the calculations of our risk measures, Value at Risk and Expected Shortfall. Secondly, to remove duplicate observations in our sample we need to limit observations from companies with multiple listings in different countries and/or markets. Therefore, we only include primary listings and no second notations on additional stock exchanges in Europe.

As a third requirement, the companies in our sample must have been listed during the entire event window and the event comprises of January 1, 2018 +/- 365 days. The reason behind this choice is that we require data for the year before and after the implementation of the regulation to be able to conduct the difference-in-difference regression.

The fourth requirement is the need for observable data regarding the criterias as defined in the specific legislative text for each country (table 1). The reason behind this is that all companies that fulfills the specific requirements in table 1 will be prompted to disclose a nonfinancial report. To be able to measure the impact of the legislative change on risk we need to segment companies in to treatment and control samples depending on if they fulfill the national requirements of 2014/95/EU. The national requirements relates to average annual number of employees, net sales and net assets.

Fifth, in line with previous research from Chen et al. (2017) and Grewal et al., (2018) we have used an automated matching function to enable best matching of treatment firms and control firms. First off, the matching requires that both the treatment and the control company operate in the same industry, and are based in same country to control for industry and regional factors. The next step in the matching is with help of an excel function that requires data on market-to-book ratio and market value (The matching function will be further described in section 4.2.4). Therefore, the companies in our sample must provide company specific data to enable matching. The data that we require disclosure of are industry-affiliation, listing country, market-to-book ratio and market value.

Control sample

In addition to the treatment sample, we need to identify all the companies that does not fulfill the requirements as stated in the regulatory text. The control sample consists of companies that are below the identified requirement for nonfinancial disclosure in table 1. Hence, the control sample will not be obliged to disclose a nonfinancial report, and therefore these companies will form our control sample. The control sample is required in the difference-in-difference estimation since they will highlight any differences in risk between the two groups. For the sample selection of control companies, we apply the same requirements as for the treatment sample. Hence, it is required that the control companies have accessible data on all the aspects as stated for the treatment sample. The main difference between the two samples is that control companies does not fulfill the requirements stated by the regulation in terms on either number of employees, net sales and or net assets.

4.2.2 Sample exclusion

The purpose of this paper is to study how the implementation of mandatory nonfinancial disclosure impact observable risk measures of European companies. In order to define if a company will be affected by the new legislation, it is important that the firm disclose firm specific information related to the mandate. This means that if a company does not disclose information regarding the average annual number of employees, annual net sales or total assets it will not become a part of our sample.

Since the legislation is only applicable to European Companies, we therefore exclude any companies that has an original listing on any stock market that is not European. Further, we eliminate all observations from European countries that already has legislative standards on nonfinancial disclosure that are similar or stricter than 2014/95/EU. The rationale for this is that in countries with higher standards we will not be able to measure the impact of the new legislation. The only country affected in our sample by this is Denmark, which introduced a mandatory nonfinancial disclosure regulation in 2008, and today all listed companies must report nonfinancial information in a social responsibility report (Ioannou and Serafeim, 2017; Erhvervstyrelsen, 2016). Due to the regulatory difference between Denmark and the rest of the European Union 80 Danish companies were excluded from the sample.

Further, we excluded companies from our sample that shared the same tickers in Thomson Reuters Datastream. Since we used the tickers for gathering different types of data, a prerequisite was that the individual companies had to have unique tickers. Hence, if two companies share the same ticker they were both excluded from the sample. The only market this occurred on was the French market, where we excluded 28 French companies that shared the same ticker. As a final step, we chose to remove companies from our sample that had missing data on any of the control variables. This decision was made to incorporate additional company-level control variables that could have an impact on the risk of an individual company.

After excluding companies according to the mentioned requirements, the complete sample consisted of 3266 companies for the implementation event.

4.2.3 Data selection

The study requires access to financial data from a large sample of European companies. To enable us to divide companies into groups that are affected, and not affected by the regulation, we require that specific company data is available over two periods.

Company specific data

The firm specific data for all the observations in the study have been collected using the service Worldscope from Thomson Reuters DataStream. This includes both requirement sorting data such as number of employees, annual net sales or total assets and data for control variables. In the study we have used the excel add-in provided at Copenhagen Business School. Datastream is a global data platform containing financial, macro and historical data from 175 countries and over 60 markets (Thomson Reuters Datastream, 2019). In our study, we primarily used the equity information on Datastream, since it includes complete data on the European markets.

Share price data

For the calculation of the risk measures, we require daily share price data. The share price data used for calculating the dependent variables, VaR and ES, has been collected using Thomson Reuters Datastream and comprises of daily closing prices for the entire event window used in the study.

ESG-performance

Environmental, Social and Governance performance ratings were accessed through the database Asset4 by using Thomson Reuters Datastream. Asset4 is a World Leading ESG-service provided by Thomson Reuters, the service aims to transparently and objectively measure a firms ESG-performance, commitment and effectiveness. Asset4 measures a company's effort over ten main themes, amongst others: Emissions, environmental product innovation, human rights and shareholders. Asset4 ratings contains over 400 different measures that is updated on a continual basis aligned with reporting patterns and new products. The ESG-ratings are updated on a weekly basis when news relating to a company are disclosed (Thomson Reuters, 2019). From the 400 measures collected, Asset4 produces an ESG-rating, which can be used for comparison of companies ESG-performance. Thomson Reuters

ESG-rating measures a firms ESG-performance based on reported data in the public domain. The measurements are divided into three broad categories that is composed of environmental, governance and social (Thomson Reuters, 2019).

The total number of observations provided through the database amounts to approximately 7000. However, only just above 1200 of these observations refers to European firms (Thomson Reuters, 2019). The limited data for European companies meant that only a fraction of our treatment sample had ratings available on their historical ESG-performance. In total, we were able to tie ESG-performance to 344 treatment firms.

4.2.4 Matching

An important design choice when conducting a difference-in-difference study and examining the effects of a regulatory intervention is to identify suitable benchmark firms to remove other non-regulatory news, which may interfere the results during the event window (Henderson, 1990). As a first step, we divided the sample in to treatment and control groups depending on firm-specific characteristics defined by the legislation. As a second step, we match all treatment firms with a suitable control firm by matching on the following variables: (1) Country and industry, (2) market capitalization and market-to-book ratio. This matching function is in line with Grewal et al. (2018) and by using country and industry as the first matching criteria, we eliminate unrelated market reactions attributable to specific countries and industries. This division is considered as a control for systematic risk, since two companies in the same country and in the same industry should be exposed to similar external risks. After controlling for industry and country, the second step is to control for firm specific similarities, which can be seen as a matching for the same level of unsystematic risk. Attributable to firm specific similarities are variables such as market capitalization and market-to-book ratio. These variables were used as a second layer in the matching process. Thus, the two first matching criterias are objective, whilst the two latter can be seen as more subjective. To control for the subjective matching criteria we created a sorting function for market capitalization and market-to-book ratio. This function automatically matches the treatment firms with the most appropriate control firm. In the first step the mathematical function retrieves all possible control companies from (1) same industry and country as the treatment firm. (2) Removes the potential control firms that have either, +/- 12 times difference as

measured in market capitalization or +/- 4 times difference in MTBV. (3) Sorts and ranks all the possible control firms on how close they are in terms of market capitalization and in MTBV to the treatment firm, and assigns them a score individually. The firm with the highest weighted score is closest to the treatment firm. As the last step, the function chooses the company with the highest score as the most suitable control company.

To make the order of matching irrelevant and align the study with previous research on the European mandatory disclosure regulation by Grewal et al., (2018) the primary matching process allows for replacement matching. This means that one control firm can be matched with different treatment firms multiple times. The advantage of using replacement matching is that we can use the most appropriate control company for every treatment firm. Hence, we can use the most suitable matching based on country, industry, market-to-book ratio and market capitalization. The alternative matching process, which does not allow for duplicate use of control firms is not used in the study. As expected when tested, this alternative method decreased the number of matched firms significantly to 460 for the implementation event (Table 3).

When segmenting companies into industries we use the Level 6-subsector classification in Datastream. The classification used by Datastream is based on the Industry Classification Benchmark (ICB) created by the Financial Times Stock Exchange (FTSE) and Dow Jones. The IBC classification has several levels from 2-6, where 6 is the most detailed. Level 2 divides the market broadly in to ten industries, whereas level 3-6 subdivides the classification into increasing detail (Thomson Reuters Datastream, 2016). In the study, we chose use the level 6 subsector classification to enable us to make the most appropriate matching depending on the industry affiliation.

Table 3 – Matching Specification

Matching specification	(1)	(2)
Matched sample EU implementation	Single	replacement
	460	2010

Table 3 – Matching specification

4.3 Difference-in-difference model

4.3.1 Difference-in-difference approach

As mentioned, we choose to apply a DiD model to investigate the relationship between risk and mandatory nonfinancial disclosure in the European Union. The model is based on OLS-regression, we present OLS-tests in appendix 2. In the model, the most important term is the interaction term $\beta_3 AffectedRegulation * RegulationInEffect$, since it measures the difference in risk between the treatment and control sample pre and post the implementation of the regulation. This means that, if there are any significant differences in risk of the treatment and control groups' in the period after the regulation, that was not present before the regulation, the model will pick this up. In the model specification there are both independent dummy variables and control variables. The dummy variables can take the value 0 or 1 depending on if the time period is before or after the implementation. Additionally, the second dummy variable can take the value 0 or 1 depending on if the company is a treatment or control company. This enables the model to differentiate which observations relates to the respective time period or sample. The control variables included in the model are a series of firm specific control variables. The dependent variables are Value at Risk and Expected Shortfall measured at a 95% and 99% confidence interval. We present the generic models for the difference-in-difference estimation.

Generic model difference-in-difference estimation, using Value at Risk:

$$\begin{aligned} VaR(\%)_i = & \beta_1 AffectedRegulation + \beta_2 RegulationInEffect + \beta_3 AffectedRegulation \\ & * RegulationInEffect + \beta_4 MTBV + \beta_4 MV\text{€} + \beta_5 Age + \beta_6 DebtEquity \\ & + \beta_7 PropertyPlantEquipment + \beta_8 Salesgrowth + \beta_{10} ROIC \end{aligned}$$

Equation 3 – Difference-in-difference regression Value at Risk

Generic model difference-in-difference estimation, using Expected Shortfall:

$$ES(\%)_i = \beta_1 AffectedRegulation + \beta_2 RegulationInEffect + \beta_3 AffectedRegulation \\ * RegulationInEffect + \beta_4 MTBV + \beta_4 MV\epsilon + \beta_5 Age + \beta_6 DebtEquity \\ + \beta_7 PropertyPlantEquipment + \beta_8 Salesgrowth + \beta_{10} ROIC$$

Equation 4 – Difference-in-difference regression Expected Shortfall.

4.3.2 Dependent variables

In statistical models, the dependent variable is used to investigate the relationship of the independent variables and the dependent variable (Henderson, 1990). Therefore, the dependent variable must measure the effect of interest in the study. The dependent variables used in this difference-in-difference study are Value at Risk and Expected Shortfall, which are two risk measures. We use these risk measures as our dependent variables since we want to examine the effect mandatory nonfinancial disclosure has on risk management. The dependent variables are used at two different confidence levels, 95% and 99%. The rationale behind this decision is to examine if the results differ depending on what confidence level we apply. The 99% confidence level involves more negative movements, which are less likely to occur, compared to the 95% confidence level.

The calculations for both Value at Risk and Expected Shortfall are presented in section 4.3.3, and 4.3.4 respectively. In the DiD estimation, the dependent variables are studied for the treatment and the control group pre and post implementation of the regulation. The DiD estimation can therefore observe if there are any significant differences in the dependent variable between the two times and treatment and control group, depending on the independent dummy variables. By using the risk measures VaR and ES as dependent variables, we will be able to observe if the regulatory change has altered the relative risk of the treatment and control group after the change, compared to the pre-regulatory period. Thus, the estimator will be able to point out differences between the two groups due to the regulatory change. We are interested in seeing if the regulation has increased or decreased the risk of the treatment sample compared to the control sample.

Value at Risk

Value at Risk (VaR) is a well-used and popular statistic that can be used to quantify the financial risk within a firm, portfolio or position. VaR is used for approximating the loss an asset or a portfolio likely will suffer in a defined time-period (Rockafellar and Uryasev, 2002). In general form Value at Risk expresses the potential minimal loss in a risky asset or portfolio for a specified confidence interval. The confidence interval level determines the magnitude of the loss and how often it occurs. According to Artzner et al., (1997) one drawback of VaR is that it has undesirable mathematical characteristics which is related to subadditivity, convexity and coherence. This creates problems for portfolio optimization and scenario analysis with VaR (Hopper, 1996).

In general form, Value at Risk expresses the potential loss of an asset or portfolio over time given a specific confidence interval. A confidence level at 95% corresponds to the price change at the 95th percentile of the negative price changes. VaR is a good estimator of the potential minimum loss given a specific confidence level, and is most commonly measured at the confidence intervals 95% and 99% (Hopper, 1996). There are several ways to estimate VaR, but we choose to use the variance-covariance method. Since the variance-covariance method assumes that stock returns are normally distributed it only requires that we estimate two factors, an expected average daily return and the standard deviation.

Step 1 – Calculate the average daily return for the asset based on historical stock price movement. We incorporate daily stock price data +/- 365 days from 1st of January 2018.

$$\bar{r}(x1) = r_1 + r_2 + r_3 \dots \dots + r_n$$

Equation 5 – Average daily return

Step 2 – Calculate the daily standard deviation for the individual assets returns. This allows us to plot a normal distribution curve to the daily returns. See appendix 3 for the test of normality distribution of stock returns.

$$\sigma(x1) = \sqrt{\frac{\sum(r - \bar{r})^2}{n}}$$

Equation 6 – Standard deviation of asset

Step 3 – Calculate the Value at Risk given the confidence interval. In our study, we choose to measure VaR at 95% and 99% confidence level respectively. Since we assume a normal distribution, we know the probability distribution for the different confidence levels. The number of standard deviations for a 95% confidence interval (expressed as $1 - \alpha$) -1, 65 and for 99% confidence interval -2, 33.

$$\text{VaR}_{1-\alpha} = \bar{r}(x1) - ((1 - \alpha) * \sigma(x1))$$

Equation 7 – Value at Risk

In the equation above, $\text{VaR}_{(1 - \alpha)}$ denotes the Value at Risk expressed in percentage loss at the chosen confidence level for the asset. We conduct the calculations for every company in our sample and repeat the calculations pre and post regulatory implementation. From these calculations, we are able to observe the minimum expected negative stock return for the time period's pre and post-implementation of 2014/95/EU, on both 95% and 99% level. The reason behind calculating the Value at Risk pre and post regulation is because the difference-in-difference estimation requires risk measures before and after to find any potential differences in risk after the treatment event.

Expected Shortfall

Due to the observed drawbacks of VaR, another approach for optimizing and hedging portfolios of financial instruments is included. Expected Shortfall, also known as Mean Shortfall, Conditional Value at Risk, Tail Value at Risk and mean excess loss is a risk measure that measures the worst outcomes for a defined period given a confidence interval. It differs from Value at Risk in the way that it presents the expected loss in the worst $x\%$ of cases, instead of the minimum loss. Hence, it includes all the losses in the far end tail of the loss distribution (Rockafellar and Uryasev, 2002). Given a confidence level at 95% it corresponds to the mean of negative price changes at the 100th-95th percentile. Therefore, the measure also includes the worst outcomes in the estimation and is claimed to be a better estimator of actual risk than VaR (Emmer et al. 2015). The method is derived from calculating VaR, with an important additional step.

Step 4 – Calculate the average of the values that fall beyond the Value at Risk at the given confidence level. The additional step includes the possibility that the loss exceeds the confidence level and includes the average tail risk with the second term.

$$ES\%_{1-\alpha} = E(Loss \mid Loss > 1 - \alpha) = \int_{\alpha}^1 \frac{1}{1 - \alpha} (1 - \alpha) dp$$

Equation 8 – Expected Shortfall

In the equation above, $ES\% (1 - \alpha)$ denotes the estimated Expected Shortfall expressed in percentage loss at the chosen confidence level for the asset. These calculations are repeated for every company in our sample, identically as for the Value at Risk. From these calculations, we are able to observe the expected negative stock return for a year, on both 95% and 99% level.

4.3.3 Independent variables

To investigate the impact on the dependent variables we will include two independent dummy variables *AffectedRegulation* and *RegulationInEffect*.

Affected by regulation

The independent variable *AffectedRegulation* is constructed as a dummy variable. When assigning the dummy variables we follow the approach used in a similar study by Ioannou and Serafeim (2017) on mandatory nonfinancial disclosure. If the specific company is affected by the regulation, the dummy variable takes on the value 1. Hence, the observation becomes one of the treatment companies.

However, if the variable takes the value of 0, the observation is not affected by the regulation. This means that the company does not fulfill the requirements for mandatory nonfinancial disclosure.

According to Suits (1957), using dummy variables for introducing information that is not measured conventionally on a numerical scale in a regression analysis is a useful and powerful method. The approach used for defining dummy variables in the event are described below.

The adopted proposition of 2014/95/EU is subject to customization by every member state. We refer to table 1 for a complete requirement list for every individual state. In generalized form, the rules are regarding the number of employees, net turnover and net assets. Therefore, a treatment or control firm are defined following the process below:

$$\text{Company } X_n > \text{requirements defined by country} = 1$$

$$\text{Company } X_n < \text{requirements defined by country} = 0$$

$$\text{Treatment company } X_n = 1$$

$$\text{Control company } X_n = 0$$

Equation 9 – Definition of implementation sample

Regulation in effect

The variable *RegulationInEffect* is also constructed as a dummy variable in order to define the time, pre or post the implementation. In line with previous research by Ioannou and Serafeim (2017), we assign the number 1 for the observations in the time period post the implementation, and 0 for the observations prior to the implementation. This division of the sample into the different time periods is essential to be able to run a difference-in-difference regression.

The event date for the implementation of EU 2014/95/EU is defined as the 1st of January 2018. As specified in section 4.1.2, we study +/- 365 days around the stated date. The companies subject to the legislation must disclose their nonfinancial statement during the year 2018. Therefore, the time period pre and post the implementation are defined as:

Timeperiod before 1st of January 2018 = T1

Timeperiod from 1st of January 2018 = T2

Company $X_n T1_{18} = 0$

Company $X_n T2_{18} = 1$

Equation 10 – Definition of implementation sample

In the equation, T1 refers to data from 2017, the pre-regulatory period. T2 refers to data from 2018, the post-regulatory period. This means that all observations from the time after implementation of 2014/95/EU will be in T2.

Interaction term

As stated previously, the most important term in our regression model is the interaction variable *AffectedRegulation x RegulationInEffect*. It is used to interact the two independent dummy variables. In a difference-in-difference model the interaction terms coefficient describes the differences over time in the outcome variable between two groups (Ai and Norton, 2003). The outcome variables in our study are Value at Risk and Expected Shortfall. Ioannou and Serafeim, (2017) use the interaction of firms

affected by regulation and time period to study the consequences of mandatory nonfinancial disclosure. The interaction term is central for a DiD regression since it divides the observations and tests for differences between the two samples pre and post regulation. Since both independent variables are constructed as dummy variables, which can take the value 0 or 1 depending on the information contained, the interaction term can take on either 0 or 1 as value in the regression model.

The interaction term for the sample of the legislative change after the 1st of January 2018 is defined as following:

$$\begin{aligned} ControlCompany X_n T1_{18} &= 0 * 0 \\ ControlCompany X_n T2_{18} &= 0 * 1 \\ TreatmentCompany X_n T1_{18} &= 1 * 0 \\ TreatmentCompany X_n T2_{18} &= 1 * 1 \end{aligned}$$

Equation 11 – Definition of interaction implementation sample

Thus, control firms will be assigned the value of 0 in both periods, and treatment firms will be assigned either a 1 or a 0 depending on if the observation is retrieved from the pre or post-regulatory period.

4.3.4 Control variables

To control for and exclude alternative explanations in our results, we include control variables in our difference-in-difference model (Schmitt and Klimoski, 1991). In order to select the most appropriate control variables we follow Becker's (2005) criteria when choosing control variables. First, we choose variables based on previous, relevant research within the field. Thus, we find evidence and support for each control variable included. Second, we exclude control variables which could be interpreted as impotent, i.e. variables that are uncorrelated with the dependent variable. By following these criteria's, we are able include relevant and logical control variables in our tests (Becker, 2005). The control variables included are stated below.

Market-to-book ratio

Market-to-book ratio measures a company's market price compared to its book value. This ratio differs among industries. According to Hopper (1996) a lower market-to-book ratio can be seen as an increase in risk, when compared within an industry. According to theory, if the market-to-book ratio is lowered, the cost of equity rises, and increases the firm specific risk. Previous research conducted by Grewal et al., (2018) includes the variable as a control variable for firm specific risk. The ratio is calculated from the market price of all outstanding shares, divided by the net assets of the company. We access the data by using the Thomson Reuters Datastream, where we download the market capitalization for and total book value for every equity in our sample. We then conclude the calculations using Microsoft excel.

$$\text{Market to book ratio} = \frac{\text{Market Capitalization}}{\text{Total Book Value}}$$

Equation 12 – Market-to-book ratio

Market value

To control for size-related effects in our difference-in-difference model we choose to incorporate market value as a control variable. The measurement of market size is the total capitalization of the company's outstanding shares. We choose to denote it in Euro to enable comparison between different currencies. Numerous research papers in empirical finance has used market value as a proxy for firm size; Comment and Schwert, (1995), Core and Guay (1999), DeAngelo et al. (2006). In addition, Harvey and Siddique (2004) find that amongst other firm specific factors, firm size can be used to predict idiosyncratic risk in companies. The data is accessed by using Thomson Reuters Datastream.

$$\text{Market capitalization} = \text{Market price per share} * \text{Number of outstanding shares}$$

Equation 13 – Market capitalization

Age

To control for impact that might be attributable to the age of the company, we choose to incorporate age as a control variable in our model. The probability that a firm will fail decreases with firm age, defined as the number of years the company has been operational (Evans, 1987). According to Fink et al., (2006) older companies has a lower idiosyncratic risk. Fink et al., (2006) uses the time elapsed since the IPO for the calculation of age. In our study, we apply the same approach. The age of all companies is accessed through Thomson Reuters Datastream. See equation 14 for definition of firm age.

$$Age = \text{Number of years since IPO}$$

Equation 14 – Age

Debt to Equity

Debt-to-equity ratio (D/E-ratio) measures a firm's debt in relation to its equity. All observations of D/E-ratio are gathered from Datastream. Previous research, among all, Bhandari (1988), elaborates on stock returns relationship with D/E-ratio, and finds a positive relation between expected common stock return and D/E-ratio. Winn (2014) elaborates whether firms have optimal D/E-ratio, by estimating value functions for firms using regression analysis. In his study Winn (2014), concludes there is an optimal D/E-ratio for all companies, and that companies which stay close to their optimal level will experience higher returns. According to Baxter, (1967) a higher level of debt over equity is perceived as an increase of risk, due to the leverage effect. In our model the D/E-ratio is calculated as:

$$Debt\ to\ Equity\ Ratio = \frac{Total\ Liabilities}{Total\ Shareholders' Equity}$$

Equation 15 – D/E ratio

Property plant and equipment over Total assets

Property plant and equipment (PPE) is a broad definition of a company's tangible assets. Among all it can include vehicles, machinery, buildings, land and office equipment (IFRS, 2019a). Unlike PPE, total assets include intangible assets, such as patents and brands (IFRS, 2019b). Ambrose and Megginson, (1992) use the measure as a proxy in determining debt-capacity among different firms. A higher proportion of PPE, increase the debt capacity for a firm which may have an impact on firm specific risk. As the asset structure for the sample firms probably differ, we want to control if asset structure affects the risk. The data regarding PPE and total assets is retrieved from data stream and the ratio is calculated using Microsoft excel.

$$\frac{\text{Property, Plant and Equipment}}{\text{Total Assets}}$$

Equation 16 – PPE/Total assets

Sales growth

The sales growth, as measured in CAGR (Compound Annual Growth Rate) is calculated as the growth rate of sales over the last three financial years. The data is retrieved from Datastream. Thus, the CAGR observations for the implementation event derive from net sales data between 2015 and 2018. CAGR was used as a control variable as it can indicate a firm's performance trend. A firm with a positive CAGR can be seen as a growing company with increasing sales. Whilst a firm with a negative CAGR might face liquidity problems, which would lead to higher risk (Brush et al. 2000). The CAGR sales growth is calculated using the following formula:

$$\text{Salesgrowth(CAGR)} = \frac{\text{Net Sales Ending Balance}^{\frac{1}{N}}}{\text{Net Sales Beginning Balance}} - 1$$

Equation 17 – Sales Growth

Return on invested capital

Return on invested capital (ROIC) is a financial performance measure, used to calculate the return from an investment. Thus, it can be seen as an indicator whether a company creates or destroys value through its investments (Damodaran, 2007). The definition of ROIC includes a number of different components. In order to exclude income unrelated to the firm's core business, operating income is used instead of net income in the numerator. The denominator in the calculation is the book value of the invested capital from the previous year (Damodaran, 2007). ROIC is an indicator of financial performance of a company, and it was included to control for firm-specific performance. Edi and Saad (2010) elaborate on the associations between firm's performance and ROIC and find a positive significant relationship. In our study, all observations for ROIC are retrieved through Datastream, where it is calculated using the following equation:

$$ROIC = \frac{Operating\ Income_t * (1 - tax\ rate)}{Book\ Value\ of\ Invested\ Capital_{t-1}}$$

Equation 18 – ROIC

4.4 ESG multiple regression model

The second step of our study is to investigate if there are any observable differences in risk between treatment companies, after they have disclosed their nonfinancial report, depending on their pre-regulatory ESG-performance. To investigate this, we choose to use a multiple regression model with an interaction term. More specifically, we will divide the treatment sample into groups depending on their pre-regulatory ESG-performance. After this, we run several multiple regression models where we interact the different groups with a variable determining the time as pre or post the implementation. Unfortunately, we were not able to obtain ESG-performance ratings for the complete sample; therefore, we will use an alternative sample consisting of 344 treatment companies for this ESG multiple regression model.

4.4.1 Multiple regression with interaction variable

To enable us to study the effect of how a firm's pre-regulatory ESG-performance affects observed risk in the post-regulatory period we choose to conduct a multiple regression using an interaction variable. By using an interaction variable, it changes the interpretation of the models coefficients compared to a regular multiple regression. Multiple regression analysis is used to predict the value of a dependent variable based on the value of two or more independent variables. Thus, the independent variable is the factor, which should predict the outcome of the dependent variable. For the ESG multiple regression we use the same dependent variables as in our difference-in-difference model. Thus, the dependent variables used in the regression model will be Value at Risk and Expected Shortfall, at 95% and 99% confidence level, respectively. The most important term in the multiple regression will be the interaction variable of *ESG* and *RegulationInEffect*. The interaction variable will test our second hypothesis, which states that firms with higher pre-regulatory ESG-performance will experience a lower increase in risk compared to firms with relatively low pre-regulatory ESG-performance after the implementation of the mandate.

The statistical method of multiple regression is an extension of ordinary least square regression as it includes more than one descriptive variable. Further, the method is based on four underlying assumptions; (1) Linear relationship between the dependent variables and the independent variables. (2) No Multicollinearity, i.e. the independent variables cannot be too highly correlated. (3) Multivariate Normality, i.e. the residuals are normally distributed and (4), Homoscedasticity, which states that the variance of error terms are identical across the values of the independent variables (Charlotte et al. 1991) See statistical tests in appendix 4. In the model we divide the sample into different dummy groups, depending on the ESG-performance ratings. How the sample is divided into groups will be further developed on in section 4.4.3 ESG-performance. In addition, we use the same control variables as for the DiD-regression. The groups we will include are *Top Half*, *Bottom Half*, *Top Quartile* and *Bottom Quartile*. In total, we will run four separate regressions for every risk measure. The equations for the multiple regression models are described below:

Generic multiple regression model for the treatment sample ESG-testing with Value at Risk:

$$\begin{aligned} VaR(\%)_i = & \beta_1 RegulationInEffect + \beta_2 ESG + \beta_3 RegulationInEffect * ESG + \beta_4 MTBV \\ & + \beta_4 MV\text{€} + \beta_5 Age + \beta_6 DebtEquity + \beta_7 PropertyPlantEquipment \\ & + \beta_8 Salesgrowth + \beta_{10} ROIC \end{aligned}$$

Equation 19 – Multiple Regression using VaR

Generic multiple regression model for the treatment sample ESG-testing with Expected Shortfall:

$$\begin{aligned} ES(\%)_i = & \beta_1 RegulationInEffect + \beta_2 ESG + \beta_3 RegulationInEffect * ESG + \beta_4 MTBV \\ & + \beta_4 MV\text{€} + \beta_5 Age + \beta_6 DebtEquity + \beta_7 PropertyPlantEquipment \\ & + \beta_8 Salesgrowth + \beta_{10} ROIC \end{aligned}$$

Equation 20 – Multiple Regression using ES

In the model, we expect to see a difference between the companies depending on their pre-regulatory ESG-performance. As previously stated in hypothesis 2, we expect the companies with higher pre-regulatory disclosure performance to have lower risk in the period post the implementation.

4.4.2 Regulation in effect

The variable *RegulationInEffect* is constructed as a dummy variable to define the time, pre or post the implementation of the regulation. In the multiple regression model, we will assign all observations from the period post the regulation with the number 1. The observations for the pre-regulatory period will be denoted with a 0. The division of observations in the two different periods is essential to be able to run the multiple regression with the interaction variable. We use *equation 10* to define if the observations corresponds to pre or post regulation.

4.4.3 ESG-performance

In the multiple regression model, we use the pre-regulatory ESG-performance ratings of the individual treatment companies as an independent variable. To investigate if there are any significant differences between companies that had a higher ESG-performance in the period before the regulation, compared to companies with a lower performance we run four multiple regressions. In these regressions, we divide the sample of affected companies into different groups depending on their relative score within the sample. The groups we will investigate for significant differences are *Top Half*, *Bottom Half*, *Top Quartile* and *Bottom Quartile*. Top Half includes the 50% of companies within the sample that has the highest pre-regulatory ESG-performance. Top Quartile includes the 25% of companies within the sample that has the highest pre-regulatory ESG-performance. The reversed method is used for Bottom Half and Bottom Quartile. The reason behind the division into these groups is to investigate if any of these groups will have an either positive or negative impact on the observed risk measures. The groups are constructed as dummy variables and if a company is tied to a group, it will take on the value 1.

4.4.4 Interaction term

In our multiple regression model, the most interesting term is the interaction variable of *RegulationInEffect*ESG*. The term is used in the multiple regression to interact the two independent dummy variables Regulation in effect and ESG-performance. By incorporating the interaction term in our model, we introduce the possibility that the effect of regulation is different depending on the groups pre-regulatory ESG-performance.

4.5 Hypothesis testing

In the following table, we have summarized our hypotheses and stated what type of test we conduct to investigate the effect. Additionally, we present the interpretation of each model that denotes the most important term of the models.

Table 4 – Summary of hypotheses

Hypothesis	Test	Interpretation
(1) Treatment firms experience an increased risk after the implementation of the mandatory regulation compared to control firms.	Difference-in-Difference study	The coefficient of the interaction term <i>AffectedRegulation</i> x <i>RegulationInEffect</i>
(2) Firms with a relatively high pre-regulatory ESG-performance will experience a lower increase in risk compared to firms with a relatively low pre-regulatory ESG-performance after the implementation of the mandate.	Multiple Regression with interaction variable	The coefficient of the interaction term <i>RegulationInEffect</i> x <i>ESG</i>

Table 4 – Summary of hypotheses

4.6 Research design considerations

During the research design a number of choices have been done that might have implications on the results of the study. First off, we chose to measure risk with Value at Risk and Expected Shortfall. The risk measures are based on daily stock prices, and assumes a normal distribution of stock prices. A weakness to this approach occurs if the conditional returns are not normally distributed. If this is the case, we will observe incorrect downside tail risk for our confidence levels. Further, if the daily stock prices are retrieved from a period with historically low volatility the risk of the sample might be underestimated. However, since we use a difference-in-difference estimation where the treatment and control sample data is collected for the same time the potential effect of non-normal distribution and low volatility should be mitigated.

To allow us to make unbiased matching of most the most appropriate control firm to each treatment firm we used replacement matching with a mathematical function. In the matching, we used replacement matching in line with Grewal et al. (2018), to make sure that we could find the most relevant control company for each treatment company. This can lead to adverse effects on our sample if several treatment companies are matched with the same control company. However, if the matching procedure had not allowed for replacement matching the number of observations would have decreased significantly to 460 observations. For the matching itself, we choose to use a mathematical function that chooses the control company from the same sector and country that resembles the treatment company most on firm specific variables. The firm specific variables we choose to use is market-to-book ratio and market capitalization. In this matching specification, we could have included additional variables for the matching. However, the rationale behind the decision of using MTBV and market capitalization is that it allows us to control our sample size with a similar study conducted by Grewal et al. (2018).

In addition, the use of ESG-performance ratings from Asset4 could have been complemented with non-disclosure scores from other databases. However, due to data constraints our sample only includes 344 ESG-performance observations. We tried to incorporate scores from other ESG-databases as MSCI and Bloomberg, but we were not able to access these because the databases were not available for us as Copenhagen Business School students. Further, the incorporation of complete ESG-ratings for our entire dataset would have allowed us to include the ESG-performance as an independent variable in our difference-in-difference analysis.

5.0 Results and analysis

5.1 Descriptive statistics of data

Descriptive statistics of implementation sample

Below, Table 5 presents the excluding process of companies with missing observations on variables in our sample. Our full sample consists of all active companies during our implementation event period. From this sample, we exclude the companies that has missing data on the variables needed for us to segment if the company is affected by the regulation or not. Our initial sample comprises of 7225 European companies, but after excluding 3814 companies with missing variables we are left with 3266 observations. This will become our initial sample size and it can be reviewed in appendix 5.

Table 6 provides an overview of the sample sizes from all European countries that are affected by the legislative change. *Sample size** denotes the number of national companies with complete data, that is required to segment if the company is affected by the regulation or not. *Treatment* displays the number of companies from the sample that surpasses the requirements, defined by the national transposition of 2014/95/EU. These companies in this list can be used as a treatment firms, if a suitable match can be found in the control sample. *Control* are the companies, which does not fulfill the national requirements for nonfinancial disclosure in the sample. *Matched* companies presents the number of cases where a suitable match between a treatment and control company has been found. The total number of matches for the implementation event are 2010. The division of companies on national level is a critical step in our research design to ensure that the treatment and control companies are subject to the same country fixed effects. This means that we can control for national changes that might influence country specific risk in our regression model.

From the table below it is apparent that the number of observations from individual countries differs. There is a spread in the observations, e.g. United Kingdom constitutes of 632 observations and Cyprus constitutes of 0 observations. In the United Kingdom the transposed legislation is applicable for all firms with over 500 employees. Thus, since there are no requirements on either net revenue or total assets there is an increased number of companies that are affected by the legislation. The implication

for our analysis will be that our findings are less generalizable for the European Union, since not all countries are equally represented in the sample. In general, our sample consists of more observations from larger economies. The reason behind the difference between countries is not only derived from national legislation, but also missing company specific data-points. The missing data forces us to exclude companies from the sample, since they can not be segmented in to either of the two groups treatment or control. Table 5 presents a complete list of excluded observations from all countries.

Table 5 – Sample size by countries

Country	Full Sample	Excluded observations	Sample size
Austria	67	20	47
Belgium	231	155	76
Bulgaria	268	246	22
Croatia	113	86	27
Cyprus	67	51	16
Czech Republic	28	9	19
Denmark	131	131	X
Estonia	16	6	10
Finland	157	62	95
France	815	373	442
Germany	1305	868	437
Greece	188	126	62
Hungary	49	32	17
Ireland	43	15	28
Italy	353	152	201
Latvia	23	7	16
Lithuania	30	10	20
Luxembourg	41	33	8
Malta	25	15	10
The Netherlands	113	30	83
Poland	733	411	322
Portugal	50	15	35
Romania	333	311	22
Slovakia	46	37	9
Slovenia	25	13	12
Spain	169	46	123
Sweden	531	226	305
United Kingdom	1261	459	802
Total	7225	3814	3266

Table 5 – Sample size by countries

Table 6 - Complete sample by countries

Country	sample size*	Treatment	Control	Matched	% sample
Austria	47	37	10	8	0,4%
Belgium	76	40	36	10	0,5%
Bulgaria	22	12	10	2	0,1%
Croatia	27	16	11	12	0,6%
Cyprus	16	8	8	0	0%
Czech Republic	19	9	10	0	0%
Denmark	X	X	X	X	X
Estonia	10	6	4	0	0%
Finland	95	50	45	44	2,2%
France	442	266	176	340	16,9%
Germany	437	254	211	392	19,5%
Greece	62	38	24	26	1,3%
Hungary	17	9	8	0	0%
Ireland	28	18	10	4	0,2%
Italy	201	120	81	140	7,0%
Latvia	16	6	10	2	0,1%
Lithuania	20	12	8	4	0,2%
Luxembourg	8	4	4	0	0,0%
Malta	10	6	4	2	0,1%
The Netherlands	83	53	30	38	1,9%
Poland	322	145	177	202	10,0%
Portugal	35	30	5	2	0,1%
Romania	22	12	10	0	0,0%
Slovakia	9	5	4	2	0,1%
Slovenia	12	8	4	0	0,0%
Spain	123	80	43	50	2,5%
Sweden	305	173	132	220	10,9%
United Kingdom	680	461	341	510	25,4%
Total	3266	1868	1426	2010	100%

Table 6 – Complete sample by countries

Matching

For the matching of treatment and control firms, we have applied the process described in section 4.2.4. In the first step of the matching process the sorting function retrieved a complete list of control companies that matched the treatment company on country and industry affiliation. After this first step, there could be several eligible control companies to use in our matched sample. Therefore, the second step in our matching process our model sorts and ranks all the possible control firms on how close they are in market capitalization and market-to-book ratio. After conducting this ranking of the possible control companies, the firm with the highest ranking is chosen as the most suitable control company.

To investigate the functionality of the matching system we present the means of the two samples before and after matching. We also conduct a t-test to investigate the differences of the two samples (See panel A). Before matching, the average difference of market-to-book ratio between the two samples is significantly negative -2,588, showing that the treatment firms has a lower market-to-book ratio. After matching, the difference of the two samples is significantly smaller, decreasing to -0,648. When studying the market value, we observe a similar change. The market value mean difference of the samples before matching is 2071,652 and after conducting the matching, the mean difference between the treatment and control sample diminishes to 1939.166. The results of panel A suggests that our matching process reduces the differences in the samples before the legislative change. Since the difference of the sample means are reduced after the matching process, it is evident that our matching system is not random.

Panel A - Test of the effectiveness of the matching

Matching variables		Mean , treatment sample (1)	Mean value, control sample (2)	Difference (1)-(2) T-test
MTBV	Pre -match	3.344	5.932	-2.588***
	Post -match	3.344	3.992	-0.648***
MV € millions	Pre-match	2358.173	286.521	2071.652***
	Post-match	2358.173	419.007	1939.166***

***=1% confidence level, **=5% confidence level, *=10% confidence level

Panel A – Test of the effectiveness of the matching

Industry

As mentioned previously, we choose to divide the sample into both country and industry before matching. The division of our sample into industry enables us to control for industry fixed effects on risk. The following table 7, presents which industries the observations in the finalized matched sample belongs to. In our sample of matched companies, there are 94 different industries represented. The choice of using the narrowest industry specification in Datastream enables a more precise matching of companies. In our sample, there are differences between the numbers of companies in individual industries and industrial machinery composes the largest industry, with over 166 observations.

Table 7 – Industry overview

Industry	Count	Industry	Count	Industry	Count	Industry	Count
Aerospace	2	Diamonds & Gemstones	2	Ind. & Office REITs	6	Recreational Services	12
Airlines	8	Distillers & Vintners	16	Industrial Machinery	166	Renewable Energy Eq.	18
Alt. Electricity	4	Divers. Industrials	4	Industrial Suppliers	24	Restaurants & Bars	6
Apparel Retailers	22	Diversified REITs	6	Insurance Brokers	4	Retail REITs	8
Asset Managers	18	Dur. Household Prod.	24	Integrated Oil & Gas	10	Semiconductors	22
Auto Parts	28	Electrical Equipment	44	Internet	20	Soft Drinks	6
Automobiles	6	Electronic Equipment	70	Investment Services	30	Software	78
Banks	76	Exploration & Prod.	8	Iron & Steel	4	Spec.Consumer Service	4
Biotechnology	20	Farm Fish Plantation	10	Life Insurance	10	Specialty Chemicals	68
Brewers	2	Financial Admin.	2	Media Agencies	32	Specialty Finance	48
Broadcast & Entertain	32	Fixed Line Telecom.	16	Medical Equipment	20	Specialty Retailers	48
Broadline Retailers	2	Food Products	44	Medical Supplies	10	Telecom. Equipment	27
Building Mat.& Fix.	72	Food Retail,Wholesale	4	Mobile Telecom.	13	Tires	2
Bus.Train & empl	24	Footwear	2	Multiutilities	6	Toys	4
Business Support Svs.	158	Forestry	2	Oil Equip. & Services	12	Transport Services	44
Clothing & Accessory	38	Furnishings	14	Paper	8	Travel & Tourism	22
Comm. Vehicles,Trucks	10	Gambling	28	Personal Products	8	Waste, Disposal.	10
Commodity Chemicals	14	General Mining	18	Pharmaceuticals	34	Water	4
Computer Hardware	10	Gold Mining	14	Plat.& Precious Metal	2		
Computer Services	108	Healthcare Providers	30	Prop. & Casualty Ins.	2		
Con. Electricity	28	Heavy Construction	48	Publishing	38		
Consumer Electronics	10	Home Construction	29	Railroads	2		
Consumer Finance	8	Home Improvement ret.	11	Real Estate Hold, Dev	36		
Containers & Package	16	Hotel & Lodging REITs	2	Real Estate Services	6		
Defense	12	Hotels	18	Recreational Products	6		

Table 7 – Industry overview

Dependent variable means

Table 8 presents the risk measure averages from the treatment and control samples pre and post-regulation. *Treatment 2017* is the group of companies that are affected by the legislation in the time period before the initiation of the new legislation. This means that they fulfill the national requirements for disclosing a nonfinancial report, but the legislation is not in effect yet. The group, *Control 2017* are the control companies in our study. It consists of the companies that are not obliged to disclose a nonfinancial report, in the time period before the legislation. *Treatment 2018* represents the group of companies that are affected by the legislation, when the legislation is in effect. The companies in this group have to disclose a nonfinancial report. Finally, *control 2018* denotes the control companies after the legislative implementation. They are not obliged to disclose a nonfinancial report.

Table 8 – Risk measure averages

SAMPLE GROUP MEANS	VAR 95%	VAR 99%	ES 95%	ES 99%
TREATMENT 2017	-0,02934	-0,04182	-0,02534	-0,04691
CONTROL 2017	-0,04347	-0,06174	-0,03464	-0,06792
TREATMENT 2018	-0,03658	-0,05135	-0,03553	-0,06022
CONTROL 2018	-0,04675	-0,06584	-0,04028	-0,07413

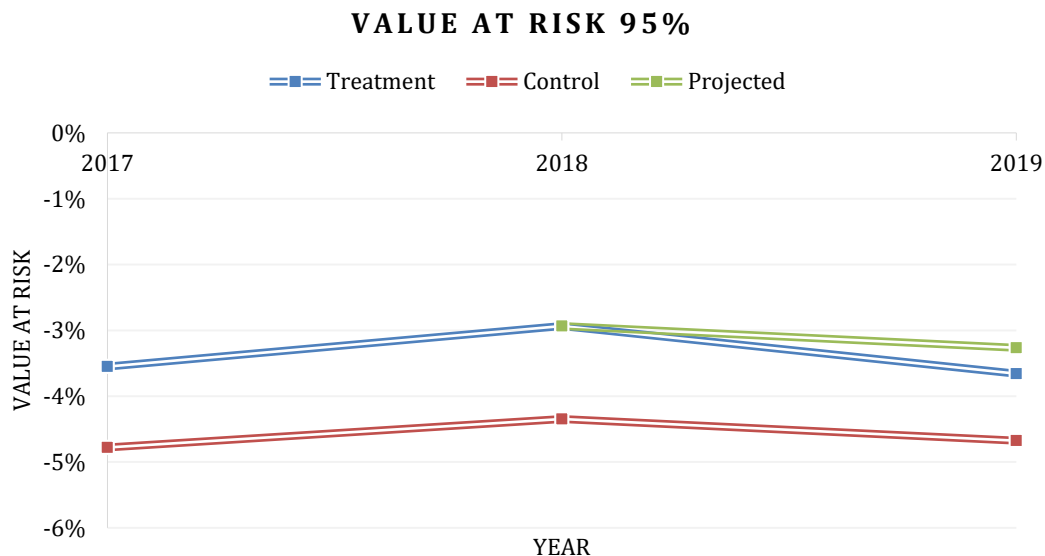
Table 8 – Risk measure averages

Illustration of risk averages means

In the following section, the risk averages are used to illustrate risk trends of treatment and control samples before and after the regulatory change. We will present graphical illustrations of the means of the dependent variables over the two time periods. According to Athey and Imbens, (2006) a presentation of graphical illustrations of dependent variables is an important control of difference-in-difference regressions. Since we measure the risk for a one-year time window, the mean is the average risk for the respective sample groups during a full year. The first observation in the charts plots the risk measure averages of the year of 2016, this is the initial value in the graph. The second observation represents the risk measure averages for the year 2017, the year before the implementation of the

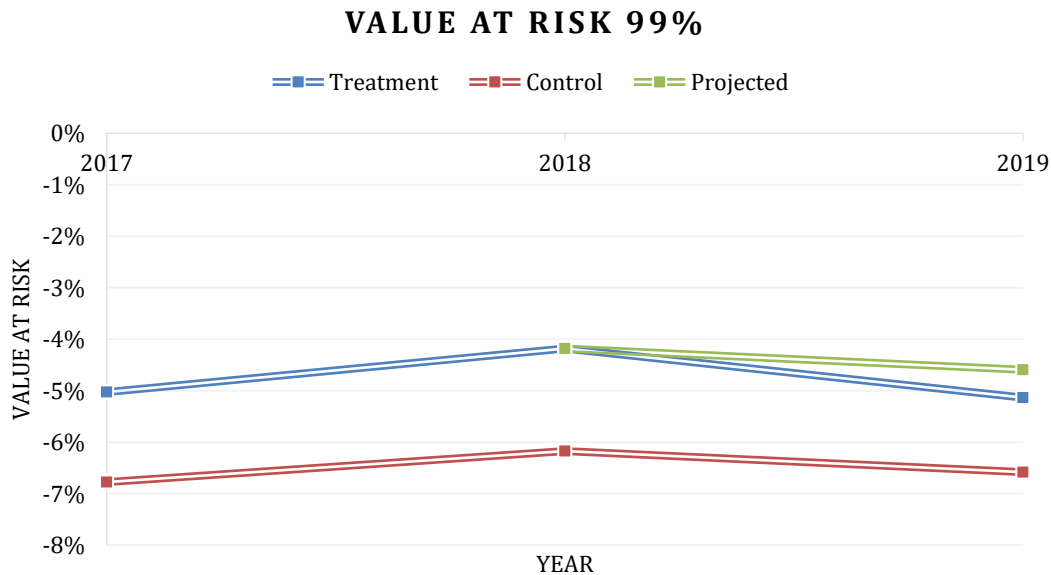
regulation. Finally, the third observation represents the risk measure averages for year 2018, when the regulation is in effect. The risk-averages provides an aggregated image of trends in the data before conducting a difference-in-difference regression. The projected risk is illustrated by the green line, which denotes at what level the risk should have been if the difference between the two groups, in the post-regulatory period would have been identical to the pre-regulatory period. The difference between the groups are statistically significant, see appendix 6 for tests.

The graph below, graph 2, illustrates the difference in average downside risk, measured in VAR 95% between the treatment and control groups pre and post the implementation. The downside risk of the control companies is higher during the year 2017 compared to the treatment sample. This indicates that the treatment sample are less prone to have large negative returns during the year before the implementation of the regulation. The difference of the average downside risk between the groups in 2017 is 1,41 %. In the time period after the implementation of the legislation the average risk of the control group increases by 0,32 % whilst the treatment group increases by 0,72 %. The difference is visually observable in the graph where the treatment and control group risk averages shows a converging trend. The difference between the two groups diminishes to 1,01 %. The implications of this is that we can observe a smaller difference in risk between the two groups after the regulation is in effect, as measured in VAR 95%.



Graph 2 – Difference-in-difference means VaR 95%

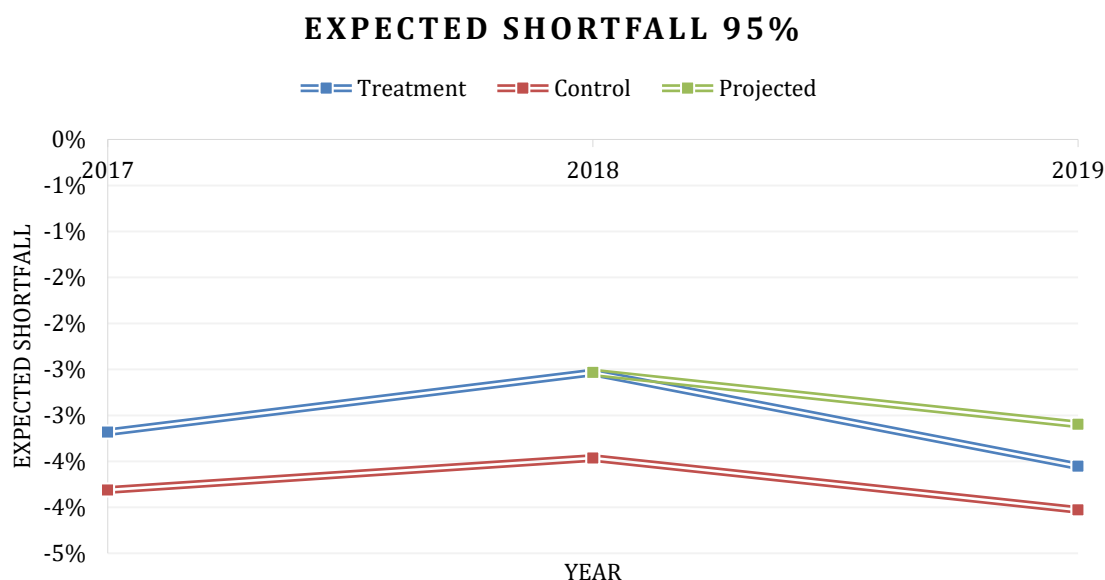
When studying the risk measurement VAR 99% below, in graph 3, we can see a similar trend before as for VAR 95%. In the year before the legislative change, there is a difference in average downside risk of 1,99 % between the treatment and control group. This means that that on average the control group are more exposed to downside risk during the the year of 2017. After implementing the legislative changes, the average downside risk of the treatment group and the control group increases by 1,01% and 0,41%, respectively. Hence, the difference in downside risk diminishes to 1,39% between the two groups. The change is observable in the graph. The interpretation of the graph is that the risk increases for the firms disclosing nonfinancial information after the mandate.



Graph 3 – Difference-in-difference means VaR 99%

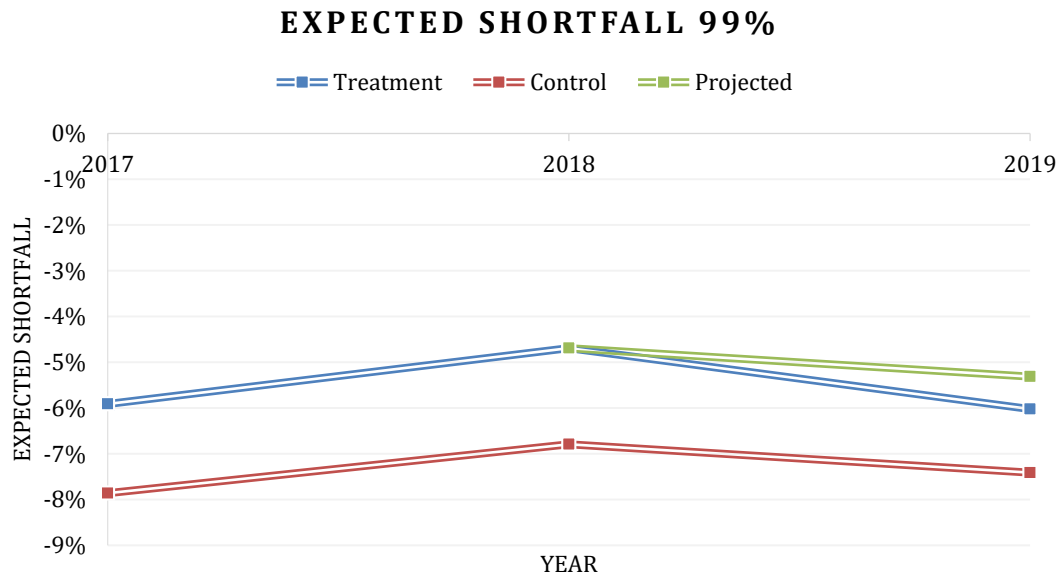
When examining the means from the risk measure ES 95% there is a similar trend in the data as for Value at Risk. In the time period leading up to the legislative change the average risk is lower for the treatment firms and the difference between the averages for the two groups is 0,93 %. Hence, during the year leading up to the new legislation the treatment companies are generally experiencing lower negative tail end risk compared to control companies. After the implementation of the regulation, both groups experience an increase in average negative tail risk. The downside risk of the treatment group

increases with 1,01 %, whilst the control group experiences an increase in Expected Shortfall of 0,56 %. The average difference in Expected Shortfall between the two groups diminishes to 0,48 %. Thus, the riskiness of both groups' increases after the implementation, but relatively to the control group, the treatment group experiences a larger increase in risk.



Graph 4 – Difference-in-difference means ES 95%

The average downside risk of ES 99% depicts a similar trend as ES 95%. For the duration of 2017 the average risk is lower for the treatment group. This suggests that the treatment companies are subject to lower risk before the new regulation is in effect. The difference in mean of the groups for the year of 2017 is 2,10 %. After the regulation is in effect both groups experience an increased level of risk. The average risk of the treatment group increases with 1,33 % and in the control group we observe an increase of 0,62 %. The difference in average risk between the two groups diminishes to 1,39 %. Hence, we observe a larger increase in the observable risk for the companies that are affected by the legislative change.



Graph 5 – Difference-in-difference means ES 99%

Control variable means

Panel B below shows that the mean of the market value (MV €) shows a significant difference between the two samples. This finding is in line with the expectations of the data set, and provides evidence that the treatment firms generally are larger than the control firms are. Since market-to-book ratio was used a criteria for matching we expect to see similarities of the two groups mean. In panel B, it is clear that the mean of the market-to-book ratios are similar across both groups, providing validation of that the control companies serves as appropriate benchmarks.

The D/E ratio of the treatment sample is slightly higher than the control sample, which might suggest that the larger companies are allowed to a more leverage because of their size. We observe a higher level of PPE/Total assets ratio for the treatment sample, compared to the control sample. This suggests that the treatment sample on average possesses more tangible assets. Further, we note a higher sales growth for the control sample. Return on invested capital (ROIC) is higher within the treatment sample and suggests that the treatment sample on average has higher return on invested capital.

Panel B - Control variable means

Treatment				Control			
	Obs	Mean	Std. Dev.		Obs	Mean	Std. Dev.
MTBV	2010	3.344	12.837		2010	3.992	24.962
MV	2010	2358.173	12664.621		2010	419.007	899.6
Age	2010	21.839	13.192		2010	15.719	10.461
D/E	2010	0.815	2.489		2010	0.784	3.859
PPE/total assets	2010	0.214	0.216		2010	0.189	0.249
SalesGrowth	2010	0.044	0.126		2010	0.065	0.350
ROIC	2010	0.074	0.624		2010	-0.023	0.807

Panel B – Control variable means

Correlation matrix

Panel C below presents the Pearson correlation coefficient for our risk measures and firm level variables. As expected, panel C shows a high level of correlation between the two risk measures Expected Shortfall and Value at Risk. None of the included firm specific control variables are declared impotent, thus meaning that the control variables increases the explanatory power of the model.

Panel C - Pearson Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) VaR 95	1										
(2) VaR 99	0.905	1									
(3) ES 95	0.813	0.811	1								
(4) ES 99	0.832	0.828	0.789	1							
(5) MTBV	-0.013	-0.012	-0.006	-0.003	1						
(6) MV €	0.133	0.133	0.138	0.142	-0.003	1					
(7) Age	0.184	0.184	0.184	0.179	-0.003	0.223	1				
(8) D/E	0.018	0.019	0.021	0.010	0.474	0.016	0.012	1			
(9) PPE/Total assets	0.087	0.086	0.104	0.089	-0.042	0.030	0.014	-0.017	1		
(10) SalesGrowth	0.082	0.081	0.080	0.108	-0.014	-0.007	-0.065	-0.044	0.063	1	
(11) ROIC	0.135	0.134	0.128	0.146	-0.003	0.018	0.057	-0.011	0.029	0.038	1

Panel C – Pearson Correlation matrix

5.2 Difference-in-difference analysis

First, we examine the differences between the treatment and control firms for the two time periods by conducting a difference-in-difference regression. The DiD regression is conducted to assess whether the legislative change contributes to increased or decreased risk for the companies that are subject to disclose more information to the market. The variable of interest in our model is the interaction term β_3 . The term captures the change in risk of the companies affected by the regulation, relative to the change of companies not affected by the regulation. A negative coefficient of β_3 is consistent with an increase in risk of the treatment group, and a positive coefficient equals a decrease in risk. We choose to examine the effect with two risk measures Value at Risk and Expected Shortfall, both at a 95% and 99% level. In addition, our model includes both a number of control variables, and a check for country and industry fixed effects. To be able to interpret the results we present the coefficients and p-value of all regressions. We choose to accept the hypothesis if the interaction term shows significance at 1%, 5% or 10% level. Further, we conduct the tests with different samples to robustness check the results. In the following sections, we will first interpret the results from the regressions by investigating the independent variables effect on the risk measures. Secondly, we will analyze the findings and discuss the implications. The model specifications used for the DiD regression are presented in appendix 7.

5.2.1 Results

Value at Risk

The results from the difference-in-difference regression, with the dependent variable Value at Risk are presented in Panel D below. The panel shows that the coefficient of the independent variable *AffectedRegulation* is significantly positive in columns (1), (2), (3) and (4.) This indicates that the treatment sample experience lower risk than our control sample prior to the disclosure shock, as measured in Value at Risk. Further, the independent variable *RegulationInEffect* has a negative coefficient, indicating that the control sample experience an increase in risk after implementation of the mandate. These trends are observable in the graphs 2 and 3, in the previous section.

The coefficient of the interesting term, the interaction term, β_3 , *AffectedRegulation* x *RegulationInEffect* is significantly negative in columns (1), (2), (3) and (4). The interaction term

suggests that the treatment sample experience a larger increase in risk subsequent to the new legislation implementation compared to the control firms. The results has implications on the observed risk of the treatment companies. It shows that they experience an increased risk, measured in both VaR 95% and VaR 99%, of 0,33% and 0,44%, respectively. Columns (3) and (4) presents results using an alternative sample including firms excluded due to missing data on control variables. Using this alternative sample, we observe similar results.

Panel D – Difference-in-difference regression results using VaR

All control variables	(1)	(2)	All Companies	(3)	(4)
Dep. Var. =	VAR 95%	VAR 99%		VAR 95%	VAR 99%
AffectedRegulation	0.0098*** (0.000)	0.0139*** (0.000)		0.0108 (0.000)	0.0154 (0.000)
RegulationInEffect	-0.0041*** (0.001)	-0.0053*** (0.002)		-0.0037 (0.002)	-0.0047 (0.006)
AffectedRegulation x RegulationInEffect	-0.0033*** (0.007)	-0.0044** (0.066)		-0.0035*** (0.009)	-0.0050** (0.039)
MTBV	0.0000** (0.030)	-0.0003** (0.018)		-0.0001** (0.031)	-0.0002** (0.039)
MV (€)	0.0000** (0.031)	0.0000*** (0.000)		0.0000** (0.033)	0.0000** (0.27)
Age	0.0030 (0.141)	0.0004 (0.052)		0.0031 (0.141)	0.0004 (0.000)
D/E	0.0002*** (0.000)	0.0004** (0.036)		0.0002** (0.020)	0.0003* (0.078)
PPE/Total assets	0.0080 (0.153)	0.0112 (0.060)		0.0088 (0.562)	0.0124 (0.121)
SalesGrowth	0.0098 (0.000)	0.0139** (0.000)			
ROIC	0.0004 (0.499)	0.0062 (0.323)			
Fixed effects	Country, Industry	Country, Industry		Country, Industry	Country, Industry
N (Companies)	4020	4020		4262	4262
Adj. R ²	0.116	0.099		0.106	0.080

***=1% confidence level, **=5% confidence level, *=10% confidence level

Panel D – Difference-in-difference regression results using VaR

To further test the robustness of the mentioned findings, we conduct additional tests with different samples. In these tests, we 1) exclude companies with large differences in market capitalization to harmonize the sample. 2) Randomly match treatment and control companies. Panel E presents the results from these robustness tests. After excluding matched companies with 10x and 3x size difference from our sample, we find that the coefficient on *AffectedRegulation* x *RegulationInEffect* remains significantly negative. When the samples are randomly matched, in column (5) and (6), we find no significant coefficient on our interaction term. This suggests that the impact of the legislative change is not random.

Overall, the results from panel D and E proposes that European companies subject to mandatory nonfinancial disclosure legislation experience a significant increase in risk after the regulation is implemented, compared to control firms. A general trend observed in the results is a diminishing adjusted R^2 which is a sign of lower fit of the model, when we remove control variables.

Panel E – Difference-in-difference regression results using VaR with an alternative sample

Market cap 10x	(1)	(2)	3x	(3)	(4)	Random sample	(5)	(6)
Dep. Var. =	VAR 95%	VAR 99%		VAR 95%	VAR 99%		VAR 95%	VAR 99%
AffectedRegulation	0.0012** (0.015)	0.0045** (0.011)		0.0182*** (0.003)	0.0078** (0.002)		0.0420 (0.410)	0.0724 (0.156)
RegulationInEffect	-0.0021* (0.092)	-0.0023* (0.088)		-0.002* (0.084)	-0.0011* (0.067)		0.0455 (0.455)	0.0428 (0.583)
AffectedRegulation x RegulationInEffect	-0.0036** (0.043)	-0.0052** (0.039)		-0.0062** (0.072)	-0.0075** (0.065)		0.0321 (0.454)	0.0403 (0.556)
MTBV	0.0000* (0.071)	0.0000* (0.077)		0.0000 (0.107)	0.0004* (0.90)		0.0541* (0.058)	0.0312* (0.067)
MV (€)	0.0000 (0.527)	0.0000 (0.554)		0.0000 (0.347)	0.0000 (0.376)		0.0410 (0.526)	0.0685 (0.685)
Age	0.0032 (0.412)	0.0004 (0.390)		0.0000 (0.725)	0.0000 (0.959)		0.0202 (0.854)	0.0521 (0.984)
D/E	0.0003 (0.100)	0.0004* (0.092)		0.0002 (0.962)	0.0001 (0.701)		0.0452 (0.264)	0.0685 (0.296)
PPE/Total assets	0.0012 (0.501)	0.0018 (0.479)		0.0088 (0.562)	0.0001 (0.969)		0.0520 (0.485)	0.0401 (0.866)
SalesGrowth	0.0115** (0.020)	0.0161** (0.031)		0.0081** (0.015)	0.0114** (0.017)		0.0442* (0.055)	0.0420* (0.061)
ROIC	0.0005 (0.566)	0.0008 (0.536)		-0.0024 (0.323)	-0.0034 (0.222)		0.0123 (0.131)	0.0253 (0.251)
Fixed effects	Country, Industry	Country, Industry		Country, Industry	Country, Industry		Country, Industry	Country, Industry
N (Companies)	2104	2104		1200	1200		4020	4020
Adj. R ²	0.078	0.071		0.070	0.068		0.021	0.019

***=1% confidence level, **=5% confidence level, *=10% confidence level

Panel E – Difference-in-difference regression results using VaR with an alternative sample

Expected Shortfall

We repeat the statistical tests, but substitute the dependent variable to Expected Shortfall. This risk measure is claimed to be a better predictor of downside risk than Value at Risk, since it includes the most negative outcomes. The results from this study are presented in Panel F.

In the panel, the coefficient of the independent variable *AffectedRegulation* is positive across the entire panel. This suggests that the treatment companies experience lower risk, measured in ES, compared to the control firms during the year before the implementation of the regulation. The variable

RegulationInEffect shows a significant negative coefficient, indicating that the treatment companies experience an increase in risk in the post regulatory period. Further, the coefficient on the term *AffectedRegulation* x *RegulationInEffect* is significantly negative in all columns. This suggest that the treatment companies experience a significantly higher risk subsequent to the legislative change of 0,18% for ES 95%, and 0,64% for ES 99% compared to the control sample. We observe a similar result for columns (3) and (4) where the tests has been conducted with a different sample. This suggests that the findings are robust. When comparing the results of the difference-in-difference regression with the graphical illustrations of the risk means, graph 4 and graph 5. We observe that they show a similar trend as the findings in the regression.

Panel F – Difference-in-difference regression results using ES

All control variables	(1)	(2)	All Companies	(3)	(4)
Dep. Var. =	ES 95%	ES 99%		ES 95%	ES 99%
AffectedRegulation	0.0019*** (0.006)	0.0015*** (0.004)		0.0020 (0.002)	0.0163 (0.000)
RegulationInEffect	-0.0058*** (0.000)	-0.0072*** (0.000)		-0.0054 (0.006)	-0.0067 (0.000)
AffectedRegulation x RegulationInEffect	-0.0018** (0.052)	-0.0064*** (0.011)		-0.0021** (0.018)	-0.0067*** (0.007)
MTBV	-0.0001 (0.247)	-0.0000 (0.242)		-0.0001 (0.176)	-0.0000 (0.120)
MV (€)	0.0000* (0.089)	0.0000** (0.012)		0.0000* (0.055)	0.0000 (0.000)
Age	0.0005** (0.012)	0.0004* (0.052)		0.0004** (0.025)	0.0004** (0.023)
D/E	0.0003*** (0.000)	0.0002 (0.129)		0.0002*** (0.001)	0.0001** (0.085)
PPE/Total assets	0.0124 (0.122)	0.0150** (0.015)		0.0013* (0.066)	0.0130** (0.012)
SalesGrowth	0.0064*** (0.000)	0.0222* (0.065)			
ROIC	0.0004 (0.900)	0.0002 (0.831)			
Fixed effects	Country, Industry	Country, Industry		Country, Industry	Country, Industry
N (Companies)	4020	4020		4262	4262
Adj. R ²	0.108	0.102		0.083	0.084

***=1% confidence level, **=5% confidence level, *=10% confidence level

Panel F – Difference-in-difference regression results using ES

Additionally, Panel G below presents the results of the robustness tests where we exclude matched companies with large differences in size and conduct a random matching. These results are not significant on the interaction term *AffectedRegulation x RegulationInEffect*. The interpretation is that the impact of Expected Shortfall in Panel F does not hold for these robustness tests.

Panel G – Difference-in-difference regression results using ES with an alternative sample

Market cap 10x	(1)	(2)	3x	(3)	(4)	Random sample	(5)	(6)
Dep. Var. =	ES 95%	ES 99%		ES 95%	ES 99%		ES 95%	ES 99%
AffectedRegulation	0.0005 (0.110)	0.0024 (0.161)		-0.0073 (0.432)	0.0009 (0.664)		0.0520 (0.510)	0.0424 (0.856)
RegulationInEffect	-0.0069* (0.020)	-0.0928* (0.038)		-0.0064* (0.051)	-0.0100* (0.065)		0.0456 (0.520)	0.9428 (0.503)
AffectedRegulation x RegulationInEffect	-0.001 (0.162)	-0.0012 (0.318)		-0.0001 (0.280)	-0.0006 (0.384)		0.0521 (0.854)	0.5203 (0.366)
MTBV	0.0004 (0.147)	0.0004 (0.188)		0.0001 (0.255)	0.0002 (0.459)		0.0441 (0.158)	0.0512 (0.187)
MV (€)	0.0000* (0.065)	0.0002* (0.063)		0.0000* (0.080)	0.0000** (0.013)		0.0710** (0.026)	0.0902* (0.055)
Age	0.0002 (0.684)	-0.0002 (0.784)		0.0007** (0.026)	0.0000** (0.019)		0.0502 (0.354)	0.0803 (0.484)
D/E	0.0002 (0.344)	0.0002 (0.254)		0.0002** (0.031)	0.0002** (0.021)		0.0452* (0.094)	0.0502* (0.054)
PPE/Total assets	0.0015 (0.542)	0.0015 (0.533)		-0.0001 (0.991)	0.0001 (0.954)		0.0001 (0.592)	0.0015 (0.511)
SalesGrowth	0.0222** (0.012)	0.0352** (0.011)		0.0055* (0.059)	0.0170* (0.085)		0.0622 (0.045)	0.0452 (0.080)
ROIC	0.0002 (0.831)	0.0002 (0.891)		-0.0013 (0.812)	-0.169 (0.672)		0.0021 (0.331)	0.0022 (0.591)
Fixed effects	Country, Industry	Country, Industry		Country, Industry	Country, Industry		Country, Industry	Country, Industry
N (Companies)	2104	2104		1200	1200		4020	4020
Adj. R ²	0.040	0.035		0.039	0.033		0.020	0.015

***=1% confidence level, **=5% confidence level, *=10% confidence level

Panel G – Difference-in-difference regression results using ES with an alternative sample

Analysis

In summary, the results in panel F is in conformity with the findings in panel D and E. The overall results suggest that the companies in the treatment sample subject to the nonfinancial disclosure legislation experienced an increase in risk in the post-regulatory period compared to control firms not subject to the legislation. There are no observable differences among the two risk measures and the impact in both risk measures, Value at Risk and Expected Shortfall, is significantly negative. We include several robustness tests. 1) Using a larger sample where we include observations with missing control variables on sales growth and ROIC. 2) Creating two samples where we exclude matches where the treatment and sample companies have large differences in size, in order to harmonize the sample. 3) Random sampling, meaning that the treatment companies are matched with random control companies. The robustness tests suggest that the findings hold better for Value at Risk, since the coefficient of the interaction variable was significantly negative for all tests. The robustness tests for Expected Shortfall in Panel G, was not significantly negative when we excluded firms with large size differences. This might be attributable to the difference in risk estimation when using Expected Shortfall. Expected Shortfall includes the entire negative tail of outcomes in the sample, which Value at Risk does not. However, the coefficient of the interaction term suggested a negative effect for these samples as well. For both models, there were no significant impact on the interaction term when the sample size was randomized. This provides evidence that the effect of the legislation was not due to random differences between the time periods, but rather attributable to differences in risk among the treatment and control samples. Additionally, the alternative sample strengthens the matching system applied in the study. When investigating the effectiveness of matching, the sorting function reduced differences among the two samples means, meaning that the companies in the matched control sample on average are more similar to the treatment sample. The findings provide evidence to reject the null hypothesis for *Hypothesis 1* and we conclude that the companies affected by the legislation do experience an increase in risk compared to companies not subject to the mandatory nonfinancial disclosure.

The descriptive statistics of data provides further evidence of the findings. In the pre-regulatory period the difference in risk between the treatment and control sample is significantly higher for both year 2016 and 2017, compared to year 2018. The difference is observable in the graphs, where the projected risk difference depicts the estimated difference in risk, calculated as the observed risk difference during

2017. From graphs 2-5 it is possible to observe that the risk mean of the treatment sample becomes more similar to the risk observed in the control sample post-regulatory implementation. Since the difference-in-difference model includes fixed control variables related to country and industry it can be seen as a control for systematic changes, other than the legislative change. Systematic or external events should influence the treatment sample and control sample correspondingly since they are matched on both industry and country level.

The result of our study suggests that European companies subject to 2014/95/EU experience an increase in risk in the post-regulation period. Our findings on the European market is in line with findings from both Hung et al. (2015) and Chen et al., (2017) which investigates the Chinese market reaction to mandatory nonfinancial disclosure in 2006. Thus, the findings of the study is in contrast with opinions of Morck et al., (2000) who argues that the Chinese stock market cannot be compared to the European market, due to the differences of legal institutions. In addition, our study provides further evidence that nonfinancial disclosure affects companies and that nonfinancial disclosure has more impact than being window dressing as Friedman (1970), Aupperle et al. (1985) and Jensen (2002) claim.

Under the European mandate, firms are required to expose information, which fulfills numerous aspects that Law 2014/95/EU requires. Consequently, information regarding services and products, operational risks, risk management, anti-corruption agendas, operational impact on environmental aspects and employee policies are now readily available to market participants. In addition, the law requires that companies have to produce information that is forward looking and standardized, which allows comparisons among companies. This is in line with the European Commissions (2017) objective as described in the legislative act. The legislation aims to increase the transparency of undertakings in all European sectors.

Previous empirical findings suggest that nonfinancial disclosure, both voluntary and mandatory, mitigates informational asymmetries between firms and various stakeholders. Reducing informational asymmetries by disclosing nonfinancial information should have a positive impact on firm aspects such as risk, valuation, forecasting, transaction costs and financial performance. This is highlighted by a

meta-study conducted by Margolis et al. (2011), summarizing findings in the field of nonfinancial disclosure. A sector that utilizes nonfinancial information is the financial sector. Previous studies have found that firms that produces higher quality nonfinancial disclosure can enjoy lower debt costs, lower capital constraints and more accessible financing (Cheng et al. 2014; Dhaliwal et al. 2011; Goss and Roberts, 2009). Easley and O'hara (2004) claims that the effect is due to informational benefits. Informational benefits relate to information used by stakeholders to predict the company's future performance. However, it seems that the informational benefits from the mandatory legislation in the EU is regarded as informational disadvantages for firms by the market, at least in terms of risk. For particular stakeholder groups such as customers, suppliers, employees and regulators the increased transparency is probably positive as they will become more informed about the individual company. However, all of these positive effects seems to be at the expense of current shareholders, which experience an increased risk in their portfolio due to the disclosure. This is in line with Chen et al., (2017) who find that mandatory nonfinancial disclosure does generate positive outcomes and externalities for a majority of stakeholders, while shareholders are worse off.

Recent research on risk and information transparency indicates that they are coupled. Firms with lower informational transparency are more prone to future risk, defined as large negative market reactions. Lee and Faff (2009) show that companies with high nonfinancial disclosure, experiences less idiosyncratic risk. However, we observe an increase of risk for companies that increases their information transparency. Hence, companies are negatively affected by mandatory disclosure of nonfinancial information. Jim and Myers (2006) might present a possible explanation for the results. They argue that negative risk occur because managers are able to hide negative information until the amount of negative information exceeds a tipping point, then all the negative information is disclosed to the market. Since the mandate requires firms to disclose ESG-information, and how it may effect risk, operations, financial performance and the business model going forward managers must disclose new information to the market. If the companies pre-regulation have been able to hide information, but post-regulation must disclose the negative information, it can be a possible explanation for the observed increase in risk. Thus, the new information disclosed increases the risk of the treatment sample since the market becomes more informed about the true inherent risk of the individual companies.

The European equity markets reaction to the passing and announcement of mandate 2014/95/EU was negative in terms of stock return for the companies affected by the disclosure. This suggests that the market expected the passing of 2014/95/EU to have a negative financial impact on the companies subject to it (Grewal et al. 2018). Grewal et al., (2018) argue that the potential costs of mandatory disclosure would overshadow the benefits due to proprietary costs and political costs. After the implementation of the same legislation, we observe that the company's subject to the mandate experiences an increase in risk, all across Europe. We also find a possible explanation in these costs and assume that a part of the effect is due to proprietary and political costs. As explained, proprietary costs arise when information harmful to a firm's competitiveness is exposed. Thus, investors might perceive the disclosure as detrimental to the firm's competitiveness and lower their expectations about future performance. In addition, there might be a fear of further political costs forcing companies to invest in projects with negative net present value in order to adapt to the regulation. Further, investors might fear that there will be increased disclosure demands in the future and that it will increase the costs of the mandate further. Since both proprietary and political costs arise when firms fulfill the requirements for the legislation, one could expect that firms would act in line with Bernards's (2018) findings of downsizing to avoid legislation in the EU. However, this does not seem to be the case since the number of firms fulfilling the requirements actually increases between 2017 and 2018 (See appendix 8).

In summary, the increased risk we observe on the European market can be attributable to both proprietary effects and fear of future political costs. The legislation enforces companies to disclose new information and removes manager's ability to decide on how much information they want to disclose to the capital market participants. Now, the market participants observe a decrease in the information asymmetry and an increased insight of the individual companies. Hence, the mandated disclosure of information under the legislation disables manager's ability to hide negative information, which is a component of risk and might impose costs. Thus, the legislation forces treatment companies to disclose accumulated information that might be negative, which leads to an increase in risk due to the imposed costs of disclosure. In addition to the proprietary effects, stakeholders and investors might be concerned about future political costs, subsequent to the mandate.

5.3 ESG multiple regression

This section investigates if there is any impact of pre-regulatory ESG-performance on post-regulatory risk.

5.3.1 Results

We observe that the mandatory nonfinancial disclosure legislation had an impact on risk in the European Union. The findings suggests that companies subject to the new mandate experiences an increase in risk. As a second step in our study, we want to introduce the possibility that treatment companies will experience different impact of risk depending on their level of ESG-performance in the pre-regulatory period. Therefore, we created a multiple regression model with an interaction term for ESG-performance. The sample consists of all treatment companies for which we have obtained ESG-performance. The sample consists solely of treatment firms, meaning that all companies in the sample must produce a nonfinancial report. Further, to investigate if there are any differences we divided the sample in to several groups depending on their pre-regulatory ESG-performance ratings. The sample for the ESG multiple regression consists of 344 companies, in relation to the 1005 companies in the full treatment sample. The descriptive statistics for the model are presented in appendix 9.

In Panel H below, we present the significant results of the multiple regression for the implementation event. The additional test for the other ESG-performance groups are presented in appendix 10. The dependent variables are the two risk measures, Value at Risk and Expected Shortfall at 95% and 99% confidence level. In the Panel, the variable, *RegulationInEffect* is significantly negative, meaning that the implementation of the regulation on average increases risk of the companies in the sample. The coefficient of *ESG_TopQ* is significantly positive, suggesting that the treatment companies with the top quartile of pre-regulatory ESG-performance experiences lower risk in the pre-regulatory period. As mentioned earlier, the variable of interest in the model is the interaction model. From studying the interaction term *RegulationInEffect*ESG_TopQ*, we can see that it has a significantly positive coefficient across all risk measures. The interpretation of this is that companies in the top quartile of ESG-performance experience a significantly lower increase in risk compared to treatment firms not in

the top quartile, in the post-regulatory period. The findings enables us to reject the null hypothesis and accept *Hypothesis 2*.

Panel H – Multiple regression results VaR and ES

ESG regression - implementation	(1)	(2)	(3)	(4)
Dep. Var. =	VAR 95%	VAR 99%	ES 95%	ES 99%
RegulationInEffect	-0.0046*** (0.004)	-0.0066*** (0.006)	-0.0108*** (0.008)	-0.0154*** (0.007)
ESG_TopQ	0.0033** (0.063)	0.0047** (0.042)	0.0037** (0.022)	0.0047** (0.026)
RegulationInEffect x ESG_TopQ	0.0022* (0.087)	0.0032* (0.079)	0.0021* (0.089)	0.0035* (0.074)
MTBV	0.0010*** (0.002)	0.0014*** (0.003)	0.0002** (0.012)	0.0016** (0.011)
MV (€)	0.0000*** (0.001)	0.0000*** (0.000)	0.0000*** (0.009)	0.0000*** (0.000)
Age	0.0007 (0.223)	0.0001 (0.214)	-0.0002 (0.257)	0.0001 (0.224)
D/E	-0.0079* (0.065)	-0.0010* (0.073)	-0.0002 (0.167)	-0.0011 (0.142)
PPE/Total assets	0.0044 (0.180)	0.0059 (0.192)	0.0051 (0.149)	0.0097 (0.100)
SalesGrowth	0.0331** (0.023)	0.0462** (0.000)	0.0130** (0.012)	0.0496** (0.010)
ROIC	0.0027 (0.599)	0.0038 (0.596)	0.0056 (0.424)	-0.0019 (0.835)
N (Companies)	688	688	688	688
Adj. R ²	0.180	0.177	0.197	0.146

***=1% confidence level, **=5% confidence level, *=10% confidence level

Panel H – Multiple regression results VaR and ES

Analysis

The observed risk increase of the treatment firms are in line with reports from both the World Economic Forum (2018) and Sustainalytics (2019). Since the treatment companies on average experiences an increase a risk after the implementation of the mandate, there seems to be a management gap between ESG-risk and risk management systems. According to the European

Commission, one of the rationales behind implementing mandatory nonfinancial disclosure was that it would benefit risk management procedures in European companies.

After conducting the multiple regression model, we have observed that the companies with the top quartile (top 25%) of pre-regulatory ESG-performance, experience lower risk after the legislation is in effect. This finding is in line with empirical studies on nonfinancial disclosure and risk. Lee and Faff (2009) find that companies with leading CSR-performance faces lower levels of idiosyncratic risk compared to firms with lagging CSR-performance. Kim et al., (2014) find that companies with a high level of transparency in their CSR activities are negatively associated with stock price crash risk. The effect is significant across all tests included in panel H. The findings suggests, in similarity with Grewal et al., (2018) that there are observable differences among companies subject to the legislation. The “good guys” defined as companies with a high ESG-performance in the period before the implementation of the regulation are significantly better off in terms of risk when the legislation is in effect. This proposes that companies engaging in high quality ESG-reporting have more successfully managed to inform investors and stakeholders about the true risks inherent to the company’s operations. According Chen et al., (2014) nonfinancial disclosure lowers agency costs and increases transparency through a two mechanisms feedback loop consisting of transparency and compliance. Hence, when the mandatory legislation is in effect, there are no adverse reaction from the market, and the risk level of the individual company is improved compared to peers. Further, the proprietary effects suggested in the main study seems to be mitigated if a company subject to the regulation have been engaging in high quality ESG-reporting in the pre-regulatory period. Thus, high quality nonfinancial disclosure seems to reduce informational asymmetries between investors, lenders and managers. This is in line with findings from both Botosan (1997) and Khurana and Raman (2004).

An alternative explanation to the findings is presented by Godfrey et al. (2005). In their article, they describe that firms consistently investing in CSR-related activities create a form of moral capital from their investors, which they can utilize when negative events unfold. Even though, the mandatory disclosure is not necessary perceived as a negative event, the buffer created from consistent investments in areas related to nonfinancial disclosure and ESG-activities might serve as an insurance.

Investors might be more confident since they have gained a trust towards the company, and therefore the company do not experience an increase in risk from the legislated disclosure.

By looking at the means of the sample, we also observe that larger companies, measured in market value, on average have the highest ESG-scores prior to the mandate, indicating that they are more aware of nonfinancial disclosure and invest more resources into it. Firms in the top quartile on average have a market value of 23,5 billion euro, while the average for all observations amounts to approximately 10,4 billion euro (Appendix 11). Thus, bigger companies seem to invest more resources into risk management related to ESG activities. This finding is in line with Godfrey et al. (2005) where they elaborate on the risk exposure of large firms and confirm that larger firms experience a higher return on their investments related to CSR-activities in comparison to their smaller counterparts.

In summary, the findings suggest that if a company is mandated to disclose information, which the market is already aware of, there is no reduction of the informational asymmetries and thus no adverse reaction. Further, the difference observed among the treatment samples groups might posit a possible explanation for the observed differences in the main study. Lower informational asymmetries, higher trust and larger investments in the pre-regulatory period seems to lead to significant less increase in risk in the period post-regulation. This suggests that on average, the informational differences in the main sample was high, and a small portion of the treatment sample comprised of “good guys”.

5.4 Additional analysis – announcement event

5.4.1 Difference-in-difference analysis

After studying how the implementation of Law 2014/95/EU affected the risk for treatment firms, we want to, in similarity to Grewal et al., (2018), investigate the impact of the announcement. Since the legislative procedure in the European Union is standardized and comprises of several instances, there are multiple potential dates where the most informed segments became aware of the coming legislative change. However, as the official announcement of the regulations passing took place on April 15, 2014 through a press release from the European Commission we chose this date as the event date for our additional analysis. (European Commission, 2014).

In similarity with the implementation of Law 2014/95/EU we need to define event windows pre and post the announcement to allow the difference-in-difference estimation to function. In contradictory to the main analysis, we choose to incorporate three separate event windows for the announcement event. The first event window is the announcement day plus/minus one year; the second event window is the announcement plus/minus six months and the third window is the announcement day plus/minus one month. We choose to incorporate different events to capture any market-effects from the announcement, which might arise quickly. The difference from the main event (implementation event) is that the announcement does not require disclosure from the affected firms, since the mandate is still not in effect. See Image 2 for a visual representation of the selected event windows for the EU announcement event of 2014.

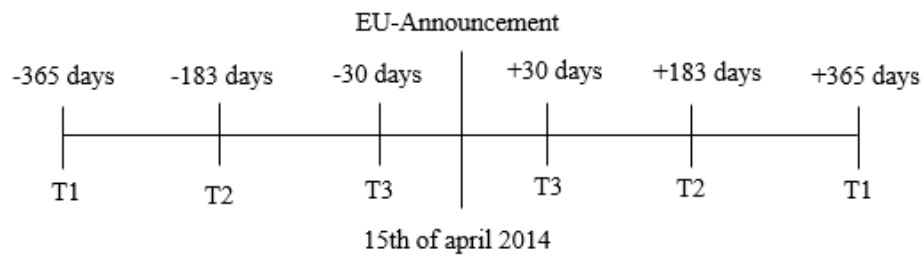


Image 2 – EU Announcement dates

For the additional analysis, we conduct an identical difference-in-difference study, where the main difference is the treatment sample. When the legislation was announced, the informational aspects of was less detailed than for the actual legislation. The treatment sample for the implementation period is smaller, and consists of European companies with more than 500 employees (European Commission, 2014).

5.4.2 Results

In Panel I, the independent variable *AffectedRegulation* displays significantly positive values for the coefficient in columns (1), (2), (3) and (4), thus indicating that treatment firms experience a lower risk before the announcement of the mandate. The variable *RegulationInEffect* show a negative coefficient, indicating that the control firms experience an increased risk after the announcement of Law

2014/95/EU. In contradiction to our results for the implementation event, the interaction term, *AffectedRegulation x RegulationInEffect* is insignificant in columns (1), (2), (3) and (4), suggesting that there is no difference in terms of risk between treatment firms and control firms after the announcement of the legislation. The regressions in panel I presents the findings from the sample of the dependent variable for +/- 365 days from the EU announcement. The reason for this is that it provided the highest explanatory power. The tests for 30 days and 6 months are presented in appendix 12. In addition, the descriptive statistics for the 1-year event window are presented in appendix 13 and tests for normality in stock returns are presented in appendix 14.

Panel I - Difference-in-difference regression – EU announcement, VaR and ES.

All control variables - 2014	(1)	(2)	(3)	(4)
Dep. Var. =	VAR 95%	VAR 99%	ES 95%	ES 99%
AffectedRegulation	0.0027*** (0.002)	0.0039*** (0.002)	0.0008** (0.016)	0.0048*** (0.003)
AfterAnnouncement	-0.0019 (0.124)	-0.0024 (0.142)	-0.0028 (0.127)	-0.0034 (0.135)
AffectedRegulation x AfterAnnouncement	0.0011 (0.362)	0.0014 (0.405)	0.0014 (0.222)	0.0019 (0.405)
MTBV	-0.0022 (0.691)	-0.0032 (0.412)	-0.0002 (0.245)	-0.0022 (0.265)
MV (€)	0.0000 (0.041)	0.0000 (0.033)	0.0000 (0.026)	0.0000 (0.033)
Age	0.0001 (0.034)	0.0001 (0.073)	0.0000 (0.878)	0.0000 (0.884)
D/E	0.0002 (0.055)	0.0003 (0.005)	0.0002 (0.000)	0.0004 (0.003)
PPE/Total assets	-0.0028 (0.034)	-0.0039 (0.038)	-0.0022 (0.020)	-0.0062 (0.014)
SalesGrowth	0.0069 (0.046)	0.0094 (0.055)	0.0078 (0.032)	0.0015 (0.015)
ROIC	0.0055 (0.245)	0.0044 (0.312)	0.0038 (0.035)	0.0087 (0.186)
Fixed effects	Country, Industry	Country, Industry	Country, Industry	Country, Industry
N (Companies)	2172	2172	2172	2172
Adj. R ²	0.054	0.050	0.045	0.044

***=1% confidence level, **=5% confidence level, *=10% confidence level

Panel I – Difference-in-difference regression – EU announcement, VaR and ES.

Analysis

The results from the difference-in-difference estimation shows that there are no significant differences between the treatment and control samples in terms of risk after the announcement of 2014/95/EU has passed. In similarity to the implementation event, there are differences between the two groups in the pre-announcement period, but there are no observable significant differences after the announcement. We do not observe any significant differences in risk between the two samples on neither +/- 30, 183 nor 365 days from the announcement date. When conducting a similar study, Grewal et al., (2018) find that there are significant differences among treatment and control companies in terms of stock price reaction after the announcement of the mandatory legislation. The firms subject to the mandatory disclosure legislation experience a negative market reaction in comparison to the control firms.

Having documented an increased risk for the treatment sample after the implementation of mandate 2014/95/EU, we now find that the announcement had no significant impact on risk. There are several potential explanations to this. First off, the information disclosed in the communication from the European Union when adopting the legislation did not include the complete scope of the legislation or the full requirements of the mandate. It referred to the European Commission's report on strategy for corporate social responsibility, which did not disclose the future requirement of ESG-reporting. Therefore, investors and stakeholders were not be able to grasp the extent of the mandatory disclosure. Secondly, the announcement stated that the mandate would not be in effect until 2018. Thus, the timing of the announcement from the European Union was more than three years ahead of the implementation. Hence, stakeholders might have expected that firms would have plenty of time for preparing and disseminating new information, thus not incurring large costs.

5.4.3 Multiple regression

To investigate the link of ESG-performance and risk, we choose to re-run the multiple regression with an interaction variable for the announcement of 2014/95/EU. In similarity with the implementation event, this sample only consists of treatment firms with ESG-performance ratings from Asset4. The sample comprises of 160 individual treatment companies. In appendix 14 we present the descriptive statistics for the sample comprising of treatment firms.

The multiple regression specification for this sample is identical to the regression used for the implementation event. The results from the regressions are presented in panel J below. Among the treatment companies in the sample, we observe no differences depending on their pre-announcement ESG-performance. The findings are insignificant for all event windows, and additional tests with all pre-announcement groups are presented in appendix 15, and descriptive statistics are presented in appendix 16.

Panel J – ESG Multiple Regression

ESG regression - Announcement	(1)	(2)	(3)	(4)
Dep. Var. =	VAR 95%	VAR 99%	ES 95%	ES 99%
AfterAnnouncement	-0.0098 (0.089)	-0.0139 (0.042)	-0.0108 (0.040)	-0.0154 (0.080)
ESG_TopQ	0.0051 (0.091)	-0.0045 (0.123)	-0.0077 (0.056)	-0.0047 (0.095)
AfterAnnouncement x ESG_TopQ	0.0027 (0.168)	0.0038 (0.120)	0.0027 (0.163)	0.0035 (0.118)
MTBV	0.0005 (0.329)	0.0016 (0.170)	0.0008 (0.220)	0.0005 (0.059)
MV (€)	0.0000 (0.003)	0.0000 (0.023)	0.0000 (0.094)	0.0000 (0.053)
Age	0.0001 (0.172)	0.0011 (0.142)	-0.0004 (0.203)	0.0002 (0.059)
D/E	-0.0037 (0.074)	-0.0005 (0.073)	-0.0003 (0.081)	-0.0005 (0.079)
PPE/Total assets	0.0090 (0.034)	0.0128 (0.032)	0.0046 (0.196)	0.0118 (0.041)
SalesGrowth	0.0069 (0.335)	0.0094 (0.350)	0.0063 (0.308)	0.0121 (0.219)
ROIC	0.0326 (0.008)	0.044 (0.011)	0.0236 (0.023)	0.0432 (0.010)
N (Companies)	320	320	320	320
<i>Adj. R²</i>	0.212	0.208	0.197	0.227

***=1% confidence level, **=5% confidence level, *=10% confidence level

Panel J – ESG Multiple Regression

The results in panel J provides evidence that firm risk was not affected by prior ESG-performance in relation to the announcement of the regulation. This suggest that the equity market did not perceive that the announcement of the regulation would increase the risk of any group. Our findings differ from the results of Grewal et al., (2018) who find that “good guys” was less negatively affected by the announcement. We believe that the differences between the results might be due to the lack of comprehensive understanding among market participants at the time of the announcement.

5.5 Summary hypothesis

In table 9, we summarize the findings from our different tests and our stated hypotheses. For the first hypothesis, we are able to reject the null hypothesis, since the treatment sample shows a significantly higher risk than the control sample in the period after the implementation of 2014/95/EU. In addition, the findings from the multiple regression confirms that companies in the top quartile of ESG-performance ratings in the pre-regulatory period experience a lower increase in risk in the post-regulatory period. Thus, we are able to reject the second null hypothesis.

Table 9 – Summary of hypotheses

Hypothesis	Test	Interpretation	Result
(1) Treatment firms experience an increased risk after the implementation of the mandatory regulation compared to control firms.	Difference-in-Difference study	The coefficient of the interaction term <i>AffectedRegulation x RegulationInEffect</i>	In line with hypothesis
(2) Firms with a relatively high pre-regulatory ESG-performance will experience a lower increase in risk compared to firms with a relatively low pre-regulatory ESG-performance after the implementation of the mandate.	Multiple Regression with interaction	The coefficient of the different ESG-groups	In line with hypothesis

Table 9 – Summary of hypotheses

6.0 Implications for managerial practice and policy

Currently, there is a paradigm shift in the way institutional bodies requires companies to disclose nonfinancial information. Previously, this has been considered a voluntary activity and not a requirement. However, times have changed and we are moving towards a business climate where nonfinancial disclosure activities are mandated. With the addition of the entire European Union, the number of countries that have enforced this kind of legislative intervention has increased. Now, European companies have to disclose risks, policies, performance relating to environmental, social, and governance matters. The legislation aims to provide investors and stakeholders with insight in to individual companies, which will reduce the informational asymmetries. It will lead to a more complete picture of performance, than provided by financial information. However, even though the number of countries and companies adopting these regulations are growing, little is known about the effects in terms of risk for companies subject to mandatory regulations.

We study the implementation of nonfinancial disclosure regulation in the European Union, occurring in 2018, affecting approximately 6000 companies. We find that the implementation of the mandatory disclosure regulation does increase the risk of the companies subject to the mandate, measured in Value at Risk and Expected Shortfall. It suggests that the market participants perceives the mandatory disclosed information as negative, in terms of risk. Thus, the implementation of mandatory disclosure regulation does have real implications for the companies subject to it, and is more than a compliance activity with little effect on a business. Second, the findings have managerial implications for the companies subject to the legislation since the impact in terms of risk varies depending on their pre-regulatory level of ESG-performance. Firms with high ESG-performance, which includes reporting activities that the mandatory legislation requires, are exposed to significantly less risk-increase after the implementation of the mandate. This suggest that the risk increase due to the implementation of mandatory nonfinancial disclosure legislation is much smaller if a firm has engaged in high quality disclosure of the same type. Hence, if a company have informed the market participants using high quality nonfinancial reporting previously, they will not be subject to an increase in risk.

In summary, the findings provide several managerial implications. First, as the market on average react negatively to the increased transparency, there might be a fear of the proprietary and political costs associated with mandatory nonfinancial disclosure. Second, since investors tend to react more positive towards firms with an extensive ESG-performance record, managers should focus on identifying the most critical components of their ESG-related issues and improve their transparency and performance within them. Ultimately, this inclusion of ESG-activities in risk management systems would lead to an increased transparency and reduce the probability of negative events for investors and other stakeholders when mandatory disclosure mandates are implemented.

7.0 Conclusion

This paper examines how mandated nonfinancial disclosure affects risk management in the European Union. Specifically, we examine the market's reaction to the implementation of mandate 2014/95/EU, which requires large European firms to disclose nonfinancial and diversity information. The regulation is in effect from January 1, 2018 and affects firms with listings within the entire European Union. To investigate the market's reaction to the new regulation, we choose to observe difference in risk between a treatment and a control sample pre and post-implementation of the mandate. In the study, risk is measured by using Value at Risk and Expected Shortfall. To eliminate external effects, the treatment and control sample are matched by country, industry, market capitalization and market-to-book ratio. Initially, we predict that the mandatory regulation will have a negative impact for the companies subject to the new mandate. The prediction is motivated by previous findings from the Chinese market, where firm's subject to similar legislations have been negatively affected by the imposed costs. We believe that proprietary effects and political costs will emerge and increase the risk of companies subject to the mandate. Further, we also predict that the difference in risk among the companies subject to the mandate will be a function of their pre-mandatory nonfinancial performance. We believe that companies with a higher pre-regulatory nonfinancial performance will be less exposed to risk in the period post-implementation. The rationale for this prediction is the believe that the use of ESG-information has a growing importance in investment decisions. Hence, firms with an extensive record of disclosing high quality nonfinancial information will have less information asymmetries, thus less actual and expected costs related to the legislation.

In the study, we apply a difference-in-difference regression to investigate if there are any significant differences in observable risk between treatment and control companies in the pre and post-regulatory period. Our empirical results confirms the first hypothesis. In particular, we document an average increase in risk for the treatment sample, measured both in Value at Risk by 0,385% and Expected Shortfall by 0,410%. We include a series of robustness tests, with alternative samples and exclusion of data points. The findings seems to be more robust for the risk measure Value at Risk than Expected Shortfall. Further, the results from our descriptive data are in line with the main model. The risk averages of the treatment group displays a significantly lower risk in the time before the

implementation, compared to the control sample. After the implementation of the mandate the observed differences in risks between the two samples is reduced. We conduct a similar study on the announcement of the mandate to see if any observable market effects arises. Nevertheless, we are not able to find any significant difference in terms of risk between the treatment and control sample when the legislation is announced.

Our second hypothesis is confirmed as well. By using a multiple regression model with a sample of treatment companies that had obtained an ESG-performance rating, we document a reduced risk after the mandate for companies in the top quartile of pre-regulatory nonfinancial disclosure-performance. The findings are robust for all risk measures. We observe the effect by applying an interaction term in the multiple regression model, where we divide the companies in to groups depending on their pre-regulatory ESG-performance.

In sum, we conclude that companies subject to the European mandatory nonfinancial disclosure mandate experience an increase in observable risk in the period post-regulation, compared to firms not subject to the mandate. The increase of risk could be attributable to proprietary effects when the information asymmetry is reduced due to the new legislation. Additionally, the regulatory implementation seems to reduce risk for treatment firms with strong nonfinancial disclosure performance in the pre-regulatory period. The difference is discussed to be attributable to the difference in transparency and therefore less proprietary and political costs subsequent to the implementation. Finally, our findings contributes to the relative small body of literature investigating the link between mandatory nonfinancial disclosure and risk management.

7.1 Further research

In our study, we examine the impact 2014/95/EU has had on European companies in terms of risk management. We believe that we have determined the relationship of mandatory nonfinancial disclosure and risk to be negative for European companies. Additionally, companies with high pre-regulatory nonfinancial disclosure performance seems to be less affected by the regulatory shift. However, there are some aspects of our study that can be improved in further research.

A drawback in our study of nonfinancial disclosure on the European market is the differences of samples from different countries. Due to restrictions of available financial data among countries, our finalized sample does not represent complete observations from all European countries. Therefore, our sample does not represent the entire European market. By retrieving data from national databases or manually from annual reports of the countries missing in our sample, it would be interesting to see if the results from our study would still hold. Moreover, if alternative methods for gathering data could be applied successfully, a new study could try to remove the replacement-matching if the sample size is large enough.

Furthermore, other risk measures could be used to verify the results from our study. The models for calculating the risk measures applied in our study are based on stock price movements. Other studies could measure risk using Beta, R-Squared, Standard Deviation or Sharpe ratio. In addition, it would be interesting for future studies to find ESG-performance ratings for all companies, which can be used in the difference-in-differences study as a third interaction variable to investigate the impact of pre-regulatory ESG-performance for all companies. Thereby, it would be possible to determine the relationship of ESG-performance and risk management on a complete sample.

Additionally, further research could examine the equity markets reaction to ESG-disclosure from affected companies. In similarity to Grewal et al., (2018) the study could measure the Cumulated abnormal return (CAR) for treatment and control companies when they disclose nonfinancial information. It would be interesting to see if there is any difference in return for shorter event windows in relation to the disclosure. Future research could also investigate if the findings of Bernard et al. (2018) on financial and audit information are applicable on mandatory nonfinancial disclosure requirements. That is, if companies actively act and engage in downsizing activities to avoid the effects and costs of mandatory nonfinancial disclosure.

As a final remark, in similarity with Margolis et al., (2009) we would suggest conducting a meta-study, summarizing the financial impact of mandatory nonfinancial regulation from previous research. This could provide an academic overview of the empirical findings related to mandatory disclosure regulation, and see if it, on average has a positive or negative impact of firms subject to it.

8.0 References

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9.0 Appendix

Appendix 1 – European Commission statement



STATEMENT

Brussels, 29 September 2014

Disclosure of non-financial information: Europe's largest companies to be more transparent on social and environmental issues

The European Commission welcomes today's adoption by the Council of the Directive on disclosure of non-financial and diversity information by large companies and groups. Companies concerned will disclose information on policies, risks and outcomes as regards environmental matters, social and employee-related aspects, respect for human rights, anti-corruption and bribery issues, and diversity on boards of directors.

The European Parliament adopted the Directive on 15 April 2014 and following today's adoption by the Council, the Directive will be published in the EU Official Journal and enter into force 20 days later. Member States will have two years to transpose the Directive into national legislation. Therefore, companies concerned will have significant time to adapt to the new requirements, and will start reporting as of their financial year 2017.

The Directive provides for further work by the Commission to develop non-binding guidelines in order to facilitate the disclosure of non-financial information by companies, taking into account current best practice, international developments and related EU initiatives.

Vice-President of the European Commission in charge of Internal Market and Services, Michel Barnier, said: *"I am pleased that the Council has adopted this Directive, which will drive the long-term performance of the EU's largest companies by significantly improving their transparency and, concretely, the disclosure of material non-financial information. Companies, investors and society at large will benefit from this increased transparency. This is important for Europe's competitiveness and the creation of more jobs."*

The new Directive will only apply to some large companies with more than 500 employees. In particular, large public-interest entities with more than 500 employees will be required to disclose certain non-financial information in their management reports. The scope includes approx. 6 000 large companies and groups across the EU. The approach taken ensures that administrative burden is kept to a minimum. Smaller companies will have no new requirements. Companies in the scope of the Directive will disclose relevant, useful information necessary for an understanding of their development, performance, position and impact of their activity, rather than detailed reports. Furthermore, the Directive provides companies with significant flexibility to disclose relevant information in the way that they consider most useful, or in a separate report. Companies may use international, European or national guidelines which they consider appropriate.

As regards diversity on company boards, large listed companies will be required to provide information on their diversity policy, such as, for instance: age, gender, educational and professional background

This Directive is also a first step towards the implementation of the European Council conclusions of 22 May 2013 on the need for further transparency on tax matters and for ensuring country-by-country reporting by large companies and groups.

http://europa.eu/rapid/press-release_STATEMENT-14-291_en.htm

Appendix 2 – OLS tests main model

OLS test - no multi-collinearity in the models

Var 95%:

	Var95	MTBV	MV	Age	DEratio	PPetotal	Salesg~R	ROIC
Var95	1.0000							
MTBV	-0.0246	1.0000						
MV	0.1398	-0.0064	1.0000					
Age	0.1790	-0.0130	0.2295	1.0000				
DEratio	0.0322	-0.0283	0.0429	0.0425	1.0000			
PPetotal	0.0819	-0.0528	0.0324	0.0205	-0.0037	1.0000		
Salesg~R	0.0879	-0.0173	-0.0092	-0.0667	-0.0292	0.0383	1.0000	
ROIC	0.0458	-0.0099	0.0153	0.0510	0.0109	0.0284	0.0348	1.0000

Var 99%:

	Var99	MTBV	MV	Age	DEratio	PPetotal	Salesg~R	ROIC
Var99	1.0000							
MTBV	-0.0248	1.0000						
MV	0.1396	-0.0064	1.0000					
Age	0.1780	-0.0130	0.2295	1.0000				
DEratio	0.0330	-0.0283	0.0429	0.0425	1.0000			
PPetotal	0.0817	-0.0528	0.0324	0.0205	-0.0037	1.0000		
Salesg~R	0.0863	-0.0173	-0.0092	-0.0667	-0.0292	0.0383	1.0000	
ROIC	0.0450	-0.0099	0.0153	0.0510	0.0109	0.0284	0.0348	1.0000

ES 95%:

	ES95	MTBV	MV	Age	DEratio	PPetotal	Salesg~R	ROIC
ES95	1.0000							
MTBV	-0.0271	1.0000						
MV	0.1586	-0.0064	1.0000					
Age	0.2061	-0.0130	0.2295	1.0000				
DEratio	0.0575	-0.0283	0.0429	0.0425	1.0000			
PPetotal	0.0962	-0.0528	0.0324	0.0205	-0.0037	1.0000		
Salesg~R	0.0678	-0.0173	-0.0092	-0.0667	-0.0292	0.0383	1.0000	
ROIC	0.0278	-0.0099	0.0153	0.0510	0.0109	0.0284	0.0348	1.0000

ES 99%:

	ES99	MTBV	MV	Age	DEratio	PPetotal	Salesg~R	ROIC
ES99	1.0000							
MTBV	-0.0157	1.0000						
MV	0.1466	-0.0064	1.0000					
Age	0.1704	-0.0130	0.2295	1.0000				
DEratio	0.0289	-0.0283	0.0429	0.0425	1.0000			
PPetotal	0.0606	-0.0528	0.0324	0.0205	-0.0037	1.0000		
Salesg~R	0.1084	-0.0173	-0.0092	-0.0667	-0.0292	0.0383	1.0000	
ROIC	0.0503	-0.0099	0.0153	0.0510	0.0109	0.0284	0.0348	1.0000

OLS test – No homoscedasticity and no autocorrelation

Var 95%:

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

chi2(7)      =    266.13
Prob > chi2   =    0.0000
```

Var 99%:

```
. hettest MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

chi2(7)      =    270.22
Prob > chi2   =    0.0000
```

ES 95%:

```
. hettest MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

chi2(7)      =    142.66
Prob > chi2   =    0.0000
```

ES 99%:

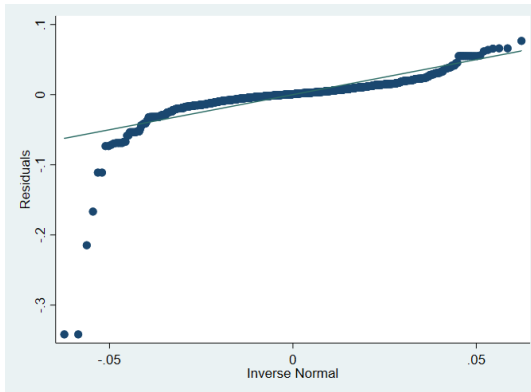
```
. hettest MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

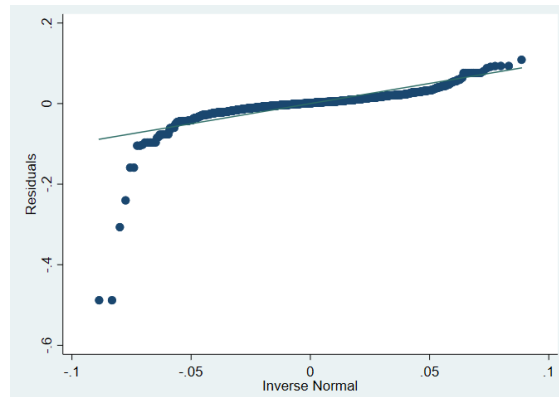
chi2(7)      =    260.46
Prob > chi2   =    0.0000
```

OLS test – Normality of error terms

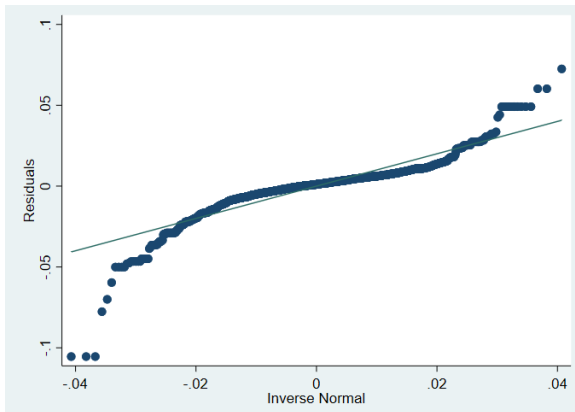
VAR 95%



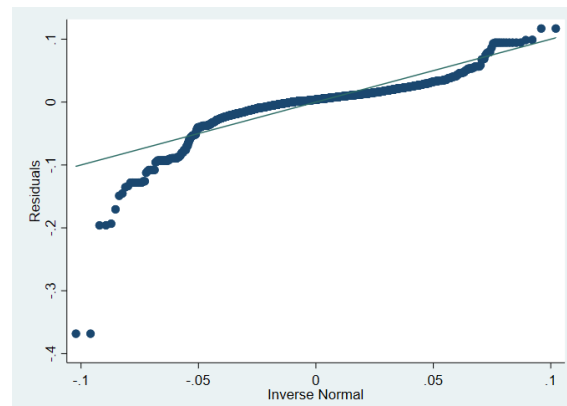
VAR 99%



ES 95%

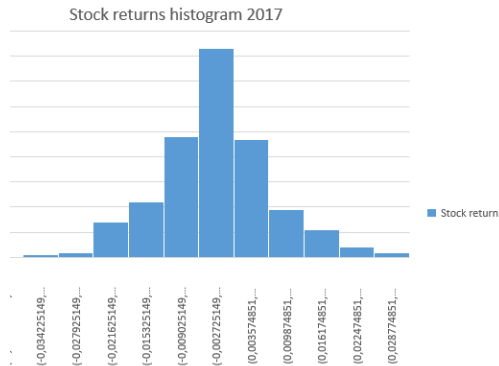


ES 99%



Appendix 3 – Normality test of stock returns main study

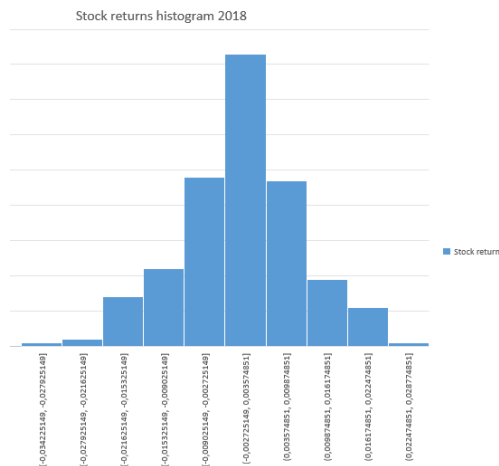
Pre-regulatory period



Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Stockreturns	522,597	0.99999	0.643	-1.253	0.89491

Post regulatory period



. swilk Stockreturns

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Stockreturns	522,597	0.99931	0.816	-0.516	0.69711

Appendix 4 - OLS testing for ESG model

OLS test – no multi-collinearity in the model

Var 95%:

	Var95	MTBV	MV	Age	DEratio	PPEtotal	Salesg~R	ROIC
Var95	1.0000							
MTBV	0.1845	1.0000						
MV	0.2410	0.0448	1.0000					
Age	0.0902	0.0098	0.2118	1.0000				
DEratio	-0.0130	0.1249	0.0074	0.0219	1.0000			
PPEtotal	-0.2924	-0.1752	-0.0971	-0.1762	-0.0576	1.0000		
Salesg~R	0.1485	-0.0849	0.0068	-0.0981	-0.0330	0.0601	1.0000	
ROIC	0.0664	0.0607	-0.0365	-0.0357	-0.0983	-0.0852	-0.1009	1.0000

Var 99%:

	Var99	MTBV	MV	Age	DEratio	PPEtotal	Salesg~R	ROIC
Var99	1.0000							
MTBV	0.1813	1.0000						
MV	0.2416	0.0448	1.0000					
Age	0.0926	0.0098	0.2118	1.0000				
DEratio	-0.0121	0.1249	0.0074	0.0219	1.0000			
PPEtotal	-0.2964	-0.1752	-0.0971	-0.1762	-0.0576	1.0000		
Salesg~R	0.1438	-0.0849	0.0068	-0.0981	-0.0330	0.0601	1.0000	
ROIC	0.0664	0.0607	-0.0365	-0.0357	-0.0983	-0.0852	-0.1009	1.0000

ES 95%:

	ES95	MTBV	MV	Age	DEratio	PPEtotal	Salesg~R	ROIC
ES95	1.0000							
MTBV	0.1954	1.0000						
MV	0.2257	0.0448	1.0000					
Age	0.1062	0.0098	0.2118	1.0000				
DEratio	0.0315	0.1249	0.0074	0.0219	1.0000			
PPEtotal	-0.2600	-0.1752	-0.0971	-0.1762	-0.0576	1.0000		
Salesg~R	0.1696	-0.0849	0.0068	-0.0981	-0.0330	0.0601	1.0000	
ROIC	0.0610	0.0607	-0.0365	-0.0357	-0.0983	-0.0852	-0.1009	1.0000

ES 99%:

	ES99	MTBV	MV	Age	DEratio	PPEtotal	Salesg~R	ROIC
ES99	1.0000							
MTBV	0.1678	1.0000						
MV	0.2326	0.0448	1.0000					
Age	0.0843	0.0098	0.2118	1.0000				
DEratio	0.0004	0.1249	0.0074	0.0219	1.0000			
PPEtotal	-0.2278	-0.1752	-0.0971	-0.1762	-0.0576	1.0000		
Salesg~R	0.1467	-0.0849	0.0068	-0.0981	-0.0330	0.0601	1.0000	
ROIC	0.0762	0.0607	-0.0365	-0.0357	-0.0983	-0.0852	-0.1009	1.0000

OLS test – No homoscedasticity and no autocorrelation

Var 95%:

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

chi2(7)      =    924.50
Prob > chi2   =    0.0000
```

Var 99%:

```
. hettest MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

chi2(7)      =    952.17
Prob > chi2   =    0.0000
```

ES 95%:

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

chi2(7)      =    571.46
Prob > chi2   =    0.0000
```

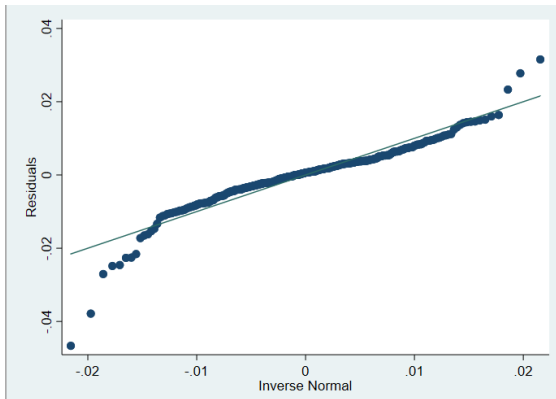
ES 99%:

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC

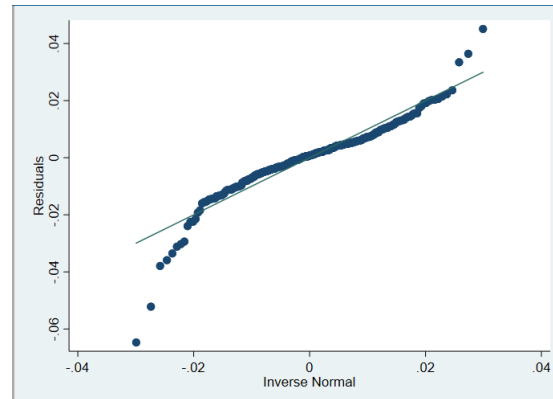
chi2(7)      =    409.99
Prob > chi2   =    0.0000
```

OLS test – Normality of error terms

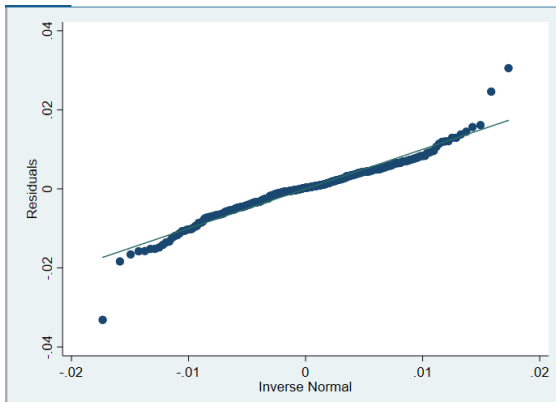
VAR 95%



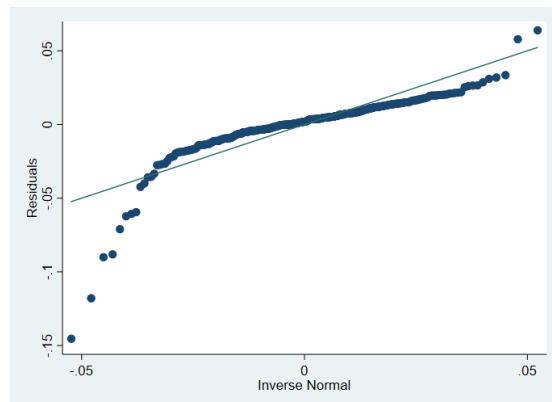
VAR 99%



ES 95%



ES 99%



Appendix 5 – Complete sample

Austria

DO & CO AG ,OESTERREICHISCHE ,UBM DEVELOPMENT ,IMMOFINANZ AG ,CA IMMOBILIEN AG ,WARIMPEX FINANZ ,SPARKASSEN IMMOBIL ,ATRIUM EUROPEAN REAL ,LINZ TEXTIL HOLDING ,WOLFORD AG ,SCHOELLER-BLECKMANN ,OMV AG ,UNIQA INSUR ,VIENNA INSURANCE ,KAPSCH TRAFFICOM AG ,OSTERREICHISCHE ,FLUGHAFEN WIEN AG ,AMAG AUSTRIA ,VOEST-ALPINE AG ,SEMPERIT AG HOLDING ,PALFINGER AG ,ANDRITZ AG ,ROSENBAUER INT AG ,MAYR-MELNHOF KARTON ,EVN AG ,JOSEF MANNER & COMP. ,AGRANA BETEILIGUNGS ,TELEKOM AUSTRIA AG ,UNTERNEHMENS INVEST ,VERBUND AG ,BURGENLAND HOLDING A ,WIENERBERGER AG ,PORR AG ,ZUMTOBEL AG ,STRABAG SE ,LENZING AG ,OTTAKRINGER GE ,ERSTE GROUP BANK AG ,BKS BANK AG ,BANK FUER TIROL UND ,OBERBANK AG ,RAIFFEISEN BANK ,KTM INDUSTRIES AG ,POLYTEC HOLDING AG ,FRAUENTHAL HOLDING ,FACC AG

Belgium

SMARTPHOTO GROUP NV ,SOCIETE ANONYME BE ,QRF COMM ,OXURION NV ,MIKO SA ,MDXHEALTH S.A. ,HAMON & CIE INTERN ,FLORIDIENNE NV ,CRESCENT SA ,BONE THERAPEUTICS SA ,BANIMMO S.A. ,ASIT BIOTECH SA ,VGP NV ,VASTNED RETAIL ,VAN DE VELDE SA ,TESSENDERLO GROU ,TER BEKE N.V ,SOCIETE DE SERVICES ,SIOEN INDUSTRIES ,BROUWERIJ HANDEL ,ROULARTA MEDIA GROUP ,RETAIL ESTATES SA ,RESILUX SA ,RECTICEL NV ,PICANOL NV ,MITHRA PHARMA ,JENSEN GROUP SA ,ION BEAM APPLICATION ,INTERVEST OFFICES ,GREENYARD FOODS NV ,GIMV INVESTE ,FLUXYS BELGIUM NV ,FAGRON NV ,EXMAR NV ,EVS BROADCA EQUIPMEN ,DEXIA SA ,DECEUNINCK N ,CELYAD SA ,CARE PROPERTY INVEST ,BIOCARTIS GROUP NV ,BEFIMMO ,BANQUE NATIONALE DE ,ATENOR SA ,WERELDHAVE ,ORANGE BELGIUM ,ONTEX GROUP NV ,KINEPOLIS GROUP ,EURONAV NV ,ECONOCOM GROUP SE ,D'IETEREN S.A. ,COMPAGNIE DU ,BREDERODE SA ,BPOST SA ,NV BEKAERT ,AGFA-GEVAERT NV ,AANNEMINGSMAATSCHA ,WAREHOUSES ,TELENET GROUP ,MELEXIS NV ,LOTUS BAKERIES NV ,ELIA SYSTEM OP ,BARCO (NEW) N.V. ,AEDIFICA ,ACKERMANS & VAN HAAR ,SOFINA SA ,COFINIMMO SA ,ARGENX SE ,PROXIMUS NV ,COLRUYT SA ,AGEAS NV ,UMICORE SA ,SOLVAY SA ,UCB SA ,KBC GROUP NV ,ANHEUSER BUSCH IN

Bulgaria

VELGRAF ASSET MAN ,SPEEDY AD ,NEOCHIM AD ,M+S HYDRAULIC ,HOLDING VARNA ,BULGARIAN STOCK ,ALBENA AD AMER SPORTS , EXEL COMPOSITE ,TCHAIKAPHARMA ,SOPHARMA AD ,CHIMIMPORT AD ,CEZ DISTRIBUT ,FIRST INVESTMENT

Croatia

TURISTHOTEL D.D. ,TANKERSKA NEXT ,LEDO DD ,KRAS DD ,KONCAR ,JAMNICA DD ,INSTITUT IGH ,HPB DD ,FTB TURIZAM DD ,DALEKOVOD DD ,CROATIA AIRLINES DD ,ATLANTSKA PLOVIDBA ,ADRIATIC CROATIA INT ,AD PLASTIK DD ,VALAMAR RIVIERA DD ,PODRAVKA DD ,PLAVA LAGUNA DD ,MAISTRA DD ,KONCAR-ELEKTROINDUST ,ERICSSON NIKOLA ,DUKAT DD ,ATLANTIC GRUPA DD ,ARENA HOSP ,ZAGREBACKA BANKA ,PRIVREDNA BANKA ZAGR ,HRVATSKI TELEKOM ,INA DD

Cyprus

PETROLINA (HOLDINGS), KEO PLC, ERMES DEPARTMENT, ATLANTIC INSURANCE, VASSILIKO CEMENT WORKS, HELLENIC BANK PUBLIC, OBER, NSE INDUSTRIES

Czech Republic

PHILIP MORRIS CR, PFNONWOVENS AS, KOFOLA CS, CENTRAL EUROPEAN, MONETA MONEY, O2 CZECH REPUBLIC AS, KOMERCNI BANKA, A.S., CEZ A.S., GENFIT, GAUMONT

Estonia

AS SILVANO FASHION, NORDECON AS, MERKO CONSTRUCTION, HARJU ELECTRICS LTD, EKSPRESS GRUPP AS, AS BALTIKA, AS TALLINNA VESI, TALLINNA KAUB, TALLINK GROUP AS, LHV GROUP AS

Finland

WULFF GROUP, VINCIT OYJ, VIKING LINE ABP, TELESTE OYJ, TECNOTREE OYJ, SUOMINEN OYJ, STOCKMANN OYJ, SSH COMM, SRV GROUP PLC, SOPRANO OYJ, SIILI SOLUTIONS OYJ, SIEVI CAPITAL OYJ, ROBIT PLC, RAUTE OYJ, RAPALA VMC, PRIVANET GROUP OYJ, KARJALAN KIRJAPAINO, PANOSTAJA OYJ, NURMINEN LOGISTICS, NOHO PARTNERS OYJ, KESKISUOMALAINEN OYJ, INNOFACTOR PLC, ILKKA YHTYMA OYJ, HONKARAKENNE OYJ, HKSCAN CORP, GLASTON CORPORATION, EXEL COMPOSITES OYJ, EFORE PLC, DIGIA PLC, CONSTI GROUP, COMPONENTA CO, ATRIA PLC, APETIT OYJ, ALANDSBANKEN ABP, VERKKOKA, VAISALA OYJ, TOKMANNI GROUP, TIKKURILA OYJ, TECHNOPSIS OYJ, TAALERI OYJ, SUOMEN HOIVATILA, SCANFIL PLC, REVENIO GROUP OYJ, RAMIRENT OYJ, RAISIO OYJ, QT GROUP OYJ, POYRY OYJ, PONSSE OYJ, PIHLAJALINNA OYJ, ORIOLA OYJ, OLVI OYJ, MARIMEKKO OYJ, LEHTO GROUP, LASSILA & TIKANOJA, F-SECURE OYJ, ETTEPLAN OYJ, EQ OYJ, DETECTION TECH, CRAMO OYJ, CAVERION OYJ, CAPMAN OYJ, BITTIUM OYJ, BASWARE OYJ, ASPO OYJ, ASIAKASTIETO, ALMA MEDIA OYJ, AKTIA BANK PLC, AFARAK GROUP, UPONOR OYJ, SANOMA- OYJ, FISKARS OYJ, FINNAIR OYJ, CITYCON OYJ, AHLSTROM-MUNKSJÖ OYJ, YIT OYJ, OUTOTEC OYJ, METSA BOARD OYJ, KEMIRA OYJ, VALMET OYJ, TIETO OYJ, OUTOKUMPU OYJ, ORION OYJ, KONECRANES ABP, HUHTAMAKI OYJ, DNA, CARGOTEC CORPORATION, KESKO OYJ, AMER SPORTS, NOKIAN TYRES PLC, METSO OYJ, ELISA CORP, STORA ENSO OYJ, WARTSILA OYJ, UPM-KYMMENE OYJ, KONE CORPORATION, FORTUM OYJ, SAMPO OYJ, NESTE OYJ, NORDEA BANK ABP, NOKIA OYJ

France

YMAGIS SAS, WEBORAMA, VISIOMED GROUP SA, VISIATIV SA, VELCAN HOLDINGS SA, UMANIS SA, UCAR, U10, TRAVEL TECHNOLOGY, TRILOGIQ SA, TRANSGENE, TOUPARGEL GROUPE, TOUAX SA, SGTR CITE, TIPIAK SA, THE BLOCKCHAIN GROUP, TERREIS, STREAMWIDE SA, STENTYS, S.T. DUPONT SA, SQLI, SPIR COMMUNICATION, SPINEMWAY SA, SPINEGUARD SA, SOGECLAIR, SOFIBUS PATRIMOINE, SIDETRADE SA, SRP GROUPE, SERGEFERRARI GROUP, SEQUANA, SOCIETE MARSEILLAIS, ROUGIER SA, RIBER SA, RECYLEX SA, QWAMPLIFY SA, PSB INDUSTRIES SA, PRODWARE, PRISMAGLEX INTL SA, PRECIA SA, POXEL SA, ETS POUJOULAT SA, PLANETMEDIA SA, PIXIUM, PISCINES DESJOYAUX, PIERRE ET VACANCES, PARROT, PARIS REALTY FUND SA, OSE IMMUNOTHERAP, OREGE SA, ORCHESTRA PREM, ORAPI SA, ONXEO SA, ONCODESIGN, OL GROUPE, OBER, NSE INDUSTRIES, NOXXON PHARMA NV, NOVACYT, NETGEM, MRM SA, MR BRICOLAGE SA, MOULINVEST SA, MONTAGNE ET N, MILLET INNOVATION SA

,MICROWAVE VISION SA ,MICROPOLE SA ,METABOLIC EXPLORER ,MEDICREA INTER ,MEDIAN TECHNO ,MEDASYS SA ,MARIE BRIZARD WINE ,MAUNA KEA TECH ,MASTRAD FINANCES ,LES HOTELS ,COMPAGNIE LEBON ,GROUPE LDLC SA ,LAFUMA SA ,LACROIX SA ,KEYYO ,KEYRUS ,KERLINK SA ,JACQUES BOGART SA ,ITS GROUP ,ITESOFT SA ,IT LINK ,INTRASENSE SA ,INSTALLUX SA ,INSIDE SE ,INNELEC MULTIMEDIA ,COMPAGNIE INDUS ,IMPLANET ,HYBRIGENICS SA ,PUBLIC SYSTEME ,HITECHPROS ,HIOLLE INDUSTRIES ,HIGH CO ,HF COMPANY ,HERIGE SA ,HARVEST ,GUILLEMOT CORPORATIO ,GROUPE OPEN SA ,GROUPE GORGE ,GROUPE FLO SA ,GROUPE PIZZORNO ,GLOBAL BIOENER ,GEVELOT SA ,GENSIGHT BIOLOGIC ,GENOWAY ,GENKYOTEX ,GENEURO SA ,GECI INTERNATIONAL ,GRENOBLOISE D'ELEC ,GASCOGNE ,LA FRANCAISE DE L ,FORESTIERE EQUATORIA ,FOCUS HOME ,SOC D EXPLOSIFS ,EXACOMPTA CLAIREFONT ,EVOLIS CARD ,EUROPACORP SA ,EUROMEDIS GROUPE ,EUROGERM ,EUROBIO SCIENTIFIC ,EURASIA GROUPE SA ,ESI GROUP ,ERYTECH PHARMA SA ,EOS IMAGING SA ,ENVEA SA ,ENCRES DUBUIT ,EKINOPS SA ,ECA SA ,EASYVISTA SA ,DNXCORP SE ,D.L.S.I. ,DIETSWELL ,DELFINGEN INDUSTRY ,DAMARTEX ,CYBERGUN SA ,CS COMMUNICATION ,CROSSJECT SA ,CAISSE REGIONALE ,CAISSE REGIONALE ,CAISSE REGIONALE DE ,CRCAM NORMANDIE SEIN ,CAISSE REGIONALE DE ,CREDIT AGRICOLE ,COIL NV ,COHERIS ATIX ,COGRA 48 SA ,CLASQUIN ,MONT-BLANC ,CERENIS THE ,CELLNOVO GROUP SA ,CBO TERRITORIA ,CIS CATERING ,CATANA GROUP ,CAST SA ,CAISSE REGIONALE ,CAISSE REGI ,CAFOM SA ,BOURSE DIRECT ,SOC CENTRALE BOIS ,BLEECKER ,BIOSYNEX SA ,BILENDI SA ,BERNARD LOISEAU SA ,BACCARAT SA ,AURES TECHNOLOGIES ,AUREA ,ATEME SA ,A.S.T. GROUPE ,ARTPRICE COM SA ,ARTEA SA ,ARCHOS SA ,AMPLITUDE SURGIC ,AMOEBE ,ALES GROUPE ,ADVINI SA ,ADUX SA ,ADOCIA SAS ,ADL PARTNER ,GROUPE ACTIPLAY SA ,ACTIA GROUP SA ,ACTEOS ,ACANTHE DEVELOPPMEMEN ,ABIVAX SA ,AB SCIENCE S.A ,1000MERCIS ,XILAM ANIMATION SA ,VRANKEN-POMMERY MONO ,VOYAGEURS DU MONDE ,VOLTALIA ,VIRBAC SA ,VILMORIN & CIE ,VIEL & CIE SA ,VETOQUINOL SA ,VALNEVA SE ,VALLOUREC SA ,UNION FIN. FRAN. BA. ,TOUR EIFFEL SA ,TOTAL GABON ,THERMADOR GROUPE ,TONNELL. FRANCOIS FR ,TESSI SA ,TARKETT SA ,SYNERGIE SE ,SWORD GROUP ,STEF SA ,STALLERGENES GREER ,SOLUTIONS 30 SE ,SOLOCAL GROUP SA ,SOCIETE IMMOBILIERE ,SOCIETE POUR L I ,SES IMAGOTAG SA ,SERMA GROUP SA ,SECHE ENVIRONNEMENT ,FERMIERE DU ,SAVENCIA SA ,SAMSE SA ,ROBERTET SA ,PLASTIQUES VAL LOIRE ,PHARMAGEST INTER ,PCAS SA ,PATRIMOINE ET ,OENEO ,NRJ GROUP ,NICOX SA ,NEURONES ,NEOPOST SA ,NANOB ,FINANCIERE MONCEY SA ,MGI DIGITAL TECH ,MERSEN SA ,MEDIWAN SA ,ETABLISSEMENTS ,MANUTAN INTERNATIONAL ,MANITOU BF SA ,MALT FRANC BELGES SA ,MAISONS FRANCE ,MAISONS DU MONDE SAS ,LOCINDUS SA ,LNA SANTE SA ,LINEDATA SERVICES ,LES NOUVEAUX ,LECTRA ,LE BELIER ,LAURENT PERRIER ,LANSON-BCC ,JACQUET METAL ,IPSOS SA ,SOCIETE INTL ,INNATE PHARMA S.A. ,INFOTEL ,IMMOBILIERE DASSAULT ,IGE+XAO ,ID LOGISTICS ,HAULOTTE GROUP ,GUERBET SA ,GROUPE SFPI ,GROUPE PARTOUCHE SA ,GROUPE GUILLIN SA ,GROUPE CRIT ,GL EVENTS ,GERARD PERRIE INDUST ,GENFIT ,GAUMONT SA ,GALIMMO SA ,FUTUREN SA ,FREY S.A. ,FONTAINE PAJOT S.A ,FONCIERE EURIS ,FLEURY MICHON ,FIGEAC AERO ,FIDUCIAL REAL ESTATE ,EXEL INDUSTRIES ,EUROPCAR MOBILITY G ,ESSO SOCIETE ,ESKER SA ,ELECTRI. DE STRASBOU ,DEVOTEAM SA ,DERICHEBOURG. ,DELTA PLUS GROUP ,DBV TECH ,CFM INDOSUEZ WE ,CAISSE REG DE CREDIT ,CAISSE REGIONALE ,CRCAM NORD DE ,C.A. ILLE & VILAINE ,COMPAGNIE DES ALPES ,COFACE SA ,CONSTRUCTIONS ,CLARANOVA SA ,CHARGEURS SA ,CELLECTIS SA ,CEGEREAL ,STE ANONYME DES ,BOURRELIER GROUP SA ,BOURBON CORPORATION ,BONDUELLE ,BOIRON SA ,BLUE SOLUTIONS SAS ,BIGBEN INTERACTIVE ,BENETEAU SA ,BASTIDE CONFOR MEDIC ,SOCIETE ANONYME ,AXWAY SOFTWARE ,AUBAY SA ,ASSYSTEM SA ,SOCIETE INDU ,ARGAN SA ,APRIL SA ,ALTAREIT SCA ,ALBIOMA SA ,AKWEL SA ,AKKA TECHNOLOGIE ,AGTA RECORD AG ,ABEO ,ABC ARBITRAGE ,WAVESTONE SA ,UNIBEL ,TRIGANO ,TECHNICOLOR SA ,SPIE SA ,SOPRA STERIA ,SOITEC ,FFP SA ,RAMSAY

GENERALE ,NEXITY ,NEXANS SA ,MERCIALYS ,LISI ,SOCIETE LDC SA ,LATECOERE SA ,KAUFMAN & BROAD SA ,INTERPARFUMS SA ,FROMAGERIES BEL SA ,BURELLE SA ,XPO LOGISTICS ,VICAT SA ,TELEVISION FRANCAISE ,SOMFY SA ,STE. FONCIERE LYONN. ,RUBIS SCA ,PARIS ORLEANS SA ,PLASTIC OMNIUM, CIE ,FINANCIERE DE L'ODET ,METROPOLE TELEVISION ,KORIAN SA ,H&K AG ,GAZTRANSPORT ,FNAC DARTY SA ,EUTELSAT COMM ,ELIS SERVICES SA ,ELIOR GROUP SA ,COVIVIO HOTELS SCA ,CGG SA ,CEGEDIM ,CARMILA SA ,COMPAGNIE CAMBODGE ,SOCIETE B I C SA ,ALTRAN TECHNOLOGIES ,ALTAREA ,WENDEL SE ,REXEL S.A. ,REMY COINTREAU SA ,ORPEA SA ,LAGARDERE SCA ,INGENICO GROUP SA ,FAURECIA SA ,EUROFINS SCIENTIFIC ,EURAZEO ,ERAMET SA ,ALTEN ,IMERYS ,EURONEXT NV ,ARKEMA SA ,SUEZ SA ,SEB SA ,JCDECAUX SA ,ICADE ,BIOMERIEUX SA ,VALEO SA ,UBISOFT ENTM. ,SCOR SE ,SARTORIUS STEDIM ,IPSEN SA ,ILIAD SA ,GETLINK SE ,TELEPERFORMANCE SE ,EDENRED S.A ,DASSAULT AVIATION SA ,COVIVIO SA ,BUREAU VERIT ,ALSTOM SA ,AIR FRANCE - KLM ,WORLDLINE SA ,KLEPIERRE SA ,GECINA ,EIFFAGE SA ,BOLLORE ,ATOS SE ,AMUNDI SA ,VEOLIA ENVIRONNEMENT ,STMICROELECTRONICS ,PUBLICIS GROUPE SA ,CNP ASSURANCES ,ACCOR SA ,SODEXO ,NATIXIS ,LEGRAND S.A. ,CARREFOUR S.A. ,BOUYGUES SA ,CAPGEMINI SE ,COMPAGNIE DE ,AEROPORTS DE PARIS ,RENAULT REGIE ,COMPAGNIE ,THALES SA ,STE. GENL. DE FRANCE ,VIVENDI SA ,CREDIT AGRICOLE SA ,DASSAULT SYSTEMES ,ENGIE SA ,ORANGE SA ,SCHNEIDER ELECTRIC ,PERNOD RICARD SA ,SAFRAN ,ELECTRICIT DE FRANCE ,L'AIR LIQUIDE SA ,ESSILORLUXOTTICA SA ,DANONE SA ,VINCI ,AXA SA ,HERMES INTERNATIONAL ,KERING ,BNP PARIBAS SA ,CHRISTIAN DIOR SA ,AIRBUS SE ,SANOFI ,L'OREAL SA ,TOTAL SA ,LVMH MOET HENNESSY

Germany

ZHONGDE WASTE ,YOUR FAMILY ENT ,YOC AG ,WINDELN DE SE ,WILLIAMS GRAND ,WESTAG & GETALIT AG ,WEBAC-HOLDING AG ,WASGAU PRODUKTIONS ,WALLSTREET: ONLINE ,VIVANCO GRUPPE AG ,VITA 34 INTL ,VISCOM AG ,VECTRON SYSTEMS AG ,VALUE MANAGEMENT & R ,VA Q TEC AG ,UNITED LABLES AG ,UESTRA HANNOVER ,TURBON AG ,TTL BETEILIGUNGS ,TRAVEL24.COM AG ,TOM TAILOR HOLDING ,TELES AG INFO TECH ,TC UNTERHAL TUNG ,SYZYGY AG ,STARAMBA SE ,SPORTTOTAL AG ,SPLENDID MEDIEN AG ,SPARTA AG ,SOLARWORLD AG ,SOFTLINE AG ,SOFTING AG ,SNP SCHNEIDER ,SMT SCHARF AG ,SLEEPZ AG ,SINO GERMAN ,SINNERSCHRADER AG ,SINGULUS TECHNOL. ,SHW AG ,SHS VIVEON AG ,SFC ENERGY AG ,SEVEN PRINCIPLES AG ,SENVION SA ,SCHWEIZER ELECTRONIC ,SCHUMAG AG ,SCHLOSS WACHENHEIM ,SCHERZER & CO. AG ,ROY CERAMICS SE ,REALTECH AG ,R. STAHL ,QUIRIN PRIVATBANK AG ,QSC AG ,PROGRESS-WERK OBERK ,PHOENIX SOLAR AG ,PFERDEWETTEN ,PARAGON GMBH ,PANTAFLIX AG ,PAION AG ,ORBIS AG ,ODEON FILM AG ,NYNOMIC AG ,NORDWEST HANDEL AG ,NORCOM AG ,NANOREPRO AG ,NANOGATE SE ,NANOFOCUS AG ,MYHAMMER HOLDING AG ,MYBET HOLDING ,MYBUCKS ,MUTARES AG ,MUELLER DIE LILA ,MUEHLHAN AG ,MS INDUSTRIE AG ,MPC - MUENCHMEYER ,MOLOGEN AG ,MOBOTIX AG ,MINERALBRUNNEN UEB ,MEVIS MEDICAL ,MERKUR BANK KGAA ,MAX AUTOMATION SE ,MATERNUS-KLINIKEN AG ,MASTERFLEX SE ,MAINOVA AG ,MAGFORCE AG ,LUDWIG BECK AM RATH ,LS TELCOM AG ,LPKF LASER & ELECTRO ,LLOYD FONDS AG ,LEWAG HOLDING AG ,KROMI LOGISTIK AG ,KLASSIK RADIO AG ,KHD HUMBOLDT WEDAG ,ARAGON AG ,IVU TRAFFIC TECHNOLO ,ITN NANOVATION AG ,INVISION AG ,INTICA SYSTEM ,INTERENTAINMENT AG ,INTERSHOP COMMUNICAT ,INTERCARD AG ,INNOTECH TSS AG ,INIT INNOVATI ,INFAS HOLDING ,INCITY IMMOBILIEN AG ,IFA SYSTEMS AG ,HWA AG ,HUMANOPTICS AG ,HESSE NEWMAN CAP ,HELMA EIGENHEIMBAU ,HEIDELBERG PHARMA AG ,HEIDELBERGER ,HAEMATO AG ,GXP GERMAN PROP ,GREIFFENBERGER AG ,GK SOFTWARE SE ,GIGASET AG ,GERRY WEBER AG ,GERATHERM MEDICAL AG ,GBS SOFTWARE AG ,FUNKWERK AG ,FRANCOTYP POSTALIA ,FORTEC ELEKTRONIK ,FORIS AG ,FINLAB AG ,FHW

NEUKOELLN ,FAIR VALUE REIT ,EXPEDEON AG ,EUROMICRON AG ,ERLEBNIS AKADEMIE AG ,EQS GROUP AG ,EPIGENOMICS AG ,ENVITEC BIOGAS AG ,ELUMEO SE ,ELANIX BIOTECH ,EDEL AG ,ECOTEL COMMUNICATION ,MOUNTAIN ALLIANCE AG ,EASY SOFTWARE AG ,DEUTSCHE GRUNDSTUECK ,DEUTSCHE EFFECTEN ,DISKUS WERKE AG ,DIERIG HOLDING AG ,DF DEUTSCHE ,DEUTSCHE ROHSTOFF ,DEUTSCHE REAL ESTATE ,DEUTSCHE CANNABIS AG ,DELTICOM AG ,DECHENG TECH ,DEAG DEUTSCHE ,DATRON AG ,DALDRUP & SOHNE ,CYTOTTOOLS AG ,CURASAN AG ,CR CAPITAL REAL ,CO.DON AG ,CLIQ DIGITAL AG ,CENTROTHERM INTERN ,CENIT SYSTEMHAUS ,BLUE CAP AG ,BHS TABLETOP ,BETA SYSTEMS ,BERENTZEN-GRUPPE AG ,BBI BURGERLICHES ,BAUMOT GROUP AG ,BASTEI LUE ,BAADER BANK AG ,ARTNET AG ,ARTEC TECH ,AMALPHI AG ,ALBIS LEASING AG ,AIR BERLIN PLC ,AHLERS AG ,AGROB IMMOBILIEN ,AGRARIUS AG ,ADLER MODEMA ,ADCAPITAL AG ,AD PEPPER MEDIA INT ,AAP IMPLANTATE AG ,AG ALLG ANLAGEVERW ,AS CREATION TAPETEN ,7C SOLARPARKEN AG ,4SC AG ,3U HOLDING AG ,2G ENERGY AG ,11 88 0 SOLUTIONS AG ,ZEAL NETWORK SE ,WESTGRUND AG ,WCM BETEILIGUNGS ,WASHTEC AG ,WACKER NEUSON SE ,VOSSLOH AG ,VERBIO VEREINIGTE ,VERALLIA DEUTSCHLAND ,UZIN UTZ AG ,USU SOFTWARE AG ,TRADEGATE AG ,TELE COLUMBUS AG ,TECHNOTRANS SE ,SURTECO GROUP SE ,SUESS MICROTEC ,SUDWESTDEUTSCHE ,STRATEC SE ,STO AG ,STINAG STUTT ,STEICO AG ,STABILUS SA ,SMA SOLAR TECH ,SLM SOLUTION ,SIXT LEASING SE ,SIMONA AG ,SHOP APOTHEKE ,SGL CARBON SE ,SECUNET SECURITY NET ,SCHALTBAU HOLDING AG ,SAF-HOLLAND S.A. ,S&T AG ,RIB SOFTWARE SE ,RENK AG ,PVA TEPLA AG ,PUBLITY AG ,PSI SOFTWARE AG ,PROCREDIT HOLDING AG ,PNE AG ,PFEIFFER VACUUM TECH ,PAUL HARTMANN AG ,OVH HOLDING AG ,OHB SE ,NUERNBERGER BET.-AG ,NORMA GROUP SE ,NORDEX SE ,NEXUS AG ,NABALTEC AG ,MUEHLBAUER HOLDING A ,MPH HEALTH CARE AG ,MENSCH UND MASCHINE ,MEDION AG ,MEDIGENE AG ,MEDICLIN AG ,MBB SE ,MANZ AG ,MI KLINIKEN AG ,LOTTO24 AG ,LOGWIN AG SA ,LEIFHEIT ,KSB SE & CO ,KPS AG ,KOENIG & BAUER AG ,KLOECKNER & CO SE ,KAP AG ,ISRA VISION AG ,INDUS HOLDING AG ,IFA HOTEL & TOURIST ,HYPOPORT FINANCE ,HORNBAACH-BAUMARKT-AG ,HOMAG GROUP AG ,HOLIDAYCHECK ,HIGHLIGHT COMM AG ,HEIDELBERGER DRUCK ,HAWESKO HOLDING AG ,H&R GMBH & CO KGAA ,GRAMMER ,GFT TECHNOLOGIES SE ,GESCO AG ,FROSTA AG ,FRIWO AG ,FIRST SENSOR AG ,EUWAX AG ,ENERGIEKONTOR ,ENERCITY AG ,ENCAVIS AG ,ELRINGKLINGER AG ,ELMOS SEMICONDUCTOR ,EISEN UND HUTTENWERK ,EDAG ENGINEERING ,ECKERT & ZIEGLER STR ,DEUTSCHE KONSUM REIT ,DR HOENLE AG ,DEUTZ AG ,DEUTSCHE BETEILIGUNG ,DEUTSCHE BALATON ,DATAGROUP SE ,DATA MODUL AG ,CROPENERGIES AG ,CORESTATE CAPITAL ,CONSTANTIN MEDIEN ,CEWE STIFTUNG ,CENTROTEC SUSTAIN ,CANCOM SE ,BRAIN BIOTECHNOLOGY ,BIOTEST AG ,BIOFRONTERA AG ,BILFINGER SE ,BIJOU BRIGITTE AG ,BET-AT-HOME.COM AG ,BERTRANDT AG ,BERLINER EFFEKTENGES ,BAYWA AG ,BAVARIA INDUSTRIES ,BAUER AG ,BASLER AG ,AURELIUS ,ATOSS SOFTWARE AG ,AMADEUS FIRE AG ,ALZCHEM GROUP AG ,ALLGEIER SE ,ALL FOR ONE STEEB ,ALBA SE ,AIXTRON SE ,ADVA AG ,ADM HAMBURG AG ,ADESSO AG ,ACCENTRO REA ,ZOOPLUS AG ,XING SE ,WUESTENROT & WUERTT ,VTG AG ,VIB VERMOEGEN AG ,TAKKT AG ,SOFTWARE AG ,SIXT SE ,GABRIEL SEDLMAYR ,SALZGITTER AG ,RHOEN KLINIKUM AG ,PATRIZIA IMMOBILIEN ,MVV ENERGIE AG ,MLP SE ,LEONI AG ,KWS SAAT SE ,KUKA AG ,KRONES AG ,JENOPTIK AG ,HSBC TRINKAUS & BURK ,HAMBORNER AG ,HAMBURGER HAFEN ,DUERR AG ,DEUTSCHE PFA ,DIEBOLD NIXDORF AG ,DIC ASSET AG ,DEUTSCHE EUROSHOP AG ,DEMIRE DEUTSCHE ,COMDIRECT BANK AG ,ADO PROPERTIES SA ,ADLER REAL ESTATE AG ,TLG IMMOBILIEN AG ,SILTRONIC AG ,SARTORIUS ,ROCKET INTERNET SE ,RHEIN AG ,PROSIEBENSAT.1 MEDIA ,NEMETSCHKE SE ,MORPHOSYS AG ,LECHWERKE AG ,HELLA GMBH & CO KGAA ,GRENKE AG ,GELSENWASSER AG ,GEA GROUP AG ,FUCHS PETROLUB SE ,FRENET AG ,EVOTEC AG ,DMG MORI AG ,DIALOG SEMICONDUCTOR ,CTS EVENTIM AG ,COMPUGROUP ,BORUSSIA DORTMUND ,BECHTLE AG ,AURUBIS AG ,WACKER CHEMIE AG ,SIEDZUCKER AG

,STROEER SE & CO KGAA ,OSRAM LICHT AG ,LANXESS AG ,KION GROUP AG ,K&S AG ,GSW IMMOBILIEN AG ,GERRESHEIMER AG ,FIELMANN AG ,CECONOMY AG ,ALSTRIA OFFICE ,AAREAL BANK AG ,UNITED INTERNET AG ,TAG IMMOBILIEN AG ,SCOUT24 AG ,HAPAG-LLOYD AG ,FRAPORT AG ,CARL ZEISS MEDITEC ,HUGO BOSS AG ,AXEL SPRINGER AG ,TALANX AG ,RATIONAL AG ,ENBW ENERGIE BADEN ,BRENNTAG AG ,MTU AERO ENGINES AG ,LEG IMMOBILIEN AG ,1&1 DRILLISCH AG ,UNIPER SE ,TELEFONICA DEUTSCH ,PUMA SE ,ZALANDO SE ,TUI AG ,COVESTRO AG ,HOCHTIEF ,HEIDELBERGCEMENT AG ,THYSSENKRUPP AG ,SYMRISE AG ,MERCK KGAA ,AUDI AG ,EVONIK INDUSTRIES AG ,DEUTSCHE WOHNEN SE ,COMMERZBANK AG ,MAN SE ,HANNOVER RUECK SE ,DEUTSCHE LUFTHANSA ,RWE AG ,WIRECARD AG ,FRESENIUS MEDICAL CA ,INNOGY SE ,FRESENIUS SE ,HENKEL AG AND ,DEUTSCHE BOERSE AG ,BEIERSDORF AG ,VONOVIA SE ,INFINEON TECHNOLOGIE ,E.ON SE ,MUNCHENER RUCKVER ,CONTINENTAL AG ,DEUTSCHE BANK AG ,DEUTSCHE POST AG ,LINDE AG ,ADIDAS AG ,BAYER. MOTOREN WERKE ,VOLKSWAGEN AG ,DAIMLER AG ,BASF SE ,BAYER AG ,DEUTSCHE TELEKOM AG ,ALLIANZ SE ,SIEMENS AG ,SAP SE

Greece

TRASTOR REAL ESTATE ,THRACE PLASTICS SA ,THESSALONIKI WATER ,TECHNICAL OLYMPIC SA ,REVOIL PETROLEUM ,PROFILE SYSTEMS ,PLAISIO COMPUTERS SA ,PETROS PETROPOULOS ,MLS MULTIMEDIA SA ,MARFIN INVESTMENT ,KRI KRI MILK IND SA ,KARATZIS SA ,J & P AVAX SA ,INTRACOM CONST ,IKTINOS HELLAS SA ,IASO SA ,FRIGOGLASS S.A. ,FOLLI FOLLIE COMM ,FLEXOPACK SA ,F.G. EUROPE S.A. ,EUROPEAN RELIANCE CO ,ELTON SA ,ELLINIKI TECHNODOMI ,CENTRIC HOLDINGS SA ,BABIS VOVOS INTL ,ATTICA BANK SA ,ATHENS MEDICAL CNTR ,THESSALONIKI PORT ,TERNA ENERGY ,QUEST HOLDINGS SA ,PIRAEUS PORT AUTH ,NBG PANGAEA ,MYTILINEOS HOLDING ,MINOAN LINES SA ,LAMPSAS GREEK HOTEL ,LAMDA DEVELOPMENT ,KARELIA TOBACCO CO. ,INTRALOT INTEGRATED ,HELLENIC EXCHANGES ,ELV ,GR. SARANTIS S.A. ,GEK TERNA HOLDING ,ELLAKTOR S.A. ,DIAGNOSTIC ,CRETE PLASTICS SA ,AUTOHELLAS ,ATHENS WATER SUPPLY ,PUBLIC POWER CORP ,FOURLIS SA ,PIRAEUS BANK ,ATTICA HOLDINGS S.A. ,AEGEAN AIRLINES S.A. ,TITAN CEMENT CO. ,NATL BANK OF GREECE ,MOTOR OIL SA ,JUMBO SA ,HELLENIC PETROLEUM ,GRIVALIA PROPERTIES ,EUROBANK ERGASIAS SA ,GREEK ORGANIS ,HELLENIC TELECOM ORG ,ALPHA BANK SA

Hungary

ZWACK UNICUM ,TAKAREK JELZALOGBANK ,RABA JARMUIPARI ,PANNERGY NYRT ,MASTERPLAST NYRT ,APPENINN VAGYON ,ANY BIZTONSAGI ,OPUS GLOBAL NYRT ,EMASZ NYRT ,ELMU NYRT ,MAGYAR TELEKOM ,RICHTER GEDEON NYRT ,MOL NYRT ,OTP BANK NYRT

Ireland

PROVIDENCE RESOURCES ,INDEP NEWS AND MEDIA ,DONEGAL INVESTMENT ,DATALEX PLC ,AMINEX PLC ,ORIGIN ENTERPRISES ,MALIN CORP ,KENMARE RESOURCES ,IRISH CONTINENTAL GR ,IFG GROUP PLC ,HIBERNIA REIT PLC ,FBD HOLDINGS ,DALATA HOTEL ,CPL RESOURCES PLC ,C&C GROUP ,APPLEGREEN PLC ,ABBEY PLC ,TOTAL PRODUCE ,PERMANENT TSB GROUP ,GLANBIA PLC ,MAINSTAY MEDICAL ,SMURFIT KAPPA GROUP ,KINGSPAN GROUP PLC ,BANK OF IRELAND ,AIB GROUP PLC ,RYANAIR HOLDINGS PLC ,KERRY GROUP PLC

Italy

ZUCCHI ,VETRYA SPA ,VALSOIA SPA ,TXT E-SOLUTIONS SPA ,TRIBOO SPA ,TREVI FINANZIARIA ,TISCALI SPA ,TESMEC S.P.A ,TERNIENERGIA ,TAS-TECNOL AVANZ SIS ,SMRE SPA ,SITI B&T GROUP ,SERVIZI ITALIA ,SAFE BAG SPA ,ROSETTI MARINO SPA ,RISANAMENTO S.P.A. ,AEDES SOCIETA DI IN ,RATTI SPA ,PRISMI SPA ,POLIGRAFICI EDITORIA ,POLIGRAFICA S. ,PITECO ,PIQUADRO S.P.A. ,PININFARINA SPA ,PANARIA GRP IND CERA ,ORSERO SPA ,OPENJOBMETIS SPA ,NEUROSOFT S A ,MONDO TV SPA ,MOLMED S.P.A. ,MITTEL SPA ,MASI AGRICOLA SPA ,M&C SPA ,LANDI RENZO S.P.A. ,ITALIA INDEP ,ISAGRO SPA ,IRCE SPA ,INTEK GROUP SPA ,INIZIATIVE BRESCIANE ,IMMSI SPA ,H-FARM ,I GRANDI VIAGGI SPA ,GIGLIO GROUP SPA ,GEFRAN ,GAS PLUS SPA ,FINTEL ENERGIA GROUP ,FIDIA SPA ,EXPRIVIA S.P.A. ,EUROTECH SPA ,EPRICE SPA ,ENERVIT SPA ,ELICA SPA ,ELETTRA INVEST ,EDISON SPA ,DIGITAL BROS ,CASA DAMIANI ,COSTAMP GROUP SPA ,CENTRALE DEL LATTE ,CARRARO SPA ,CALTAGIRONE ED ,CALEFFI SPA ,BEGHELLI SPA ,BE THINK SOLVE EXEC ,BASTOGI SPA ,BANCA SISTEMA SPA ,BANCA PROFILO ,BANCA INTERMOBILIARE ,BANCA FINNAT EURAMER ,BANCA CARIGE ,B&C SPEAKERS S.P.A. ,AUTOSTRAD MERID ,ASTALDI ,AMBIENTHESIS SPA ,ALERION CLEANPOWER ,ACOTEL GROUP ,ZIGNAGO VETRO ,TOSCANA AEROPORTI ,TINEXTA SPA ,TAMBURI INV ,SOL SPA ,SOGEFI SPA ,SESA SPA ,SAFILO GROUP ,SAES GETTERS SPA ,SABAF SPA ,RIZZOLI CORRIERE ,RETI TELEMATICHE ,RENO DE MEDICI SPA ,RAI WAY ,PRIMA INDUSTRIE SPA ,PIAGGIO NC SPA ,OVS SPA ,NICE SPA ,MASSIMO ZANETTI ,MARR SPA ,MAIRE TECNIMONT SPA ,LUVE SPA ,LA DORIA SPA ,IVS GROUP SA ,ITALMOBILIARE SPA ,ITALIAONLINE SPA ,IMMOBILIARE GRANDE ,GRUPPO MUTUIONLINE ,GEOX SPA ,GEDI GRUPPO EDITOR ,FNM S.P.A. ,FILA FABBRICA ITA ,FIERA MILANO SPA ,FALCK RENEWABLES SPA ,ESPRINET SPA ,EMAK SPA ,EL.EN SPA ,DEA CAPITAL S.P.A. ,DANIELI & C OFFICINE ,COFIDE FIN BENEDETTI ,CIR COMPAGNIE ,CEMENTIR HOLDING ,CEMBRE SPA ,CALTAGIRONE SPA ,CAIRO COMMUNICATION ,BANCO DESIO BRIANZA ,BIO ,BIESSE SPA ,BASICNET SPA ,BANCA POPOLARE ,BANCA IFIS SPA ,AVIO SPA ,ARNOLDO MONDADORI ED ,AEROPORTO GUGLI ,AEFFE S.P.A. ,ACSM-AGAM SPA ,TOD'S SPA ,REPLY SPA ,SALINI IMPREGILO SPA ,FINCANTIERI SPA ,ENAV ,DATALOGIC SPA ,CREDITO EMILIANO SPA ,COIMA RES ,CERVED GROUP ,CATTOLICA ASS ,BANCA PICCOLO ,ASTM SPA ,ASCOPIAVE SPA ,A.S. ROMA SPA ,ANIMA HOLDING ,TECHNOGYM SPA ,SIAS ,SARAS ,ITALGAS SPA ,INTERPUMP GROUP SPA ,INFRASTRUTTURE WIRE ,IMA INDUSTRIA MAC ,ERG SPA ,DE LONGHI SPA ,BRUNELLO CUCINELLI ,BANCA GENERALI SPA ,SALVATORE FERR ,PRYSMIAN SPA ,JUVENTUS FOOTBALL ,IREN SPA ,FRENI BREMBO ,BUZZI UNICEM SPA ,BPER BANCA SPA ,AZIMUT HOLDING SPA ,UNIPOL GRUPPO SPA ,SAIPEM SPA ,PARMALAT SPA ,MEDIASET SPA ,HERA SPA ,DIASORIN S.P.A. ,BANCA MEDIOLANUM SPA ,AUTOGRILL SPA ,ACEA SPA ,UNIPOLSAI ASSICUR ,UNIONE DI BAN ,RECORDATI SPA ,FINECOBANK ,BANCA MONTE PASCHI ,AMPLIFON SPA ,A2A SPA ,MEDIOBANCA SPA ,LEONARDO SPA ,BANCO BPM SPA ,TELECOM ITALIA ,POSTE ITALIANE SPA ,MONCLER SPA ,TERNA SPA ,DAVIDE CAMPARI ,SNAM SPA ,CNH INDUSTRIAL NV ,EXOR NV ,ATLANTIA SPA ,ASSICUR GENERALI SPA ,LUXOTTICA GROUP SPA ,FIAT CHRYSLER ,UNICREDIT SPA ,INTESA SANPAOLO SPA ,ENEL SPA ,ENI GROUP

Latvia

VEF AS ,SIGULDAS CILTSLIETU ,SAF TEHNIKA AS ,RIGAS KUGU BUVETAVA ,RIGAS JUVELIERIZSTRA ,RIGAS ELEKTROMASINBU ,VEF RADIOTEHNIKA RRR ,PATA SALDUS AS ,OLAINFARM AS ,LATVIJAS JURAS MEDIC ,KURZEMES ATSLEGA 1 A ,HANSAMATRIX AS ,GRINDEKS AS ,DITTON PIEVADKEZU RU ,LATVIJAS GAZE AS

Lithuania

ZEMAITIJOS PIENAS ,VILNIAUS DEGTINE ,VILNIAUS BALDAI AB ,VILKYU ,ROKISKIO SURIS AB ,LINAS AB ,KLAIPEDOS NAFTA AB ,INVL BALTIC REAL ,INVL BALTIC ,INVALIDA INVL AB ,GRIGEO AB ,AUGA GROUP AB ,APB APRANGA ,TELIA LIETUVA ,SIAULIU BANKAS AB ,LITGRID AB ,LIETUVOS ENERGIJOS ,ENERGIJOS SKIRS ,AMBER GRID AB

Luxembourg

SAINT CROIX HOLDING ,SOCFINASIA SA ,SOCIETE FINANCIERE ,LUXEMPART SA ,SOCFINAF SA ,SES S.A.

Malta

SIMONDS FARSONS CISK ,MAPFRE MIDDLESEA PLC ,MALTA INTERNATIONAL ,INTL HOTEL ,FIMBANK ,BANK OF VALLETTA

Netherlands

TIE KINETIX NV ,STERN GROEP NV ,ROOD MICROTEC ,RONSON DEVELOPMENT ,NEWAYS ELECTRONICS ,KONINKLIJKE BRILL NV ,KAS BANK NV ,ICT GROUP NV ,HOLLAND COLOURS NV ,ENVIPCO HOLDING ,EASE2PAY NV ,DPA GROUP NV ,CURETIS NV ,BETER BED HOLDING ,BATENBURG TECHN ,KONINKLIJKE WESSA ,VAN LANS ,SIF HOLDING NV ,POSTNL ,PHARMING GROUP NV ,ORDINA NV ,ORANJEWOUD NV ,NV NEDERLANDSCHE ,LUCAS BOLLS ,KIADIS PHARMA ,KENDRION NV ,INTERTRUST NV ,HEIJMANS NV ,FORFARMERS NV ,FNG NV ,BRUNEL INTERNATIONAL ,BINCKBANK NV ,AMSTERDAM COMM ,AMG ADVANCED METAL ,ACCELL GROUP NV ,VASTNED RETAIL NV ,SLIGRO FOOD GROUP NV ,NIEUWE STEEN INVESTM ,HUNTER DOUGLAS N.V. ,FUGRO NV ,FLOW TRADE ,EUROCOMMERCIAL PROP ,CORBION NV ,KONINKLIJKE BAM GRP ,ARCADIS NV ,WERELDHAVE NV ,TKH GROUP N.V. ,IMCD GROUP BV ,BE SEMICONDUCTOR IND ,BASIC FIT NV ,AALBERTS INDUSTRIES ,TOMTOM N.V. ,SIGNIFY NV ,SBM OFFSHORE NV ,OCI NV ,KONINKLIJKE VOPAK NV ,GRANDVISION NV ,KONINKLIJKE BOSKALIS ,ASR NEDERLAND NV ,TAKEAWAY.COM NV ,ASM INTERNATIONAL NV ,APERAM ,ALTICE EUROPE NV ,RANDSTAD NV ,HAL TRUST ,NN GROUP NV ,AEGON N.V. ,KONINKLIJKE KPN NV ,WOLTERS KLUWER N.V. ,KONINKLIJKE DSM N.V. ,HEINEKEN HOLDING ,AKZO NOBEL N.V. ,ARCELORMITTAL SA ,ABN AMRO GROUP ,KONINKLIJKE AHOLD ,KONINKLIJKE PHILIPS ,ING GROEP N.V. ,HEINEKEN N.V. ,ASML HOLDING NV ,UNILEVER N.V. ,ROYAL DUTCH SHELL

Poland

ZUE SA ,ZPUE SA ,KOGENERACJA SA ,ZESPOL ELEKTROW ,ZASTAL SA ,ZAMET SA ,ZUK STAPORKOW ,ZAKLADY URZADZE ,ZPC OTMUCHOW ,ZAKLADY MAGNE ,ZBM ZREMB CHOJNICE ,YOLO SA ,X TRADE BROKER ,WOJAS SA ,WITTCHEN ,WILBO SA ,WIKANA SA ,WIELTON S.A. ,WASKO SA ,VOXEL SA ,VOTUM SA ,VIVID GAMES SA ,VISTAL GDYNIA ,VIGO SYSTEM SA ,URSUS SA ,UNIBEP SA ,ULMA CONSTRUCCION ,TRITON DEVELOPMENT ,TRANS POLONIA SA ,TRAKCJA PRKII SA ,TORPOL SA ,TIM SA ,TESGAS SA ,TERMO REX SA ,TELESTRADA SA ,TARCZYNSKI SA ,TALEX SA ,SYNEKTIK SA ,SYGNITY S.A. ,SUWARY SA ,STELMET ,STARHEDGE SA ,STALPROFIL SA ,SONEL SA ,SOLAR CO ,SOHO DEVELOPMENT ,SKOTAN SA ,SKARBIEC HOLDING SA ,SIMPLE SA ,SFINKS POLSKA SA ,SETANTA ALTERNATYWNA ,SELENA FM ,SEKO SA ,SECO/WARWICK SA ,SCO-PAK S.A. ,SARE SA ,STOMIL SANOK S.A. ,RESBUD S.A. ,RELPOLE S.A. ,REINO CAPITAL ,REDAN SA ,RAWLPLUG SA ,RANK PROGRESS SA ,RAINBOW TOURS SA ,FABRYKA KOTLOW ,RADPOL SA ,QUMAK SA ,PLAST-BOX SA ,PEPEES SA ,REMAK S.A. ,PRZEDSIEBIORSTWO

,PRZEDSIĘBIORSTWO H ,PROTEKTOR SA ,PROJPRZEM MAKRU ,PROCHEM SA ,PROCAD SA ,PRIMETECH SA ,PRIME CAR ,POZBUD T&R ,POLWAX SA ,POLNORD SA ,FINANCIAL ASSETS MAN ,POLIMEX-MOSTOSTAL SA ,POLSKI HOLDING NIER ,PHARMENA SA ,PGS SOFTWARE ,PGO SA ,POZNANSKA KORPO ,PBS FINA ,PBG SA ,PATENTUS SA ,PAMAPOL SA ,P.A. NOVA ,OVOSTAR UN ,OT LOGISTICS SA ,ORZEL BIALY S.A. ,OPTEAM SA ,OPONEO.PL S.A. ,OPEN FIN ,OEX SA ,ODLEWNIE POLSKIE SA ,OCTAVA SA ,NTT SYSTEM ,NOVITA S.A. ,NEWAG ,NETMEDIA SA ,MUZA SA ,MOSTOSTAL ZABRZE SA ,MOSTOSTAL WARSZAWA ,MOSTOSTAL PLOCK SA ,MONNARI TRADE SA ,MOJ SA ,MIRBUD SA ,MIRACULUM SA ,MILKILAND NV ,MILESTONE MEDI ,MFO SA ,MEX POLSKA SA ,MERCOR S.A. ,MERCATOR MEDICAL ,MEDICALGORITHMS SA ,MEDIATEL SA ,MCI CAPITAL ,MANGATA HOLDING ,MAKARONY POLSKIE SA ,MAGNA POLONIA SA ,LUG S.A. ,LUBAWA SA ,LSI SOFTWARE SA ,LIVECHAT SOFT ,LIBET ,LENTEX SA ,LENA LIGHTING SA ,LARQ SA ,LARK.PL SA ,KOSZALINSKIE PRZED ,KRYNICKI RECYKLI ,KREZUS SA ,KREDYT INKASO ,KRAKCHEMIA SA ,EFEKT ,KORPORACJA ,KONSORCJUM STALI SA ,KOMPUTRONIK S.A. ,PRZEDSIĘBIORS ,KANCELARIA M ,KINO POLSKA ,KCI S.A. ,JW CONSTRUCTION ,IZOSTAL ,IQ PARTNERS SA ,IPOPEMA SECURITIES ,INVESTMENT FRIENDS ,INVESTMENT ,INTROL SA ,INTERSPORT POLSKA SA ,INTERMA TRADE SA ,INTERFERIE SA ,INTER RAO LIETUVA AB ,INSTAL KRAKOW SA ,INPRO SA ,INDYKPOL S.A. ,INC SA ,IMS SA ,IMPEXMETAL SA ,IMPERA CAPITAL SA ,IMPEL SA ,IFIRMA SA ,I2 DEVELOP ,HYPERION SA ,HUBSTYLE SA ,HERKULES SA ,HELIO SA ,GRUPA KAPITALOWA ,INTER GROCLIN AUTO ,GPM VINDEUS S.A. ,GOBARTO SA ,GLOBAL COS ,GINO ROSSI SA ,PRAGMA FAKTORING ,GETIN HOLDING SA ,FON SE ,FERRUM SA ,FERRO SA ,FEERUM SA ,FAST FINANCE SA ,FABRYKI SPRZETU ,FABRYKI MEBLI FORTE ,RAFAMET SA ,EUROTEL SA ,EUROPOJSKIE CENTR ,ESOTIQ & H ,ERGIS SA ,ERG SA ,ERBUD SA ,ENTER AIR SA ,ENERGOINSTAL SA ,ENERGOAPARATURA SA ,CENTRUM MEDYCZNE E ,EMC INSTYTUT MEDY ,ELKOP SA ,ELEMENTAL HOLD ,ELEKTROTIM SA ,ELEKTROCIEPLOWNIA ,ELEKTROBUDOWA S.A. ,EKO EXPORT SA ,ED INVEST SA ,DROZAPOL-PROFIL SA ,DECORA SA ,CUBE.ITG SA W ,COMPERIA PL ,COMP SAFE SUPPORT SA ,COGNOR HOLDING SA ,COAL ENE ,CLOUD TECH ,CI GAMES SA ,CHEMOSER ,CENTRUM NOW ,CDRL SA ,CAPITAL PARTNERS SA ,CAPITAL PARK ,BSC DRUKA ,BRASTER SA ,BOWIM ,BIURO INWEST ,BIOTON SA ,BIOMED LUBLIN ,BETACOM SA ,BEST S.A. ,BBI DEVELOPMENT SA ,BALTIC BRIDGE SA ,AWBUD SA ,AUTO PARTNER SA ,ATREM SA ,ATLANTIS SE ,ATLANTA POLAND SA ,ASTARTA HOLDING NV ,ASM GROUP SA ,ARTIFEX MUNDI SA ,ARTERIA SA ,ARCTIC PAPER ,ARCHICOM ,APLISENS S.A. ,AMBRA SA ,ALUMETAL SA ,ALTUS TOWARZYSTWO ,ALTA SA ,AIRWAY MEDIX SA ,AGORA SA ,ADIUVO INVESTMENT ,ACTION SA ,AC SA ,ABC DATA ,11 BIT STUDIOS SA ,KRUSZWICA SA ,WIRTUALNA POLSKA ,WAWEL SA ,VRG SA ,SUPERIOR INDUSTRIES ,TAURON POLSKA ,STALPRODKUT SA ,STALEXPORT AUTO ,SELVITA SA ,ROBYG SA ,POLENERGIA SA ,PKP CARGO ,PFLEIDERER GROUP SA ,ORBIS S.A. ,NEUCA SA ,NETIA S.A. ,MLP GR ,MENNICA POLSKA ,MABION SA ,LC CORP. S.A. ,KRUK ,KERNEL HOLDING ,INTER CARS SA ,GRUPA ZYWIEC SA ,GRUPA KETY SA ,GRUPA AZOTY ,GRUPA AZOTY ZAK ,GRUPA AZOTY SA ,GLOBE TRADE CENTRE ,GETIN NOBLE BANK SA ,FIRMA OPONIAR ,FAMUR SA ,FABRYKA FARB I ,EUROCASH SA ,ENERGA SA ,ENEA SA ,ECHO INVESTMENT SA ,DOM DEVELOPMENT SA ,COMARCH S.A. ,CIECH SA ,CELON PHARMA SA ,BUDIMEX ,BORYSZEW SA ,LUBELSKI WEGIEL ,BENEFIT SYSTEMS ,BANK OCHRONY ,ATAL SA ,ASSECO SOUTH EASTERN ,ASSECO POLAND S.A. ,ASSECO BUSINESS SOL ,APATOR SA ,AMICA ,ALCHEMIA SA ,GIELDA PAPIEROW ,ORANGE POLSKA SA ,JASTRZEBSKA SP ,CCC SA ,BANK MILLENNIUM SA ,BANK HANDLOWY ,BANK BGZ BNP ,AMREST HOLDINGS SE ,MBANK ,GRUPA LOTOS S.A. ,CYFROWY POLSAT SA ,CD PROJEKT SA ,ALIOR BANK SA ,PGE ,KGHM POLSKA MIEDZ ,ING BANK SLASKI SA ,BANK PEKAO S.A. ,POWSZECHNY ZAKLAD ,POLSKIE GORNICTWO ,SANTANDER BANK ,PKN ORLEN ,POWSZECHNA KASA

Portugal

TEIXEIRA DUARTE, S.A. ,SONAE INDUSTRIA ,SAG GEST - SOLUCOES ,NOVABASE SGPS SA ,MARTIFER SGPS, S.A. ,INAPA-INVESTIMENTOS ,IMPRESA SGPS SA ,CONSTRUTORA DURIENCE ,COFINA SGPS, SA ,VAA-VISTA ALEGRE ,SONAE CAPITAL ,SEMAPA-INVESTIMENTOS ,RAMADA INVESTIMENTOS ,GRUPO MEDIA CAPITAL ,IBERSOL SGPS SA ,CTT CORREIOS ,CORTICEIRA AMORIM ,SONAE SGPS SA ,SONAECOM SGPS SA ,REN - REDES ENER ,MOTA-ENGIL SGPS SA ,ALTRI SGPS S.A. ,NOS SGPS SA ,NAVIGATOR COMPANY ,BANCO COMERCIAL PORT ,JERONIMO MARTINS SA ,GALP ENERGIA ,EDP - ENERGIAS DE

Romania

BURSA DE ,ZENTIVA SA ,SNTGN TRANSGAZ SA ,SOCIETATEA NATIONALA ,ROMPETROL RAFINARE S ,SOCIETATEA ENERGE ,TRANSELECTRICA SA ,ALRO SA ,FONDUL PROPRIETATEA ,SNGN ROMGAZ ,BRD GROUPE SOCIETE ,BANCA TRANSILVANIA ,OMV PETROM SA

Slovakia

SLOV ENERG STROJARNE ,OTP BANKA SLOVENSKO ,BIOTIKA A.S. ,BEST HOTEL PROPE ,VSEOB UVER BANKA ,SLOVNAFT AS ,KUPELE DUDINCE AS ,TATRA BANKA AS

Slovenia

UNIOR DD ,MERCATOR POSLOVNI ,INTEREUROPA INC ,CINKARNA CELJE DD ,ZAVAROVARNICA ,TELEKOM SLOVENIJE DD ,POZAVAROVARNICA SAVA ,PETROL LJUBLJANA ,LUKA KOPER, D.D. ,KRKA DD NOVO MESTO

Spain

VOCENTO SA ,VITRUVIO REAL ,URO PROPERT ,URBAS GRUPO ,TUBOS REUNIDOS SA ,TRAJANO IBERIA ,SERVICE POINT SOL ,SECUOYA GRUPO ,RENTA CORP ,PESCANOVA S.A. ,ORYZON GENOMICS SA ,OPTIMUM RE ,NICOLAS CORREA S.A. ,NATURHOUSE HEALTH SA ,NATRA SA ,LINGOTES ESPECIALES ,LABORATORIO REIG ,ISC FRESH ,GENERAL DE ALQUILER ,ENTRECAMPOS CUATRO ,ECOLUMBER SA ,DURO FELGUERA SA ,DEOLEO SA ,CORPORACION EMPRES ,CIA ESPANOLA VIVIEND ,BODEGAS RIOJANAS SA ,BIOSEARCH ,AUTONOMY SPAIN ,ALTIA CONSULTORES SA ,ADVEO GROUP INTL ,ADOLFO DOMINGUEZ SA ,ABENGOA S.A. ,AB-BIOTICS SA ,ZAMBAL SPAIN ,TUBACEX, S.A. ,TELEPIZZA GROUP SA ,TECNICAS REUNIDAS ,SOLARIA ENERGIA Y ,RENTA 4 BANCO SA ,REALIA BUSINESS SA. ,QUABIT INMOBILIARIA ,PRIM, S.A. ,PHARMA MAR SA ,OBRASCON HUARTE LAIN ,NUEVA EXPRESION ,MIQUEL Y COSTAS ,LABORATORIOS FARMA ,REAL ESPANA ,INMOBILIARIA SUR SA ,IBERPAPEL GESTION SA ,GRUPO EZENTI ,GRUPO EMPRESARIAL ,GMP PROPERTY SOC ,GLOBAL DOMINION ,FAES FARMA SA ,ERCROS, S.A. ,ELECENOR S.A. ,EDREAMS ODIGE ,CODERE, S. A. ,CLINICA BAVIERA SA ,CEMENTOS MOLINS SA ,BARON DE LEY S.A. ,AZKOYEN, S.A. ,AUDAX RENO ,ATRESMEDIA CORP ,AMPER S.A. ,ALANTRA PARTNERS ,VISCOFAN SA ,VIDRALA S.A. ,TALGO SA ,SACYR SA ,PROMOTORA DE INFORMA ,PAPELES Y CARTONES ,MELIA HOTELS ,MEDIASET ESPANA ,MASMOVIL IBERCOM SA ,LIBERBANK SA ,INDRA SISTEMAS SA ,HISPANIA ACTIVOS INM ,FLUIDRA SA ,EUSKALTEL SA ,ENCE ENERGIA ,DISTRIBUIDORA IN ,CORP FIN ALBA SA ,CONST Y AUX DE FERRO ,BOLSAS Y MERCADOS ,APPLUS SERVICES SA ,ZARDOYA OTIS S.A. ,PROSEGUR CIA DE SEGU ,NH HOTEL GROUP SA ,CIA DE DISTRIBUC ,GRUPO CATALANA ,EBRO FOODS SA ,CIE AUTOMOTIVE SA ,ALMIRALL SA ,ACERINOX S.A. ,INMOBILIARIA COLONI ,FOMENTO CONSTRUCCION ,MERLIN PROPERTIES ,ENAGAS SA ,CELLNEX TEL ,ACCIONA SA ,GRIFOLS SA

,BANKINTER S.A. ,BANCO SABADELL ,MAPFRE SA ,RED ELECTRICA ,BANKIA SAU ,SIEMENS GAMESA RE ,ACS
ACTIVIDADES ,FERROVIAL SA ,CAIXABANK ,AENA SME SA ,NATURGY ENERGY GROUP ,ENDESA S.A. ,REPSOL SA
,AMADEUS IT GROUP SA ,BANCO BILBAO VIZCAYA ,TELEFONICA S.A. ,IBERDROLA SA ,BANCO SANTANDER SA
,INDITEX

Sweden

ZETADISPLAY AB ,XBRANE BIOPHARMA AB ,WESC AB (PUBL) ,WAYSTREAM ,VOSTOK EMERGING FIN ,VENUE
RETAIL GROUP ,TRENTION AB ,TRANSTEMA GROUP AB ,TRADEDOUBLER AB ,TAGMASTER AB ,SVERIGES BOSTAD
,SVEDBERGS I DALSTORP ,STUDSVIK AB ,STILLE AB ,STARBREEZE AB ,SPORTAMORE AB (PUBL) ,SOFTRONIC AB ,SJR
IN SCANDINAVIA ,SINTERCAST AB ,SERNEKE GROUP AB ,SENSYS GATSO GR ,SEMCON AB ,SAXLUND GROUP AB
,SANIONA AB ,SALTANGEN PROPERTY ,ROTTNEROS AB ,REJLERS PUBL AB ,QLIRO GROUP AB ,PROFILGRUPPEN AB
,PRIME LIVING ,PRICER AB ,PREVAS AB ,PRECISE BIOMETRICS ,POOLIA AB ,POLYGIENE AB ,PLEDPH ,OSCAR
PROPERTIES ,OPUS GROUP AB (PUBL) ,OASMA PHARMA ,NUEVOLUTION AB ,NORDIC WATERPROOF ,NGS NEXT
GENERATION ,NEXAM CHEMICAL AB ,NEUROVIVE PHARMA ,NET INSIGHT AB ,NAXS AB (PUBL) ,MULTIQ INTL AB
,MOMENT GROUP AB ,MOBERG PHARMA ,MEDIVIR AB ,MEDCAP AB (PUBL) ,MALMBERGS ELEKTRISKA ,MAGNOLIA
BOSTAD AB ,LAMMHULTS ,KOPY GOLDFIELDS ,KLOVERN AB ,KAROLINSKA ,KALLEBACK PRO ,KABE GROUP AB ,JLT
MOBILE COMPUTERS ,ITAB SHOP CONCEPT ,INDEX PHARMACEUTICA ,IMPACT COATINGS ,IMMUNICUM AB ,HIFAB
GROUP AB ,GOMSPACE ,GHP SPECIALTY CARE ,GENOVIS AB ,G5 ENTERTAINMENT ,FORMPIPE SOFTWARE ,EWORK
GROUP AB ,EPISURF MEDICAL AB ,EOLUS VIND ,ENZYMATICA AB (PUBL) ,ENIRO AB ,ENDOMINES AB (PUBL) ,ELOS
MEDTECH AB ,ELECTRA GRUPPEN AB ,EDGEWARE AB ,DUROC AB ,DORO AB ,DISTIT AB ,DELARKA HOLDING
,DEDICARE AB (PUBL) ,CROWN ENERGY ,CORTUS ENERGY AB ,COREM PROPERTY ,CONSILIUM AB ,CONCORDIA
MARITIME ,CLAVISTER ,CAVOTEC SA ,C-RAD AB ,BULTEN AB ,BRINOVA FASTIGHETER ,BREDBAND2 I SKAND
,BOULE DIA ,BOTNIA EXPLORATION ,BONG LJUNGDAHL AB ,BONASUDDEN ,BJORN BORG AB ,BIOINVENT INTL
,BINERO GROUP AB ,BESQAB AB (PUBL) ,BEIJER ELECTRONICS ,BE GROUP AB (PUBL) ,AXICHEM AB ,ARISE AB
,ANOTO GROUP AB ,ALLIGATOR BIOSCIE ,ALLGON AB (PUBL) ,AGROMINO A/S ,ACTIVE BIOTECH AB ,ALLTELE
ALLMANN ,XVIVO PERFUSION AB ,XANO INDUSTRI AB ,VOSTOK NEW ,VOLATI AB ,VITEC SOFTWARE GROUP
,VICTORIA PARK I ,VBG GROUP AB ,TROAX GROUP AB ,TRACTION AB ,TOBII AB ,THQ NORDIC AB ,SYSTEMAIR AB
,SWEDOL AB ,STORYTEL AB (PUBL) ,STILLFRONT GROUP ,STENDORREN FASTIG ,SKISTAR AB ,SECTRA AB ,SCANDIC
HOTELS ,SCANDI STANDARD ,SAGAX AB ,RESURS HOLDIN ,RECIPHARM AB (PUBL) ,RAYSEARCH LABORAT ,RATOS
AB ,RADISSON HOSPITALITY ,PROBI AB ,PROACT IT GROUP AB ,POWERCELL SWE ,PLATZER FASTIGHETER
,ORIFLAME HOLDING AG ,OREXO AB ,ORESUND INVESTMENT ,OEM-INTERNATIONAL AB ,NP3 FASTIGHETER AB
,NOLATO AB ,NOBINA AB (PUBL) ,NOBIA AB ,NETENT AB (PUBL) ,NEDERMAN HOLDING AB ,MYCRONIC AB (PUBL)
,MR GREEN & CO ,MIDSONA ,MICRO SYSTEMATION ,MEKONOMEN AB ,LINDAB INTER ,LEOVEGAS AB
,LAGERCRANTZ GROUP AB ,KNOWIT AB ,KARO PHARMA AB ,KAPPAHL AB (PUBL) ,KAMBI GROUP PLC ,JM AB
,INWIDO AB (PUBL) ,INVISIO COMM ,INTERNATIONELLA ENG ,IMMUNOVIA AB (PUBL) ,IAR SYSTEMS ,HUMANA AB
,HOIST FINANCE AB ,HMS NETWORKS AB ,HIQ INTERNATIONAL AB ,HEXATRONIC GROUP AB ,HEMFOSA
FASTIGHETER ,HEMBLA AB ,HEBA FASTIGHETS AB ,HANSA BIO ,HALDEX AB ,GUNNEBO AB ,GRANGES AB ,GARO AB
,FORTNOX AB ,FENIX OUTDOOR ,FASTPARTNER AB ,FAGERHULT AB ,ENEA AB ,ELTEL AB ,ELANDERS AB ,EASTNINE
AB (PUBL) ,DUSTIN GROUP AB ,DUNI AB ,DIOS FASTIGHETER ,CTT SYSTEMS AB ,CREADES AB (PUBL) ,COOR SERVICE
MGMT ,COLLECTOR AB ,CLX COMMUN ,CLOETTA AB ,CLAS OHLSON AB ,CHERRY AB ,CELLINK AB ,CELLAVISION

AB ,CATENA MEDIA PLC ,CATENA AB ,CATELLA AB ,CAMURUS ,BYGGMAX GROUP AB ,BUFAB AB (PUBL) ,BTS GROUP AB ,BRAVIDA HO ,BONAVA AB ,BIOTAGE AB ,BIOGAIA AB ,BIMOBJECT AB ,BILIA AB ,BETSSON AB ,BERGMAN & BEVING AB ,BEIJER ALMA AB ,AVANZA BANK ,ATTENDO AB ,AQ GROUP AB ,ALM EQUITY AB (PUBL) ,ALIMAK GROUP ,ADDTECH AB ,ADDNODE GROUP AB ,ADDLIFE AB ,ACADE ,ABSOLENT GRO ,WIHLBORG FASTIGHETER ,WALLENSTAM AB ,VITROLIFE AB ,THULE GROUP AB ,TETHYS ,PARADOX INTERACTIVE ,NEW WAVE GROUP AB ,NCC AB ,LOOMIS AB ,KUNGSLEDEN AB ,HOLMEN AB ,HEXPOL AB ,FINGERPRINT CARDS AB ,EVOLUTION GAMING ,DOMETIC GROUP ,CONCENTRIC AB ,BURE EQUITY AB ,BILLERUDKORSNAS AB ,BEIJER REF AB ,ATRIUM LJUNGBERG AB ,AHLSELL AB (PUBL) ,AF AB ,ACANDO AB ,TRELLEBORG AB ,SSAB SVENSKT STAL AB ,SAS AB ,PEAB AB ,PANDOX AB ,L E LUNDBERGFORET ,LIFCO AB (PUBL) ,KINDRED GROUP ,INTRUM AB ,INDUTRADE AB ,INDUSTRIVARDEN AB ,HUFVUDSTADEN AB ,GETINGE AB ,FASTIGHETS AB BALDER ,AXFOOD AB ,SWEDISH ORPHAN ,SWECO AB (PUBL) ,NIBE INDUSTRIER AB ,MODERN TIMES GRP MTG ,KINNEVIK ,HUSQVARNA ,FABEGE AB ,ELEKTA AB (PUBL) ,AAK AB (PUBL) ,SVENSKA CELLULOSA ,AB SKF ,SAAB AB ,INVESTMENT AB LATOUR ,CASTELLUM AB ,TELE2 AB ,SKANSKA AB ,SECURITAS AB ,ICA GRUPPEN AB ,BOLIDEN AB ,SWEDISH MATCH AB ,ELECTROLUX AB ,LUNDIN PETROLEUM AB ,ALFA LAVAL AB ,HEXAGON AB ,TELIA COMPANY AB ,INVESTOR AB ,SV. HANDELSBANKEN AB ,SKANDINAVISKA ENSK ,SANDVIK AB ,ASSA ABLOY AB ,ATLAS COPCO AB ,HENNES & MAURITZ AB ,VOLVO AB ,SWEDBANK AB ,TELEFONAKTIEBOLAGET

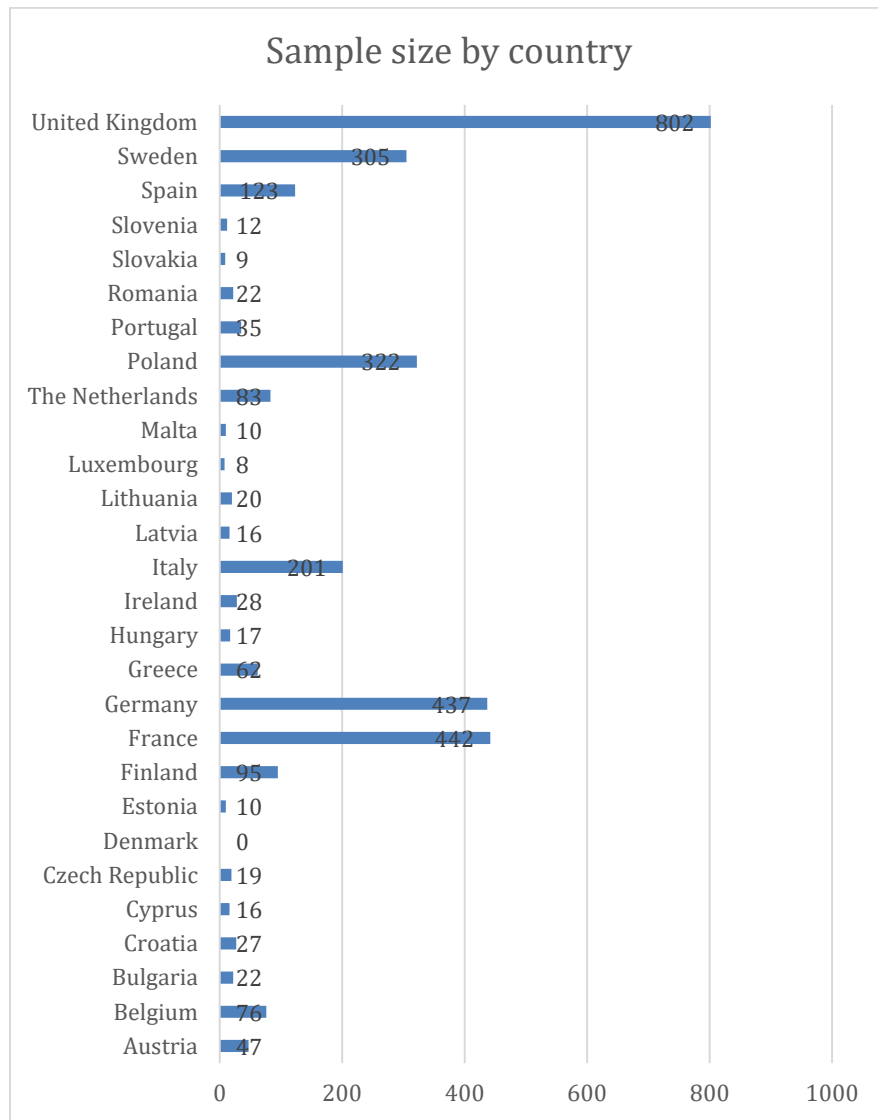
United Kingdom

ZYTRONIC PLC ,ZOO DIGITAL ,ZOLTAV RES ,ZEGONA COM ,ZANAGA IRON ,YOURGENE HEALTH PLC ,YOLO LEISUR ,XEROS TECH ,XAAR PLC ,WYNNSTAY GROUP ,WYG PLC ,WATER INTELLIGENCE ,WATCHSTONE GROUP ,WARPAINT LON ,WALKER GREENBANK PLC ,W RESOURCES PLC ,W.H. IRELAND GROUP ,VOLGA GAS PLC ,VOLEX PLC ,VICTORIA OIL & GAS ,VIANET GROUP PLC ,VERONA PHARMA ,VELOCYS PLC ,VAN ELLE HOLD ,VALIRX PLC ,UTILITYWISE ,URALS ENERGY PCL ,UNIVERSE GROUP PLC ,UNITED CARPETS GRP ,UNION JACK OIL PLC ,ULS TECH ,TUNG ,TRISTEL PLC ,TRINITY EXPLOR ,TRICORN GROUP PLC ,TRI-STAR RESOURC ,TRANSENSE ,TRAKM8 HOLDINGS PLC ,TRAFALGAR PROPERTY ,TP GROUP PLC ,TOWN CENTRE SECS ,TOWER RESOURCES PLC ,TOUCHSTAR PLC ,TOPPS TILES PLC ,TLA WORLD ,TIZIANA LIFE SCIE ,TISSUE REGENIX GR ,TIME OUT GROUP PLC ,THRUVISION GROUP PLC ,MISSION MKTG GRP ,FULHAM SHORE ,TERTIARY MINERALS ,TASTY PLC ,SYSTEM1 GROUP PLC ,SYSGROUP PLC ,SYNNOVIA ,SYNECTICS PLC ,SYNAIRGEN PLC ,SYMPHONY ENV ,SWALLOWFIELD PLC ,SUTTON HARBOUR ,SURGICAL INNOVATION ,SURESERVE GROUP PLC ,SUMMIT THERAPEUTICS ,STV GROUP PLC ,STERLING ENERGY PLC ,STEPPE CEMENT LTD ,STATPRO GROUP PLC ,STARCOM PLC ,STANLEY GIBBONS ,SRT MARINE SYS ,SPORTECH PLC ,SPACEANDPEOPLE PLC ,SOPHEON PLC ,SOLID STATE PLC ,SMARTSPACE SOFTWARE ,SIRIUS PETROLEUM PLC ,SIMEC ATLANTIS ,SILENCE THERA ,SIGMA CAPITAL GP ,SHOE ZONE ,SHIELD THERAPE ,SHERBORNE INVESTORS ,SHARE PLC ,SHANTA GOLD LIMITED ,SERABI GOLD ,SEEING MACHINES LTD ,SEC SPA ,SCS GROUP PLC ,SCISYS GROUP ,SCIENTIFIC DIGITAL ,SCIENCE IN ,SCIENCE GROUP PLC ,SCANCELL HOLDINGS ,SAREUM HOLDINGS PLC ,SANDERSON GROUP PLC ,SALVARX GROUP PLC ,SAFESTYLE ,SAFESTAY PLC ,SABIEN TECHNOLOGY ,RURELEC PLC ,RTC GROUP PLC ,ROOTALA PLC ,ROCKHOPPER EXP PLC ,ROBINSON PLC ,RM2 INTEN ,RHYTHMONE PLC ,REVOLUTION BARS ,RENOLD PLC ,RENEURON GROUP PLC ,REGENCY MINES PLC ,CAMCO CLEAN ,REDHALL GROUP ,REDCENTRIC PLC ,RED ROCK RESOURCES ,RECORD PLC ,REALM THERAPEUTICS ,REAL ESTATE INV ,R.E.A. HOLDINGS PLC ,RAMBLER METALS AND ,QUARTO GROUP INC ,QUARTIX HOLDINGS PLC ,QUADRISE FUELS ,PV CRYSTALOX SOLA ,PROTON POWER ,PROTEOME SCIENCES ,PROSPEX OIL AND GAS ,PROACTIS HLDGS ,PRESSURE TECHNO ,PRESIDENT ENERGY ,PORTMEIRION GROUP ,PORTA COM ,PLEXUS HOLDINGS PLC ,PLANT HEALTH CARE ,PITTARDS PLC ,PHYSIOMICS PLC ,PHOTONSTAR LED ,PETREL RESOURCES PLC ,PETARDS GROUP PLC ,PERSONAL GROUP ,PENNANT INT'L ,PEBBLE BEACH SYS ,PCF GROUP PLC ,PATISSERIE H ,PATAGONIA GOLD PLC ,PARKMEAD GROUP PLC ,PARK GROUP PLC ,PARITY GROUP PLC ,PANTHER SECURITIES ,PANTHEON RESRCS PLC ,PALACE CAPITAL PLC ,OXFORD METRICS ,OSIRIUM TECHNOLOG ,ORIOLE RESOURCES PLC ,OPTIBIOTIX HEALTH ,ONE MEDIA ,ONCIMMUNE HOLD ,OMEGA DIAGNOSTICS ,NWF GROUP PLC ,NORTHBRIDGE INDL SVC ,NMCN PLC ,NEWMARK SECURITY PLC

,NETCALL ,NAUTILUS MARINE SER ,NASSTAR PLC ,NANOCO GROUP ,NAHL GROUP PLC ,MYSALE GROUP PLC ,MXC CAPITAL LTD ,MURGITROYD GROUP ,MPORIUM GROUP PLC ,MPAC GROUP PLC ,MOUNTFIELD GROUP ,MOTIF BIO PLC ,MOTHERCARE PLC ,MOSS BROS GROUP PLC ,MODERN WATER PLC ,MOBILE TORNADO ,MOBILE STREAMS PLC ,MITON GROUP PLC ,MINOAN GROUP PLC ,MINDS MA ,MIDATECH PHAR ,MICHELMERSH BRICK ,METALS EXP PLC ,MEREIO BIOPHARMA ,MERCIA TECH ,MERCANTILE PORTS ,MCCOLLS RETAIL ,MAYAN ENERGY ,MAXCYTE ,MARSHALL MOTOR ,MANAGEMENT CON ,MALVERN INTERNATIONAL ,MAISTRO PLC ,MAINTEL HOLDINGS PLC ,MACFARLANE GROUP PLC ,M WINKWORTH ,LUCECO PLC ,LPA GROUP PLC ,LOW & BONAR PLC ,LOCATION SCIENCE ,LIVE COMPANY ,LIGHTHOUSE GROUP PLC ,LIDCO GROUP PLC ,LATHAM (JAMES) PLC ,LANDORE RESRCS LTD ,KROMEK GROUP ,KERAS RESOURCES ,KEFI MINERALS PLC ,KAZERA GLOBAL PLC ,K3 BUSINESS ,JUBILEE ,JKX OIL AND GAS ,JERSEY OIL AND ,JAYWING PLC ,JARVIS SECURITES PLC ,IXICO PLC ,REVOLYMER PLC ,IQGEO GROUP ,IOFINA PLC ,INTERCEDE GROUP PLC ,INSTEM PLC ,INSPIRED ENERGY ,INLAND HOMES PLC ,INGENTA PLC ,INFRASTRATA PLC ,INDIGO VISION GROUP ,INDEPENDENT OIL ,IMMUPHARMA PLC ,IMMUNODIAGNOSTIC SYS ,IMMEDIA GROUP ,IMIMO ,ILIKA PLC ,IGAS ENERGY PLC ,IDE ,HYDROGEN GROUP PLC ,HYDRODEC GROUP PLC ,HVIVO PLC ,HUMMINGBIRD RESOUR ,HSS HIRE GROUP PLC ,HORNBY PLC ,HORIZONTE MINERALS ,HOLDERS TECHNOLOGY ,HML HOLDINGS PLC ,HERENCIA RESRCS PLC ,HAYNES PUBLISHING ,HARWOOD WEALTH MA ,HARGREAVES SVCS ,HARDY OIL & GAS ,HARDIDE PLC ,H & T GROUP PLC ,GRESHAM TECHNOLOG ,GRAFENIA PLC ,GOOD ENERGY GROUP ,GOALS SOCCER CENTRES ,GETECH GROUP PLC ,GENEDRIVE PLC ,GEM DIAMONDS ,GEAR4MUSIC ,GATTACA PLC ,GAN PLC ,GAMING RE ,GAME DIGITAL PLC ,GAMA AVIATION PLC ,FUTURA MEDICAL PLC ,FRONTIER SMART TECH ,FRONTIER IP GROUP ,FRENKEL TOPPING GRP ,FRENCH CONNECTION GR ,FRANCHISE BRAND ,FOX MARBLE HOLDINGS ,FORBIDDEN TECHNOLOGY ,FLYBE GROUP PLC ,FLOWTECH F ,FIRST PROPERTY ,FIRESTONE DIAMONDS ,FIREANGEL SAFETY ,FINSBURY FOOD GROUP ,FILTRONIC PLC ,FIH GROUP ,FASTJET PLC ,FARON PHARMA ,FAIRFX ,EXILLON ENERGY ,EVR HOLDINGS PLC ,EVERYMAN MEDIA ,EUROPA OIL & GAS ,EU SUPPLY ,ERGOMED PLC ,EQUATORIAL PALM ,EQTEC PLC ,ENTEQ UPSTREAM ,EMPRESARIA GROUP PLC ,ELEGANT HOTELS ,EGDON RESOURCES PLC ,EDENVILLE ENERGY ,EDEN RESEARCH ,ECSC GROUP PLC ,ECR MINERALS PLC ,ECKOH PLC ,EBIQUITY PLC ,EASYHOTEL PLC ,E-THERAPEUTICS PLC ,DX (GROUP) ,DRIVER GROUP PLC ,DP POLAND PLC ,DIRECTA PLUS PLC ,DILLISTONE GROUP PLC ,DIALIGHT PLC ,DEWHURST PLC ,DELTEX MEDICAL GROUP ,D4T4 SOLUTIONS ,CURTIS BANKS ,JAMES CROPPER PLC ,CROMA SECURITY SOL ,CRIMSON TIDE PLC ,CPPGROUP PLC ,CORERO NET ,CONYGAR INV CO ,CONNECT GROUP PLC ,CONDOR GOLD ,CONCURRENT TECHNOLOG ,CONCEPTA PLC ,COLUMBUS ENERG ,COLEFAX GROUP PLC ,CML MICROSYSTEMS PLC ,CLUFF NATURAL ,CLOUDCALL GROUP PLC ,CLOUDBUY PLC ,T CLARKE PLC ,CITY OF LONDON ,CITY OF LONDON GR ,CHURCHILL CHINA PLC ,CHRISTIE GROUP PLC ,CHINA NONFERR ,CHARACTER GROUP ,CHAMBERLIN PLC ,CHAARAT GOLD ,CENTRALNIC GROUP PLC ,CENTAUR MEDIA PLC ,CENKOS SECURITIES ,CELLO HEALTH PLC ,CASTLETON TECHNO ,CASPIAN SUNRISE PLC ,CARPETRIGHT PLC ,CARILLION PLC ,CARCLO PLC ,CAMBRIA AUTOMOBILES ,CAMBRIDGE COG ,CADOGAN PETROLEUM ,CADENCE MINERALS PLC ,CABOT ENERGY ,BYOTROL PLC ,BRIGHTON PIER GRO ,BRAVEHEART INVEST ,BRAVE BISON GROUP ,BRAEMAR SHIPPING ,BRADY PLC ,BOXHILL TECHNOL ,BOWLEVEN PLC ,BORDERS & SOUTHERN ,BONMARCHE HOLDINGS ,BLUEJAY MINING ,BLANCCO TECH ,BIOME TECHN ,BILLINGTON HOLDINGS ,BILBY PLC ,BIGBLU BROADBAND ,BIG SOFA TECH ,BEZANT RESOURCES ,BEST OF THE BEST PLC ,BELVOIR LETTINGS ,BEGBIES TRAYNOR GRP ,BE HEARD GR ,BANGO PLC ,AVOCET ,AVINGTRANS ,AVANTI COMMUNICATION ,AVACTA GROUP ,AUKETT SWANKE ,AUGEAN PLC ,LAURA ASHLEY ,ASHLEY HOUSE PLC ,ASCENT RESOURCES PLC ,ARIANA RESOURCES PLC ,ARCONTECH GROUP PLC ,APPLIED GRAPHENE ,APC TECH ,AORTECH INT'L ,ANPARIO PLC ,ANIMALCARE GROUP PLC ,ANGLO ASIAN MIN ,AMUR MINERALS CORP ,AMRYT PHARMA PLC ,AMINO TECH PLC ,ALUMASC GROUP PLC ,ALTYN PLC ,ALTITUDE GROUP PLC ,ALPHA REAL TRUST LTD ,ALLIED MINDS PLC ,ALLERGY THERAPEUTICS ,ALIEN METALS LTD ,ALEXANDER MINING PLC ,AIREA PLC ,AIR PARTNER PLC ,AFH FINANCIAL ,ADVANCED ONCO ,ADEPT TECHNO ,ACTUAL EXPERIENCE ,ACCSYS TECH ,ACCROL GROUP HOLD ,ACCESS INTELLIGENCE ,ABZENA PLC ,7DIGITAL GROUP PLC ,SIX HUNDRED GROUP ,4D PHARMA PLC ,ISPATIAL PLC ,ZOTEFOMAS PLC ,YOUNGOV PLC ,WINCANTON PLC ,WILMINGTON PLC ,WATKIN JONES PLC ,WANDISCO PLC ,VP PLC ,VOLUTION GROUP PLC ,VITEC GROUP ,VICTORIA PLC ,VERSARIEN PLC ,URBAN&CIVIC PLC ,DEV'T SECURITIES PLC ,TYMAN PLC ,TT ELECTRONICS PLC ,TRIFAST PLC ,TRIBAL GROUP PLC ,TREATT PLC ,TRACSYS PLC ,FW THORPE PLC ,GYM ,TELIT COMMN PLC ,TELFORD HOMES PLC ,TELECOM PLUS PLC ,TARSUS GROUP PLC ,STOCK SPIRITS ,STHREE PLC ,STAFFLINE GROUP PLC ,ST. MODWEN PROPER ,SPIRE HEALTH ,SPEEDY HIRE PLC ,SOUND OIL PLC ,SOLGOLD PLC ,SOCO INT'L PLC ,SMART METERI ,SEVERFIELD PLC ,SERICA ENERGY PLC

,SENIOR PLC ,SECURE TRUST ,SDL PLC ,SAVILLS PLC ,SAVANNAH PETRO ,SAN LEON ENERGY PLC ,SAFECHARGE INTERN ,S & U PLC ,ROBERT WALTERS PLC ,RIVER AND MERCANTILE ,RICARDO PLC ,RESTORE PLC ,RENEWI PLC ,RENEW HOLDINGS PLC ,REGAL PETROLEUM PLC ,HELPHIRE GROUP PLC ,REAL GOOD FOOD PLC ,REACH PLC ,RAVEN PROPERTY GROUP ,RANDALL AND QUILTER ,QUIXANT PLC ,PURPLEBRICKS GR ,PURECIRCLE LIMITED ,PREMIER TECH ,PREMIER FOODS PLC ,PREMIER ASSET M ,PORVAIR PLC ,POLYPIPE GROUP PLC ,POLAR CAPITAL HLDGS ,PHOTO-ME INT'L PLC ,PHOENIX GLOBAL RES ,PETROPAVLOVSK PLC ,PAYPOINT PLC ,PARAGON BANKING GR ,PAN AFRICAN ,OXFORD INSTRUMENTS ,OXFORD BIOMEDICA ,OCEAN WILSONS ,NUMIS CORP PLC ,NOSTRUM OIL ,NORTHGATE PLC ,NORCROS PLC ,NON-STANDARD ,NICHOLS PLC ,NEXT FIFTEEN ,NCC GROUP PLC ,MULBERRY GROUP ,A & J MUCKLOW ,MOUNTVIEW ESTATES ,MOTORPOINT GROUP PLC ,MORSES CLUB PLC ,MORGAN SINDALL ,M J GLEESON ,MITIE GROUP PLC ,MINCON GROUP ,MIDWICH GROUP PLC ,MICROGEN PLC ,MORTGAGE ADVICE ,JOHN MENZIES PLC ,MEARS ,MCKAY SECURITIES PLC ,MCBRIDE PLC ,MATTIOLI WOODS PLC ,MARSTON'S PLC ,MARLOWE PLC ,MAJESTIC WINE PLC ,M&C SAATCHI PLC ,M.P. EVANS ,LSL PROPERTY ,LOOPUP GROUP PLC ,LONDON SECURITY PLC ,LOK'N STORE GROUP ,LIONTRUST ASSET MGT ,LEARNING TECH ,LAMPRELL PLC ,KOOVS PLC ,KIN AND CARTA PLC ,KELLER GROUP PLC ,KCOM GROUP PLC ,KAINOS GRP ,JUDGES SCIE ,JOULES GROUP ,JOHNSON SERVICE GRP ,JAMES HALSTEAD PLC ,ITE GROUP PLC ,IQE PLC ,IOMART GROUP PLC ,INTERSERVE PLC ,IMPELLAM GROUP PLC ,IMPAX ASSET ,IG DESIGN GROUP ,IDOX PLC ,IDEAGEN PLC ,IBSTOCK PLC ,HURRICANE ENERGY ,HUNTING PLC ,HOTEL CHOCOLAT GRO ,HOSTELWORLD GROUP ,HORIZON DISCO ,HOLLYWOOD BOWL ,HOCHSCHILD MIN ,HILTON FOOD GROUP ,HILL & SMITH HOLDING ,HELICAL PLC ,HEADLAM GROUP PLC ,HARWORTH GROUP PLC ,GULF MARINE ,GRIFFIN MINING LTD ,GOODWIN PLC ,GOOCH & HOUSEGO ,GOLDPLAT PLC ,GO-AHEAD GROUP PLC ,GLOBALDATA PLC ,GEORGIA HEALTHCARE ,GENEL ENE ,GB GROUP PLC ,GATELEY HOLDINGS ,GAMMA COM ,GAMES WORKSHOP GROUP ,FULLER, SMITH ,FRONTIER DEVELO ,FOXTONS GROUP ,FORTERRA PLC ,FOCUSRITE PLC ,FIRST DERIVATIVES ,FINDEL PLC ,EUROCELL PLC ,ESSENTIA PLC ,EQUINITI GROUP ,EMIS GROUP PLC ,ELAND OIL ,EKF DIAGNOSTICS ,ECO ANIMAL ,EARTHPORT PLC ,DRAPER ESPRIT PLC ,DOTDIGITAL GROUP ,DOMINO'S PIZZA GR ,DIVERSIFIED GA ,DISCOVERIE GROUP PLC ,DIGNITY PLC ,DFS FURNITURE PLC ,DEVRO PLC ,DEBENHAMS PLC ,DE LA RUE PLC ,DART GROUP PLC ,DAIRY CREST GROUP ,DAEJAN HOLDINGS PLC ,CVS GROUP PLC ,CREO MEDICAL ,CRANEWARE PLC ,COUNTRYWIDE PLC ,COSTAIN GROUP PLC ,COHORT PLC ,CMC MARKETS PLC ,CLIPPER LOG ,CLINIGEN GROUP PLC ,CIRCASSIA PHARMA ,CHESNARA PLC ,CHARLES TAYLOR PLC ,CHARLES STANLEY ,CERES POWER HLDGS ,CENTRAL ASIA ,CASTINGS PLC ,CARR'S GROUP PLC ,CARETECH HLDGS ,CAMELLIA PLC ,N BROWN GROUP PLC ,BROOKS MACDONALD GRP ,BREWIN DOLPHIN HLDGS ,HENRY BOOT PLC ,BLOOMSBURY ,BIOVENTIX ,BIFFA PLC ,BENCHMARK HOLD ,AVATION ,ATALAYA MINI ,ARROW GLOBAL ,ARBUTHNOT BANKING ,AO WORLD PLC ,ANGLO-EASTERN PLANTS ,ANGLO PACIFIC GROUP ,ANDREWS SYKES GROUP ,AMERISUR RESOURCES ,AMEDEO AIR ,ADVANCED MEDICAL ,ACCESSO TECH ,AB DYNAMICS PLC ,AA PLC ,4IMPRINT GROUP PLC ,IPM PLC ,YOUNG & CO'S BREWERY ,WILLIAM HILL PLC ,VESUVIUS PLC ,VERTU MOTORS PLC ,VECTURA GROUP PLC ,UK COMMERCIAL ,TED BAKER PLC ,TBC BANK GROUP PLC ,SUPERDRY PLC ,STAGECOACH GROUP PLC ,SPIRENT COMM ,SOFTCAT PLC ,SIRIUS MINERALS PLC ,SIG PLC ,SCAPA GROUP PLC ,RWS HOLDINGS PLC ,RPS GROUP PLC ,RM PLC ,RESTAURANT GROUP PLC ,RANK GROUP PLC ,PZ CUSSONS PLC ,PREMIER OIL PLC ,PLAYTECH PLC ,PETS AT HOME ,PETRA DIAMONDS LTD ,PAGEGROUP PLC ,OPHIR EN ,ONESAVINGS BANK PLC ,ON THE BEACH ,NEWRIVER REIT PLC ,MORGAN ADVANCED ,MARSHALLS PLC ,LOOKERS PLC ,KIER GROUP PLC ,KEYWORDS STUDIOS PLC ,JUST GROUP PLC ,JP GROUP PLC ,INTERNATIONAL ,HUNTSWORTH PLC ,HANSTEEN HLDGS ,GOCOMPARE.COM ,GALLIFORD TRY PLC ,FUTURE PLC ,FDM GROUP ,ELEMENTIS PLC ,EI GROUP PLC ,DAILY MAIL AN ,CRANSWICK PLC ,CONSORT MEDICAL PLC ,CLS HOLDINGS PLC ,CLARKSON PLC ,CHEMRING GROUP PLC ,CENTAMIN PLC ,CELTIC PLC ,CARD FACTORY PLC ,CAPITAL & REGIONAL ,CAIRN ENERGY PLC ,BLUE PRISM GROUP PLC ,A.G. BARR PLC ,AVON RUBBER PLC ,ALLIANCE PHARMA PLC ,888 HOLDINGS PLC ,WH SMITH PLC ,J D WETHERSPOON ,ULTRA ELECTRONICS ,TP ICAP PLC ,TALKTALK TELECOM ,SYNTHOMER PLC ,STOBART GROUP LTD ,RATHBONE BROTHERS ,PETROFAC LIMITED ,PENDRAGON PLC ,NATIONAL EXPRESS GRP ,MONEYSUPERMARKE ,MILLENNIUM ,MCCARTHY & STO ,LONMIN PLC ,JOHN LAING ,INTERMEDIATE CAPITAL ,INDIVIOR PLC ,IMI PLC ,HOWDEN JOINERY ,HAYS PLC ,HASTINGS GROUP ,HALFORDS GROUP PLC ,GREENE KING PLC ,GRAFTON GROUP PLC ,JAMES FISHER & SONS ,FIRSTGROUP PLC ,FEVERTREE DRINKS PLC ,FERREXPO PLC ,ENQUEST PLC ,DRAX GROUP PLC ,DIPLOMA PLC ,CREST NICHOLSON HOLD ,COUNTRYSIDE PROPERTI ,COMPUTACENTER PLC ,COATS GROUP PLC ,BREEDON GROUP PLC ,BODYCOTE ,BBA AVIATION ,BGEO GROUP PLC ,ASCENTIAL PLC ,WORKSPACE GROUP PLC ,VICTREX PLC ,TULLOW OIL PLC ,THOMAS COOK GROUP ,TATE & LYLE PLC ,SPORTS DIRECT INTER ,SOPHOS GROUP PLC

,SERCO GROUP PLC ,SAGA PLC ,SAFESTORE HOLD ,ROTORK PLC ,PROVIDENT FINANCIAL ,PRIMARY HEALTH PROP. ,MITCHELLS & BUTLERS ,METRO BANK PLC ,MERLIN ENTERTAIN ,MEGGITT PLC ,MEDICLINIC INTERNA ,LONDONMETRIC PRO ,JUPITER FUND ,JARDINE LLOYD ,IWG PLC ,INMARSAT PLC ,IG GROUP HLDGS ,HOMESERVE PLC ,GREGGS PLC ,GRAINGER PLC ,GENUS PLC ,EUROMONEY INSTL INV ,ELECTROCOMPONENTS ,DUNELM GROUP PLC ,DECHRA PHARMA ,CYBG PLC ,CONVATEC GROUP ,CLOSE BROTHERS PLC ,CINEWORLD GROUP PLC ,CAPITAL & COUNTIES ,BRITVIC PLC ,BOVIS HOMES GROUP ,BOOHOO GROUP PLC ,BIG YELLOW PLC ,BCA MARKETPLACE PLC ,ASSURA PLC ,ASHMORE GROUP PLC ,AGGREKO PLC ,ACACIA MINING PLC ,ABCAM PLC ,JOHN WOOD GROUP PLC ,WIZZ AIR ,WEIR GROUP PLC ,UNITE GROUP PLC ,SSP GROUP LIMITED ,SPECTRIS PLC ,SHAFTESBURY PLC ,RPC GROUP PLC ,ROYAL MAIL PLC ,RIGHTMOVE PLC ,RENISHAW PLC ,REDROW PLC ,QINETIQ GROUP ,POLYMETAL INTER ,PENNON GROUP PLC ,MAN GROUP PLC ,KAZ MINERALS PLC ,INVESTEC PLC ,INCHCAPE PLC ,HISCOX PLC ,HIKMA PHARMACEUTICAL ,GVC HOLDINGS ,G4S PLC ,COBHAM PLC ,BTG PLC ,BELLWAY PLC ,BALFOUR BEATTY PLC ,B&M EUROPEAN ,TRAVIS PERKINS PLC ,SPIRAX-SARCO ENGIN. ,DS SMITH PLC ,PHOENIX GROUP ,ITV PLC ,INTU PROPERTIE ,HAMMERSON PLC ,GREAT PORTLAND ,DIXONS CARPHONE PLC ,CAPITA PLC ,BEAZLEY PLC ,AVEVA GROUP PLC ,ST. JAMES'S ,SMITHS INDUSTRIES ,SEVERN TRENT PLC ,NMC HEALTHCARE LLC ,KINGFISHER PLC ,JOHNSON MATTHEY PLC ,JD SPORTS FASHION ,HALMA PLC ,DIRECT LINE ,DERWENT LONDON PLC ,BABCOCK INT'L GROUP ,AUTO TRADER ,ASOS PLC ,RENTOKIL INITIAL PLC ,NEXT PLC ,MICRO FOCUS INTL ,MARKS & SPENCER ,JUST EAT PLC ,FRESNILLO PLC ,EASYJET PLC ,DCC PLC ,CRODA INTERNATIONAL ,CARNIVAL PLC ,BERKELEY GROUP ,TAYLOR WIMPEY PLC ,SCHRODERS PLC ,THE SAGE GROUP PLC ,RSA INSURANCE GROUP ,PEARSON PLC ,OCADO GROUP PLC ,MONDI PLC ,EVRAZ PLC ,BARRATT DEVELOPMENTS ,ADMIRAL GROUP PLC ,UNITED UTILITIES PLC ,MELROSE ,INTERTEK GROUP ,INFORMA PLC ,HARGREAVES LANSD ,CENTRICA PLC ,BURBERRY GROUP ,BRITISH LAND COMPANY ,STANDARD LIFE ABER ,SEGRO PLC ,J SAINSBURY PLC ,PERSIMMON PLC ,LAND SECURITIES ,INTERCONTINENTAL ,BUNZL PLC ,ANTOFAGASTA PLC ,WPP PLC ,WHITBREAD PLC ,COCA COLA HBC AG ,ASHTREAD GROUP PLC ,WM. MORRISON SUPERMT ,FERGUSON PLC ,SSE PLC ,SMITH & NEPHEW PLC ,LEGAL & GEN'L GRP ,AVIVA PLC ,ROLLS-ROYCE ,EXPERIAN PLC ,BAE SYSTEMS ,LONDON STOCK EXCH ,CRH PLC ,ASSOCIATED BRITISH ,STANDARD CHARTERED ,IMPERIAL BRANDS ,BT GROUP PLC ,COMPASS GROUP PLC ,ANGLO AMERICAN PLC ,TESCO PLC ,NATIONAL GRID PLC ,ROYAL BANK ,RELX PLC ,BARCLAYS PLC ,PRUDENTIAL PLC ,GLENCORE PLC ,BHP GROUP PLC ,RECKITT BENCKISER ,LLOYDS BANKING GROUP ,VODAFONE GROUP PLC ,UNILEVER PLC ,RIO TINTO PLC ,BRITISH AMERICAN TOB ,DIAGEO PLC ,ASTRAZENECA PLC ,GLAXOSMITHKLINE ,ROYAL DUTCH SHELL ,BP PLC ,HSBC HOLDINGS PLC



Appendix 6 – T-test for differences of risk between samples

2017 – Value at Risk

```
. ttest VAR95, by( Sample)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Control	1,005	-.0354938	.0005209	.0168788	-.0365159	-.0344716
Treatmen	1,005	-.0477896	.0011122	.0356957	-.0499721	-.045607
combined	2,010	-.0415825	.0006249	.0284994	-.042808	-.0403571
diff		.0122958	.0012207		.0099019	.0146897

```
diff = mean(Control) - mean(Treatmen)          t = 10.0728
Ho: diff = 0                                degrees of freedom = 2078
```

```
Ha: diff < 0                                Ha: diff != 0                                Ha: diff > 0
Pr(T < t) = 1.0000                        Pr(|T| > |t|) = 0.0000                        Pr(T > t) = 0.0000
```

.

```
. ttest VAR99 , by( Sample)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Control	1,005	-.0677636	.0015775	.0506282	-.0708591	-.064668
Treatmen	1,005	-.0502831	.0007386	.0239334	-.0517324	-.0488338
combined	2,010	-.0589393	.0008864	.040424	-.0606775	-.057201
diff		-.0174805	.0017313		-.0208756	-.0140853

```
diff = mean(Control) - mean(Treatmen)          t = -10.0970
Ho: diff = 0                                degrees of freedom = 2078
```

```
Ha: diff < 0                                Ha: diff != 0                                Ha: diff > 0
Pr(T < t) = 0.0000                        Pr(|T| > |t|) = 0.0000                        Pr(T > t) = 1.0000
```


2017 – Expected Shortfall

```
. ttest ES95 , by( Sample)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Control	1,005	-.0381118	.000815	.0261563	-.0397111	-.0365126
Treatmen	1,005	-.0318276	.0003551	.0115069	-.0325244	-.0311308
combined	2,010	-.0349395	.0004468	.0203791	-.0358158	-.0340632
diff		-.0062842	.0008832		-.0080164	-.0045521

```
diff = mean(Control) - mean(Treatmen)          t = -7.1150
Ho: diff = 0                                degrees of freedom = 2078
```

```
Ha: diff < 0          Ha: diff != 0          Ha: diff > 0
Pr(T < t) = 0.0000    Pr(|T| > |t|) = 0.0000    Pr(T > t) = 1.0000
```

```
. ttest ES99 , by( Sample)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Control	1,005	-.0786037	.0019888	.0638268	-.0825062	-.0747012
Treatmen	1,005	-.0591017	.0007022	.0227548	-.0604796	-.0577238
combined	2,010	-.0687589	.0010681	.0487106	-.0708535	-.0666644
diff		-.019502	.0020934		-.0236075	-.0153965

```
diff = mean(Control) - mean(Treatmen)          t = -9.3157
Ho: diff = 0                                degrees of freedom = 2078
```

```
Ha: diff < 0          Ha: diff != 0          Ha: diff > 0
Pr(T < t) = 0.0000    Pr(|T| > |t|) = 0.0000    Pr(T > t) = 1.0000
```

2018 – Value at Risk

```
. ttest VAR95, by( Sample)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Control	1,005	-.0467552	.0011518	.0375713	-.0490153	-.0444951
Treatmen	1,005	-.0365799	.0005539	.0180859	-.0376668	-.0354929
combined	2,010	-.0416627	.000648	.0299054	-.0429335	-.040392
diff		-.0101753	.0012774		-.0126803	-.0076703

```
diff = mean(Control) - mean(Treatmen)          t = -7.9659
Ho: diff = 0                                degrees of freedom = 2128
```

```
Ha: diff < 0          Ha: diff != 0          Ha: diff > 0
Pr(T < t) = 0.0000    Pr(|T| > |t|) = 0.0000    Pr(T > t) = 1.0000
```

```
. ttest VAR99, by( Sample)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Control	1,005	-.0658405	.0016308	.0531953	-.0690405	-.0626405
Treatmen	1,005	-.0513515	.0007777	.0253928	-.0528775	-.0498254
combined	2,010	-.0585892	.0009162	.0422839	-.0603859	-.0567925
diff		-.014489	.0018057		-.0180301	-.0109479

```
diff = mean(Control) - mean(Treatmen)          t = -8.0240
Ho: diff = 0                                degrees of freedom = 2128
```

```
Ha: diff < 0          Ha: diff != 0          Ha: diff > 0
Pr(T < t) = 0.0000    Pr(|T| > |t|) = 0.0000    Pr(T > t) = 1.0000
```

2018 – Expected Shortfall

```
. ttest ES95, by( Sample)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Control	1,005	-.0402873	.0008425	.0274804	-.0419404	-.0386342
Treatmen	1,005	-.0335304	.000431	.0140711	-.034376	-.0326847
combined	2,010	-.0369057	.0004784	.0220798	-.0378439	-.0359675
diff		-.006757	.0009458		-.0086117	-.0049022

```
diff = mean(Control) - mean(Treatmen)          t = -7.1443
Ho: diff = 0                                degrees of freedom = 2128
```

```
Ha: diff < 0                                Ha: diff != 0                                Ha: diff > 0
Pr(T < t) = 0.0000                        Pr(|T| > |t|) = 0.0000                        Pr(T > t) = 1.0000
```

```
. ttest ES99, by( Sample)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Control	1,005	-.0741346	.0015545	.0507071	-.0771849	-.0710843
Treatmen	1,005	-.060224	.0009717	.031725	-.0621306	-.0583174
combined	2,010	-.0671728	.0009283	.0428447	-.0689933	-.0653522
diff		-.0139106	.0018325		-.0175042	-.010317

```
diff = mean(Control) - mean(Treatmen)          t = -7.5912
Ho: diff = 0                                degrees of freedom = 2128
```

```
Ha: diff < 0                                Ha: diff != 0                                Ha: diff > 0
Pr(T < t) = 0.0000                        Pr(|T| > |t|) = 0.0000                        Pr(T > t) = 1.0000
```

Appendix 7 – Difference-in-difference model specification Stata code

Var 95%:

Reg Var95 AffectedRegulation RegulationInEffect AffectedRegulation_RegulationInEffect MTBV
MV AGE D/E PPEtotal SalesGrowth ROIC

Var 99%:

Reg Var99 AffectedRegulation RegulationInEffect AffectedRegulation_RegulationInEffect MTBV
MV AGE D/E PPEtotal SalesGrowth ROIC

ES 95%:

Reg ES95 AffectedRegulation RegulationInEffect AffectedRegulation_RegulationInEffect MTBV MV
AGE D/E PPEtotal SalesGrowth ROIC

ES99%:

Reg ES99 AffectedRegulation RegulationInEffect AffectedRegulation_RegulationInEffect MTBV MV
AGE D/E PPEtotal SalesGrowth ROIC

Appendix 8 – Size management

	2017	2018	CHANGE %
NUMBER OF COMPANIES WITH OVER 500 EMPLOYEES:	1050	1116	6,3%
NUMBER OF COMPANIES WITH MORE THAN 20 MILLION EURO IN ASSETS:	1951	1976	1,3%

Appendix 9 - Descriptive statistics ESG model

Control variables

ESG model	<i>MTBV</i>	<i>MV€</i>	<i>Age</i>	<i>D/E-ratio</i>	<i>PPE/total</i>	<i>Sales growth</i>	<i>ROIC</i>
Mean	2,22	10383,04	29,15	0,96	0,23	0,04	0,10
Standard Error	0,17	1028,50	0,74	0,11	0,01	0,01	0,01
Median	1,70	3382,21	27,50	0,57	0,13	0,03	0,09
Standard Deviation	3,10	19075,91	13,79	1,96	0,25	0,13	0,16
Sample Variance	9,60	57227,72	190,11	3,85	0,06	0,02	0,03
Kurtosis	34,64	13,40	-0,92	23,59	0,56	27,71	81,91
Skewness	-1,52	3,46	0,45	2,15	1,23	0,73	6,47
Range	51,76	121845,13	52,00	26,28	0,97	2,00	2,61
Minimum	-26,19	0,97	2,00	-11,06	0,00	-1,00	-0,44
Maximum	25,57	121846,10	54,00	15,22	0,97	1,00	2,18
Sum	763,95	3571765,85	10026,00	329,55	80,66	14,04	34,27
Count	344,00	344,00	344,00	344,00	344,00	344,00	344,00

Pearson correlation matrix:

	<i>MTBV</i>	<i>MV€</i>	<i>Age</i>	<i>D/E-</i>	<i>PPE/total</i>	<i>Sales growth</i>	<i>ROIC</i>
MTBV	1						
MV€	0,081915	1					
Age	0,062625	0,187053	1				
D/E-ratio	0,175803	-0,00531	0,106752	1			
PPE/total	-0,20858	-0,01246	-0,12597	-0,11088	1		
Sales growth						1	
CAGR	-0,00235	-0,00382	0,005871	-0,16669	-0,05867		1
ROIC	0,214608	-0,03728	-0,02054	-0,2435	-0,13492	-0,05994	

Dependent variable means

ESG multiple regression	<i>Var 95</i>	<i>Var 99</i>	<i>ES 95</i>	<i>ES 99</i>
Mean	-0,03234	-0,04537	-0,0302	-0,05385
Standard Error	0,000839	0,001175	0,000679	0,001496
Median	-0,02913	-0,04086	-0,02788	-0,04707
Standard Deviation	0,015569	0,021796	0,012595	0,027745
Sample Variance	0,000242	0,000475	0,000159	0,00077
Kurtosis	18,35088	18,50218	25,11187	14,30673
Skewness	-3,46177	-3,4795	-3,72351	-3,30487
Range	0,14224	0,19949	0,130579	0,199993
Minimum	-0,15697	-0,22018	-0,14444	-0,22353
Maximum	-0,01473	-0,02069	-0,01387	-0,02354
Sum	-11,1243	-15,606	-10,3879	-18,5251
Count	344	344	344	344

Appendix 10 – ESG model alternative groups

VAR 95% – Bottom quartile of ESGperformance

```
. reg Var95 Year2018 ESG_BotQ Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
				F(10, 677)	=	18.13
Model	.042641341	10	.004264134	Prob > F	=	0.0000
Residual	.159269538	677	.000235258	R-squared	=	0.2112
				Adj R-squared	=	0.1995
Total	.201910879	687	.000293902	Root MSE	=	.01534

Var95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0048942	.0015724	-3.11	0.002	-.0079815	-.0018069
ESG_BotQ	.003353	.0018	1.86	0.063	-.0001812	.0068872
Interaction	.0023375	.0025198	0.93	0.354	-.00261	.0072851
MTBV	.0007679	.0001986	3.87	0.000	.0003779	.0011578
MV	1.42e-07	3.13e-08	4.55	0.000	8.10e-08	2.04e-07
Age	.0000226	.0000439	0.51	0.607	-.0000636	.0001087
DEratio	-.0001212	.0001623	-0.75	0.455	-.0004398	.0001974
PPEtotal	-.0228023	.0029188	-7.81	0.000	-.0285333	-.0170713
SalesgrowthCAGR	.0107	.0030879	3.47	0.001	.0046371	.0167629
ROIC	.0046923	.0025219	1.86	0.063	-.0002593	.009644
_cons	-.0286129	.0021136	-13.54	0.000	-.0327629	-.0244629

VAR 99% – Bottom Quartile of ESGperformance

```
. reg Var99 Year2018 ESG_BotQ Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
				F(10, 677)	=	17.95
Model	.083236552	10	.008323655	Prob > F	=	0.0000
Residual	.313978016	677	.000463778	R-squared	=	0.2096
				Adj R-squared	=	0.1979
Total	.397214568	687	.000578187	Root MSE	=	.02154

Var99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0064543	.0022077	-2.92	0.004	-.010789	-.0021196
ESG_BotQ	.004699	.0025273	1.86	0.063	-.0002633	.0096612
Interaction	.0032999	.0035379	0.93	0.351	-.0036467	.0102465
MTBV	.0010479	.0002789	3.76	0.000	.0005004	.0015955
MV	2.00e-07	4.39e-08	4.55	0.000	1.14e-07	2.86e-07
Age	.0000322	.0000616	0.52	0.602	-.0000888	.0001532
DEratio	-.0001607	.0002278	-0.71	0.481	-.0006081	.0002866
PPEtotal	-.0323422	.0040982	-7.89	0.000	-.0403889	-.0242955
SalesgrowthCAGR	.0148805	.0043355	3.43	0.001	.0063679	.0233932
ROIC	.006511	.0035409	1.84	0.066	-.0004414	.0134634
_cons	-.0404229	.0029676	-13.62	0.000	-.0462497	-.0345961

ES 95% – Bottom Quartile of ESGperformance

```
. reg ES95 Year2018 ESG_BotQ Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
				F(10, 677)	=	21.36
Model	.02880072	10	.002880072	Prob > F	=	0.0000
Residual	.091299761	677	.000134859	R-squared	=	0.2398
				Adj R-squared	=	0.2286
Total	.120100482	687	.000174819	Root MSE	=	.01161

ES95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0073033	.0011905	-6.13	0.000	-.0096408	-.0049658
ESG_BotQ	.0020169	.0013628	1.48	0.139	-.000659	.0046927
Interaction	.0030032	.0019078	1.57	0.116	-.0007427	.0067491
MTBV	.000598	.0001504	3.98	0.000	.0003027	.0008932
MV	9.49e-08	2.37e-08	4.01	0.000	4.84e-08	1.41e-07
Age	.000054	.0000332	1.63	0.105	-.0000112	.0001192
DEratio	.000101	.0001229	0.82	0.411	-.0001402	.0003422
PPEtotal	-.0165124	.0022099	-7.47	0.000	-.0208515	-.0121733
SalesgrowthCAGR	.006708	.0023379	2.87	0.004	.0021176	.0112984
ROIC	.0040966	.0019094	2.15	0.032	.0003475	.0078456
_cons	-.025352	.0016003	-15.84	0.000	-.028494	-.0222099

ES 99% – Bottom Quartile of ESGperformance

```
. reg ES99 Year2018 ESG_BotQ Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
				F(10, 677)	=	13.14
Model	.115757269	10	.011575727	Prob > F	=	0.0000
Residual	.596344756	677	.000880864	R-squared	=	0.1626
				Adj R-squared	=	0.1502
Total	.712102025	687	.001036539	Root MSE	=	.02968

ES99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0068282	.0030425	-2.24	0.025	-.0128021	-.0008543
ESG_BotQ	.0056429	.003483	1.62	0.106	-.0011958	.0124817
Interaction	.0023968	.0048758	0.49	0.623	-.0071768	.0119703
MTBV	.0013866	.0003843	3.61	0.000	.0006321	.0021412
MV	2.77e-07	6.06e-08	4.58	0.000	1.58e-07	3.96e-07
Age	.0000554	.0000849	0.65	0.515	-.0001114	.0002221
DEratio	-.0000756	.000314	-0.24	0.810	-.000692	.0005409
PPEtotal	-.0310757	.0056479	-5.50	0.000	-.0421653	-.0199861
SalesgrowthCAGR	.0209555	.005975	3.51	0.000	.0092237	.0326872
ROIC	.0109592	.0048799	2.25	0.025	.0013777	.0205407
_cons	-.0518486	.0040898	-12.68	0.000	-.0598788	-.0438184

VAR 95% – Top half of ESGperformance

```
. reg Var95 Year2018 ESG_TopHalf Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
Model	.042641341	10	.004264134	F(10, 677)	=	18.13
Residual	.159269538	677	.000235258	Prob > F	=	0.0000
Total	.201910879	687	.000293902	R-squared	=	0.2112
				Adj R-squared	=	0.1995
				Root MSE	=	.01534

Var95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0048942	.0015724	-3.11	0.002	-.0079815	-.0018069
ESG_TopHalf	.003353	.0018	1.86	0.063	-.0001812	.0068872
Interaction	.0023375	.0025198	0.93	0.354	-.00261	.0072851
MTBV	.0007679	.0001986	3.87	0.000	.0003779	.0011578
MV	1.42e-07	3.13e-08	4.55	0.000	8.10e-08	2.04e-07
Age	.0000226	.0000439	0.51	0.607	-.0000636	.0001087
DERatio	-.0001212	.0001623	-0.75	0.455	-.0004398	.0001974
PPEtotal	-.0228023	.0029188	-7.81	0.000	-.0285333	-.0170713
SalesgrowthCAGR	.0107	.0030879	3.47	0.001	.0046371	.0167629
ROIC	.0046923	.0025219	1.86	0.063	-.0002593	.009644
_cons	-.0286129	.0021136	-13.54	0.000	-.0327629	-.0244629

VAR 99% – Top Half of ESGperformance

```
. reg Var99 Year2018 ESG_TopHalf Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
Model	.083236552	10	.008323655	F(10, 677)	=	17.95
Residual	.313978016	677	.000463778	Prob > F	=	0.0000
Total	.397214568	687	.000578187	R-squared	=	0.2096
				Adj R-squared	=	0.1979
				Root MSE	=	.02154

Var99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0064543	.0022077	-2.92	0.004	-.010789	-.0021196
ESG_TopHalf	.004699	.0025273	1.86	0.063	-.0002633	.0096612
Interaction	.0032999	.0035379	0.93	0.351	-.0036467	.0102465
MTBV	.0010479	.0002789	3.76	0.000	.0005004	.0015955
MV	2.00e-07	4.39e-08	4.55	0.000	1.14e-07	2.86e-07
Age	.0000322	.0000616	0.52	0.602	-.0000888	.0001532
DERatio	-.0001607	.0002278	-0.71	0.481	-.0006081	.0002866
PPEtotal	-.0323422	.0040982	-7.89	0.000	-.0403889	-.0242955
SalesgrowthCAGR	.0148805	.0043355	3.43	0.001	.0063679	.0233932
ROIC	.006511	.0035409	1.84	0.066	-.0004414	.0134634
_cons	-.0404229	.0029676	-13.62	0.000	-.0462497	-.0345961

ES 95% – Top Half of ESGperformance

```
. reg ES95 Year2018 ESG_TopHalf Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
				F(10, 677)	=	21.36
Model	.02880072	10	.002880072	Prob > F	=	0.0000
Residual	.091299761	677	.000134859	R-squared	=	0.2398
				Adj R-squared	=	0.2286
Total	.120100482	687	.000174819	Root MSE	=	.01161

ES95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0073033	.0011905	-6.13	0.000	-.0096408	-.0049658
ESG_TopHalf	.0020169	.0013628	1.48	0.139	-.000659	.0046927
Interaction	.0030032	.0019078	1.57	0.116	-.0007427	.0067491
MTBV	.000598	.0001504	3.98	0.000	.0003027	.0008932
MV	9.49e-08	2.37e-08	4.01	0.000	4.84e-08	1.41e-07
Age	.000054	.0000332	1.63	0.105	-.0000112	.0001192
DEratio	.000101	.0001229	0.82	0.411	-.0001402	.0003422
PPEtotal	-.0165124	.0022099	-7.47	0.000	-.0208515	-.0121733
SalesgrowthCAGR	.006708	.0023379	2.87	0.004	.0021176	.0112984
ROIC	.0040966	.0019094	2.15	0.032	.0003475	.0078456
_cons	-.025352	.0016003	-15.84	0.000	-.028494	-.0222099

ES 99% – Top Half of ESGperformance

```
. reg ES99 Year2018 ESG_TopHalf Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
				F(10, 677)	=	13.14
Model	.115757269	10	.011575727	Prob > F	=	0.0000
Residual	.596344756	677	.000880864	R-squared	=	0.1626
				Adj R-squared	=	0.1502
Total	.712102025	687	.001036539	Root MSE	=	.02968

ES99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0068282	.0030425	-2.24	0.025	-.0128021	-.0008543
ESG_TopHalf	.0056429	.003483	1.62	0.106	-.0011958	.0124817
Interaction	.0023968	.0048758	0.49	0.623	-.0071768	.0119703
MTBV	.0013866	.0003843	3.61	0.000	.0006321	.0021412
MV	2.77e-07	6.06e-08	4.58	0.000	1.58e-07	3.96e-07
Age	.0000554	.0000849	0.65	0.515	-.0001114	.0002221
DEratio	-.0000756	.000314	-0.24	0.810	-.000692	.0005409
PPEtotal	-.0310757	.0056479	-5.50	0.000	-.0421653	-.0199861
SalesgrowthCAGR	.0209555	.005975	3.51	0.000	.0092237	.0326872
ROIC	.0109592	.0048799	2.25	0.025	.0013777	.0205407
_cons	-.0518486	.0040898	-12.68	0.000	-.0598788	-.0438184

VAR 95% – Bottom half of ESGperformance

```
. reg Var95 Year2018 ESG_BotHalf Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
				F(10, 677)	=	18.13
Model	.042641341	10	.004264134	Prob > F	=	0.0000
Residual	.159269538	677	.000235258	R-squared	=	0.2112
				Adj R-squared	=	0.1995
Total	.201910879	687	.000293902	Root MSE	=	.01534

Var95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0048942	.0015724	-3.11	0.002	-.0079815	-.0018069
ESG_BotHalf	.003353	.0018	1.86	0.063	-.0001812	.0068872
Interaction	.0023375	.0025198	0.93	0.354	-.00261	.0072851
MTBV	.0007679	.0001986	3.87	0.000	.0003779	.0011578
MV	1.42e-07	3.13e-08	4.55	0.000	8.10e-08	2.04e-07
Age	.0000226	.0000439	0.51	0.607	-.0000636	.0001087
DEratio	-.0001212	.0001623	-0.75	0.455	-.0004398	.0001974
PPEtotal	-.0228023	.0029188	-7.81	0.000	-.0285333	-.0170713
SalesgrowthCAGR	.0107	.0030879	3.47	0.001	.0046371	.0167629
ROIC	.0046923	.0025219	1.86	0.063	-.0002593	.009644
_cons	-.0286129	.0021136	-13.54	0.000	-.0327629	-.0244629

VAR 99% – Bottom half of ESGperformance

```
. reg Var99 Year2018 ESG_BotHalf Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
				F(10, 677)	=	17.95
Model	.083236552	10	.008323655	Prob > F	=	0.0000
Residual	.313978016	677	.000463778	R-squared	=	0.2096
				Adj R-squared	=	0.1979
Total	.397214568	687	.000578187	Root MSE	=	.02154

Var99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0064543	.0022077	-2.92	0.004	-.010789	-.0021196
ESG_BotHalf	.004699	.0025273	1.86	0.063	-.0002633	.0096612
Interaction	.0032999	.0035379	0.93	0.351	-.0036467	.0102465
MTBV	.0010479	.0002789	3.76	0.000	.0005004	.0015955
MV	2.00e-07	4.39e-08	4.55	0.000	1.14e-07	2.86e-07
Age	.0000322	.0000616	0.52	0.602	-.0000888	.0001532
DEratio	-.0001607	.0002278	-0.71	0.481	-.0006081	.0002866
PPEtotal	-.0323422	.0040982	-7.89	0.000	-.0403889	-.0242955
SalesgrowthCAGR	.0148805	.0043355	3.43	0.001	.0063679	.0233932
ROIC	.006511	.0035409	1.84	0.066	-.0004414	.0134634
_cons	-.0404229	.0029676	-13.62	0.000	-.0462497	-.0345961

ES 95% – Bottom half of ESGperformance

```
. reg ES95 Year2018 ESG_BotHalf Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
Model	.02880072	10	.002880072	F(10, 677)	=	21.36
Residual	.091299761	677	.000134859	Prob > F	=	0.0000
				R-squared	=	0.2398
				Adj R-squared	=	0.2286
Total	.120100482	687	.000174819	Root MSE	=	.01161

ES95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0073033	.0011905	-6.13	0.000	-.0096408	-.0049658
ESG_BotHalf	.0020169	.0013628	1.48	0.139	-.000659	.0046927
Interaction	.0030032	.0019078	1.57	0.116	-.0007427	.0067491
MTBV	.000598	.0001504	3.98	0.000	.0003027	.0008932
MV	9.49e-08	2.37e-08	4.01	0.000	4.84e-08	1.41e-07
Age	.000054	.0000332	1.63	0.105	-.0000112	.0001192
DEratio	.000101	.0001229	0.82	0.411	-.0001402	.0003422
PPEtotal	-.0165124	.0022099	-7.47	0.000	-.0208515	-.0121733
SalesgrowthCAGR	.006708	.0023379	2.87	0.004	.0021176	.0112984
ROIC	.0040966	.0019094	2.15	0.032	.0003475	.0078456
_cons	-.025352	.0016003	-15.84	0.000	-.028494	-.0222099

ES 99% – Bottom half of ESGperformance

```
. reg ES99 Year2018 ESG_BotHalf Interaction MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	688
Model	.115757269	10	.011575727	F(10, 677)	=	13.14
Residual	.596344756	677	.000880864	Prob > F	=	0.0000
				R-squared	=	0.1626
				Adj R-squared	=	0.1502
Total	.712102025	687	.001036539	Root MSE	=	.02968

ES99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Year2018	-.0068282	.0030425	-2.24	0.025	-.0128021	-.0008543
ESG_BotHalf	.0056429	.003483	1.62	0.106	-.0011958	.0124817
Interaction	.0023968	.0048758	0.49	0.623	-.0071768	.0119703
MTBV	.0013866	.0003843	3.61	0.000	.0006321	.0021412
MV	2.77e-07	6.06e-08	4.58	0.000	1.58e-07	3.96e-07
Age	.0000554	.0000849	0.65	0.515	-.0001114	.0002221
DEratio	-.0000756	.000314	-0.24	0.810	-.000692	.0005409
PPEtotal	-.0310757	.0056479	-5.50	0.000	-.0421653	-.0199861
SalesgrowthCAGR	.0209555	.005975	3.51	0.000	.0092237	.0326872
ROIC	.0109592	.0048799	2.25	0.025	.0013777	.0205407
_cons	-.0518486	.0040898	-12.68	0.000	-.0598788	-.0438184

Appendix 11 – ESG scores in relation to market value

ESG-score in relation to Market Value

ESG- SCORE	MARKET VALUE (BILLION EURO)
TOP QUARTILE (25%)	23,5
TOP HALF (50%)	16,7
COMPLETE SAMPLE (100%)	10,4

Appendix 12 – Announcement event using alternative event lengths

6 months

ALL CONTROL VARIABLES - 2014	(1)	(2)	(3)	(4)
DEP. VAR. =	VAR 95%	VAR 99%	ES 95%	ES 99%
AFFECTEDREGULATION	0.0427 (0.042)	0.4856 (0.652)	0.0508 (0.656)	0.5548 (0.516)
ANNOUNCEMENTNINEFFECT	-0.4019 (0.124)	-0.2541 (0.155)	-0.6528 (0.127)	-0.0534 (0.564)
AFFECTEDREGULATION X ANNOUNCEMENTNINEFFECT	0.7011 (0.762)	0.1556 (0.556)	0.6554 (0.564)	0.8554 (0.654)
MTBV	-0.7022 (0.791)	-0.6551 (0.456)	-0.9584 (0.564)	-0.8554 (0.789)
MV (€)	0.0700 (0.741)	0.0845 (0.656)	0.0855 (0.695)	0.0955 (0.968)
AGE	0.0501 (0.634)	0.6514 (0.546)	0.4556 (0.878)	0.9655 (0.564)
D/E	0.6002 (0.445)	0.6810 (0.546)	0.4895 (0.659)	0.955 (0.556)
PPE/TOTAL ASSETS	0.0528 (0.654)	-0.1655 (0.654)	-0.0985 (0.065)	-0.0542 (0.123)
SALESGROWTH	0.0785 (0.458)	0.0894 (0.546)	0.5642 (0.125)	0.456 (0.126)
ROIC	0.9587 (0.444)	0.5562 (0.312)	0.5526 (0.125)	0.654 (0.186)
FIXED EFFECTS	Country, Industry	Country, Industry	Country, Industry	Country, Industry
N (COMPANIES)	2172	2172	2172	2172
Adj. R ²	0.005	0.015	0.014	0.004

30 days

ALL CONTROL VARIABLES - 2014	(1)	(2)	(3)	(4)
DEP. VAR. =	VAR 95%	VAR 99%	ES 95%	ES 99%
AFFECTEDREGULATION	0.0027 (0.002)	0.4522 (0.002)	0.1265 (0.316)	0.1245 (0.003)
ANNOUNCEMENTNINEFFECT	-0.4554 (0.024)	-0.7655 (0.042)	-0.4568 (0.127)	-0.5684 (0.035)
AFFECTEDREGULATION X ANNOUNCEMENTNINEFFECT	0.4565 (0.362)	0.4588 (0.405)	0.5421 (0.222)	0.4562 (0.405)
MTBV	-0.4564 (0.691)	-0.4563 (0.412)	-0.2315 (0.245)	-0.2123 (0.265)
MV (€)	0.5654 (0.041)	0.7854 (0.033)	0.1235 (0.026)	0.4568 (0.033)
AGE	0.4455 (0.034)	0.4568 (0.073)	0.4538 (0.878)	0.4561 (0.884)
D/E	0.2124 (0.055)	0.2457 (0.005)	0.5321 (0.000)	0.2345 (0.003)
PPE/TOTAL ASSETS	-0.1244 (0.034)	-0.12354 (0.038)	-0.2135 (0.020)	-0.5462 (0.014)
SALESGROWTH	0.3215 (0.046)	0.3558 (0.055)	0.1235 (0.032)	0.1235 (0.015)
ROIC	0.4566 (0.245)	0.4567 (0.312)	0.2546 (0.035)	0.1235 (0.186)
FIXED EFFECTS	Country, Industry	Country, Industry	Country, Industry	Country, Industry
N (COMPANIES)	2172	2172	2172	2172
Adj. R ²	0.004	0.005	0.025	0.014

Appendix 13 – Descriptive control variables announcement event

Treatment sample averages

DiD announcement control variables	<i>Age</i>	<i>MTB</i>	<i>MV €</i>	<i>PPE/total ass</i>	<i>CAGR</i>	<i>Total debt/equity</i>	<i>ROIC</i>
Mean	17,4	2,1	3.550,2	0,2	0,0	0,8	0,1
Standard Error	0,3	0,1	310,2	0,0	0,0	0,1	0,0
Median	15,0	1,5	364,0	0,1	0,0	0,4	0,1
Standard Deviation	10,8	4,2	11.942,5	0,2	0,2	2,9	0,3
Sample Variance	116,4	17,9	35.827,6	0,1	0,0	8,4	0,1
Kurtosis	0,7	256,6	71,2	0,7	137,1	210,7	411,2
Skewness	1,0 -	6,2	7,3	1,2	7,9	6,8 -	8,7
Range	49,0	157,3	188.485,7	1,0	4,8	92,8	13,2
Minimum	- -	98,9	0,3	- -	1,0 -	25,6 -	8,1
Maximum	49,0	58,4	188.486,0	1,0	3,8	67,2	5,2
Sum	25.755,0	3.130,2	5.261.365,7	324,9	34,4	1.135,8	88,7
Count	1.482,0	1.482,0	1.482,0	1.482,0	1.482,0	1.482,0	1.482,0

Control variable averages

DiD announcement control variables	<i>Age</i>	<i>MTB</i>	<i>MV €</i>	<i>PPE/total ass</i>	<i>CAGR</i>	<i>Total debt/equity</i>	<i>ROIC</i>
Mean	14	2	225	0,2	0	1	0
Standard Error	0	0	24	0,0	0	0	0
Median	13	1	50	0,1	0	0	0
Standard Deviation	10	9	928	0,2	1	12	0
Sample Variance	97	84	860.351	0,1	2	134	0
Kurtosis	2	294	158	1,3	563	1.355	82
Skewness	1 -	13	12	1,5 -	10	36 -	4
Range	49	267	14.254	1,0	63	472	9
Minimum	- -	194	0	- -	40 -	36 -	4
Maximum	49	73	14.254	1,0	23	436	4
Count	1.482	1.482	1.482	1.482,0	1.482	1.482	1.482

Pearson correlation matrix

	<i>Age</i>	<i>MTB</i>	<i>MV €</i>	<i>PPE/total ass</i>	<i>CAGR</i>	<i>Total debt/equity</i>	<i>ROIC</i>
Age	1						
MTB	0,050934	1					
MV €	0,267618	0,095754	1				
PPE/total ass	0,007166	-0,07975	-0,01728	1			
CAGR	-0,06006	-0,03644	-0,02183	-0,05105	1		
Total debt/equity	-0,01325	0,147321	0,043562	-0,0599	-0,1587	1	
ROIC	0,073117	0,490595	0,047778	-0,02711	-0,03085	-0,04191	1

Dependent variable means Treatment sample:

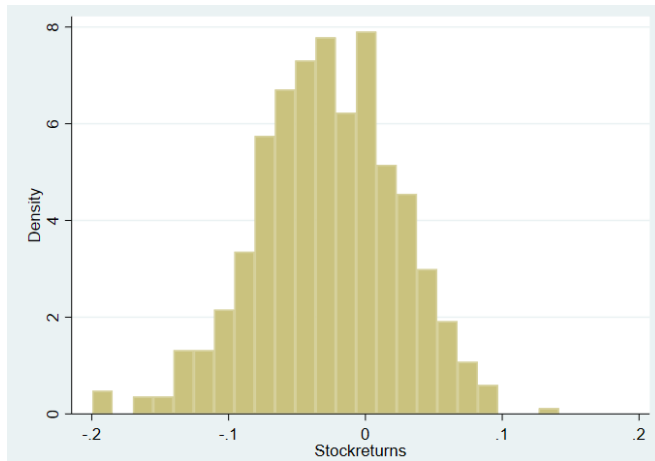
<i>Treatment sample</i>	<i>Var 95</i>	<i>Var 99</i>	<i>ES 95%</i>	<i>ES 99%</i>
Mean	- 0,038	- 0,054	- 0,033	- 0,060
Standard Error	0,001	0,001	0,001	0,001
Median	- 0,032	- 0,046	- 0,029	- 0,050
Standard Deviation	0,025	0,036	0,021	0,042
Sample Variance	0,001	0,001	0,000	0,002
Kurtosis	15,995	16,645	12,663	16,984
Skewness	- 2,937	- 2,987	- 2,372	- 3,063
Range	0,298	0,427	0,250	0,500
Minimum	- 0,298	- 0,427	- 0,250	- 0,500
Maximum	-	-	-	-
Sum	- 56,399	- 79,981	- 48,510	- 89,096
Count	1.482,000	1.482,000	1.482,000	1.482,000

Dependent variables means Control sample:

<i>Control sample</i>	<i>VAR95</i>	<i>VAR99</i>	<i>ES95</i>	<i>ES99</i>
Mean	-0,038	-0,055	-0,032	-0,059
Standard Error	0,001	0,001	0,001	0,001
Median	-0,033	-0,047	-0,029	-0,050
Standard Deviation	0,028	0,040	0,020	0,039
Sample Variance	0,001	0,002	0,000	0,002
Kurtosis	43,168	44,120	15,606	13,400
Skewness	-4,825	-4,883	-2,562	-2,854
Range	0,398	0,569	0,250	0,342
Minimum	-0,398	-0,569	-0,250	-0,342
Maximum	0,000	0,000	0,000	0,000
Sum	-57,006	-81,201	-46,809	-86,932
Count	1482,000	1482,000	1482,000	1482,000

Appendix 14 – Normality test of stock returns for announcement event

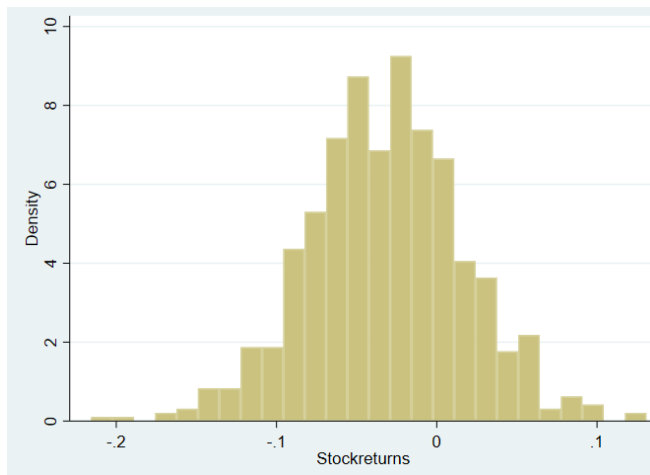
Pre announcement



Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Stockreturns	282,358	0.99878	0.830	-0.463	0.67847

Post announcement



Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Stockreturns	282,358	0.99759	1.132	0.304	0.38059

Appendix 15 – ESG model alternative division of sample additional event

VAR 95% – Bottom quartile of ESGperformance

```
. reg Var95 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	320
				F(10, 309)	=	15.02
Model	.032868354	10	.003286835	Prob > F	=	0.0000
Residual	.067618514	309	.00021883	R-squared	=	0.3271
				Adj R-squared	=	0.3053
Total	.100486867	319	.000315006	Root MSE	=	.01479

Var95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0052372	.0021722	-2.41	0.016	-.0095113	-.0009631
ESG	-.0028582	.0026857	-1.06	0.288	-.0081428	.0024264
InteractionTerm	-.0005577	.0037937	-0.15	0.883	-.0080225	.0069072
MTBV	.000317	.0002248	1.41	0.160	-.0001254	.0007594
MV	1.56e-07	3.72e-08	4.20	0.000	8.30e-08	2.29e-07
Age	.0001272	.0000604	2.11	0.036	8.39e-06	.000246
DEratio	.0000674	.0002217	0.30	0.761	-.0003688	.0005035
PPEtotal	-.0184495	.0041725	-4.42	0.000	-.0266596	-.0102394
SalesgrowthCAGR	.0117932	.0044688	2.64	0.009	.003	.0205864
ROIC	.0524355	.0066444	7.89	0.000	.0393616	.0655095
_cons	-.0315782	.0028563	-11.06	0.000	-.0371985	-.025958

VAR 99% – Bottom Quartile of ESGperformance

```
. reg Var99 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	320
				F(10, 309)	=	14.99
Model	.064909545	10	.006490954	Prob > F	=	0.0000
Residual	.133839777	309	.000433138	R-squared	=	0.3266
				Adj R-squared	=	0.3048
Total	.198749321	319	.000623039	Root MSE	=	.02081

Var99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0069391	.003056	-2.27	0.024	-.0129523	-.0009259
ESG	-.0040649	.0037785	-1.08	0.283	-.0114998	.00337
InteractionTerm	-.0007479	.0053374	-0.14	0.889	-.0112501	.0097542
MTBV	.0004171	.0003163	1.32	0.188	-.0002053	.0010395
MV	2.19e-07	5.23e-08	4.18	0.000	1.16e-07	3.22e-07
Age	.0001795	.000085	2.11	0.035	.0000123	.0003466
DEratio	.0001059	.0003118	0.34	0.734	-.0005077	.0007195
PPEtotal	-.0264146	.0058702	-4.50	0.000	-.0379653	-.0148639
SalesgrowthCAGR	.0163828	.0062872	2.61	0.010	.0040117	.0287538
ROIC	.0738709	.0093479	7.90	0.000	.0554773	.0922645
_cons	-.0445533	.0040185	-11.09	0.000	-.0524603	-.0366463

ES 95% – Bottom Quartile of ESGperformance

```
. reg ES95 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	320
				F(10, 309)	=	13.15
Model	.017588238	10	.001758824	Prob > F	=	0.0000
Residual	.04131367	309	.000133701	R-squared	=	0.2986
				Adj R-squared	=	0.2759
Total	.058901908	319	.000184645	Root MSE	=	.01156

ES95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0061843	.0016979	-3.64	0.000	-.0095252	-.0028435
ESG	-.0021848	.0020993	-1.04	0.299	-.0063156	.0019459
InteractionTerm	-.0014577	.0029654	-0.49	0.623	-.0072926	.0043772
MTBV	.0002295	.0001757	1.31	0.193	-.0001163	.0005753
MV	1.05e-07	2.91e-08	3.60	0.000	4.75e-08	1.62e-07
Age	.0001108	.0000472	2.35	0.020	.0000179	.0002036
DEratio	.0003105	.0001733	1.79	0.074	-.0000304	.0006514
PPEtotal	-.0124105	.0032614	-3.81	0.000	-.0188279	-.005993
SalesgrowthCAGR	.007888	.0034931	2.26	0.025	.0010148	.0147612
ROIC	.0355146	.0051936	6.84	0.000	.0252953	.0457339
_cons	-.0273277	.0022326	-12.24	0.000	-.0317207	-.0229346

.

ES 99% – Bottom Quartile of ESGperformance

```
. reg ES99 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	320
				F(10, 309)	=	10.45
Model	.082934359	10	.008293436	Prob > F	=	0.0000
Residual	.245284647	309	.000793801	R-squared	=	0.2527
				Adj R-squared	=	0.2285
Total	.328219006	319	.0010289	Root MSE	=	.02817

ES99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.009399	.0041371	-2.27	0.024	-.0175395	-.0012586
ESG	-.0067238	.0051152	-1.31	0.190	-.0167889	.0033413
InteractionTerm	.0015416	.0072255	0.21	0.831	-.0126758	.0157591
MTBV	.0006236	.0004282	1.46	0.146	-.000219	.0014661
MV	3.01e-07	7.08e-08	4.25	0.000	1.61e-07	4.40e-07
Age	.0002281	.000115	1.98	0.048	1.76e-06	.0004543
DEratio	.0003182	.0004222	0.75	0.452	-.0005125	.0011488
PPEtotal	-.0243649	.0079469	-3.07	0.002	-.0400018	-.008728
SalesgrowthCAGR	.018197	.0085113	2.14	0.033	.0014495	.0349445
ROIC	.0783482	.0126548	6.19	0.000	.0534476	.1032487
_cons	-.0546492	.00544	-10.05	0.000	-.0653534	-.043945

VAR 95% – Top half of ESGperformance

```
. reg Var95 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	321
				F(10, 310)	=	14.40
Model	.032126879	10	.003212688	Prob > F	=	0.0000
Residual	.069147795	310	.000223057	R-squared	=	0.3172
				Adj R-squared	=	0.2952
Total	.101274673	320	.000316483	Root MSE	=	.01494

Var95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0065845	.0025084	-2.63	0.009	-.0115201	-.001649
ESG	-.0006715	.0024104	-0.28	0.781	-.0054142	.0040712
InteractionTerm	.0021803	.0033787	0.65	0.519	-.0044678	.0088283
MTBV	.0003112	.0002269	1.37	0.171	-.0001354	.0007577
MV	1.63e-07	3.80e-08	4.30	0.000	8.86e-08	2.38e-07
Age	.0001143	.0000606	1.89	0.060	-4.98e-06	.0002336
DEratio	.000082	.0002228	0.37	0.713	-.0003563	.0005204
PPEtotal	-.019061	.0041992	-4.54	0.000	-.0273235	-.0107984
SalesgrowthCAGR	.0116972	.0045146	2.59	0.010	.002814	.0205803
ROIC	.0520323	.0067058	7.76	0.000	.0388376	.065227
_cons	-.0313919	.002873	-10.93	0.000	-.0370449	-.025739

VAR 99% – Top Half of ESGperformance

```
. reg Var99 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	321
				F(10, 310)	=	14.36
Model	.063415924	10	.006341592	Prob > F	=	0.0000
Residual	.136900808	310	.000441616	R-squared	=	0.3166
				Adj R-squared	=	0.2945
Total	.200316732	320	.00062599	Root MSE	=	.02101

Var99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0087698	.0035294	-2.48	0.013	-.0157145	-.0018252
ESG	-.0008242	.0033915	-0.24	0.808	-.0074975	.0058491
InteractionTerm	.0029467	.004754	0.62	0.536	-.0064075	.0123009
MTBV	.0004084	.0003193	1.28	0.202	-.0002199	.0010367
MV	2.29e-07	5.34e-08	4.28	0.000	1.23e-07	3.34e-07
Age	.0001613	.0000853	1.89	0.060	-6.57e-06	.0003291
DEratio	.0001276	.0003135	0.41	0.684	-.0004893	.0007444
PPEtotal	-.0272752	.0059086	-4.62	0.000	-.0389012	-.0156493
SalesgrowthCAGR	.0162282	.0063524	2.55	0.011	.003729	.0287274
ROIC	.0733115	.0094355	7.77	0.000	.0547458	.0918773
_cons	-.0443527	.0040424	-10.97	0.000	-.0523068	-.0363986

ES 95% – Top Half of ESGperformance

```
. reg ES95 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	321
				F(10, 310)	=	12.44
Model	.017050623	10	.001705062	Prob > F	=	0.0000
Residual	.042496339	310	.000137085	R-squared	=	0.2863
				Adj R-squared	=	0.2633
Total	.059546962	320	.000186084	Root MSE	=	.01171

ES95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0079307	.0019664	-4.03	0.000	-.0117999	-.0040615
ESG	-.0013849	.0018896	-0.73	0.464	-.005103	.0023331
InteractionTerm	.0026014	.0026487	0.98	0.327	-.0026103	.0078131
MTBV	.0002261	.0001779	1.27	0.205	-.000124	.0005762
MV	1.14e-07	2.98e-08	3.83	0.000	5.53e-08	1.72e-07
Age	.0000997	.0000475	2.10	0.037	6.23e-06	.0001933
DERatio	.0003168	.0001747	1.81	0.071	-.0000269	.0006604
PPEtotal	-.0127585	.003292	-3.88	0.000	-.0192359	-.0062811
SalesgrowthCAGR	.0079529	.0035392	2.25	0.025	.0009889	.0149168
ROIC	.0351888	.005257	6.69	0.000	.0248449	.0455328
_cons	-.0268244	.0022523	-11.91	0.000	-.031256	-.0223927

ES 99% – Top Half of ESGperformance

```
. reg ES99 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	321
				F(10, 310)	=	9.97
Model	.080433899	10	.00804339	Prob > F	=	0.0000
Residual	.249982282	310	.000806394	R-squared	=	0.2434
				Adj R-squared	=	0.2190
Total	.33041618	320	.001032551	Root MSE	=	.0284

ES99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0116736	.0047693	-2.45	0.015	-.0210579	-.0022893
ESG	-.0037971	.004583	-0.83	0.408	-.0128148	.0052205
InteractionTerm	.0051927	.0064241	0.81	0.420	-.0074476	.017833
MTBV	.0006267	.0004315	1.45	0.147	-.0002223	.0014757
MV	3.24e-07	7.22e-08	4.48	0.000	1.82e-07	4.66e-07
Age	.0002076	.0001153	1.80	0.073	-.0000192	.0004345
DERatio	.0003392	.0004236	0.80	0.424	-.0004944	.0011727
PPEtotal	-.0253936	.0079842	-3.18	0.002	-.0411037	-.0096835
SalesgrowthCAGR	.0186162	.0085839	2.17	0.031	.001726	.0355063
ROIC	.0775955	.0127502	6.09	0.000	.0525076	.1026834
_cons	-.0538818	.0054626	-9.86	0.000	-.0646302	-.0431334

VAR 95% – Bottom half of ESGperformance

```
. reg Var95 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	320
				F(10, 309)	=	14.69
Model	.032379727	10	.003237973	Prob > F	=	0.0000
Residual	.06810714	309	.000220411	R-squared	=	0.3222
				Adj R-squared	=	0.3003
Total	.100486867	319	.000315006	Root MSE	=	.01485

Var95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0050752	.0028126	-1.80	0.072	-.0106095	.000459
ESG	-.0007811	.0025175	-0.31	0.757	-.0057347	.0041725
InteractionTerm	-.0006534	.0034394	-0.19	0.849	-.007421	.0061141
MTBV	.0003276	.0002256	1.45	0.147	-.0001162	.0007715
MV	1.61e-07	3.80e-08	4.24	0.000	8.65e-08	2.36e-07
Age	.0001286	.0000606	2.12	0.035	9.27e-06	.0002479
DERatio	.0001089	.000222	0.49	0.624	-.000328	.0005457
PPEtotal	-.0180759	.0041995	-4.30	0.000	-.0263391	-.0098127
SalesgrowthCAGR	.0120538	.0044974	2.68	0.008	.0032044	.0209033
ROIC	.0527905	.0066781	7.90	0.000	.0396502	.0659309
_cons	-.0322238	.0031815	-10.13	0.000	-.0384838	-.0259637

VAR 99% – Bottom half of ESGperformance

```
. reg Var99 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	320
				F(10, 309)	=	14.66
Model	.063938637	10	.006393864	Prob > F	=	0.0000
Residual	.134810684	309	.000436281	R-squared	=	0.3217
				Adj R-squared	=	0.2998
Total	.198749321	319	.000623039	Root MSE	=	.02089

Var99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0067785	.0039571	-1.71	0.088	-.0145647	.0010077
ESG	-.001216	.0035419	-0.34	0.732	-.0081853	.0057532
InteractionTerm	-.0008015	.0048389	-0.17	0.869	-.0103229	.0087199
MTBV	.0004321	.0003174	1.36	0.174	-.0001924	.0010565
MV	2.26e-07	5.35e-08	4.22	0.000	1.20e-07	3.31e-07
Age	.0001815	.0000853	2.13	0.034	.0000137	.0003493
DERatio	.0001656	.0003123	0.53	0.596	-.000449	.0007802
PPEtotal	-.0258788	.0059083	-4.38	0.000	-.0375044	-.0142531
SalesgrowthCAGR	.0167337	.0063274	2.64	0.009	.0042834	.0291841
ROIC	.0743882	.0093955	7.92	0.000	.055901	.0928755
_cons	-.0454009	.004476	-10.14	0.000	-.0542082	-.0365935

ES 95% – Bottom half of ESGperformance

```
. reg ES95 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	320
				F(10, 309)	=	12.66
Model	.017121522	10	.001712152	Prob > F	=	0.0000
Residual	.041780386	309	.000135212	R-squared	=	0.2907
				Adj R-squared	=	0.2677
Total	.058901908	319	.000184645	Root MSE	=	.01163

ES95	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0063002	.0022029	-2.86	0.005	-.0106348	-.0019656
ESG	-.0006258	.0019718	-0.32	0.751	-.0045056	.003254
InteractionTerm	-.0005486	.0026938	-0.20	0.839	-.0058492	.004752
MTBV	.0002372	.0001767	1.34	0.180	-.0001105	.0005848
MV	1.10e-07	2.98e-08	3.71	0.000	5.18e-08	1.69e-07
Age	.0001118	.0000475	2.36	0.019	.0000184	.0002053
DEratio	.0003445	.0001739	1.98	0.048	2.36e-06	.0006866
PPEtotal	-.0118951	.0032892	-3.62	0.000	-.0183671	-.005423
SalesgrowthCAGR	.0081291	.0035225	2.31	0.022	.001198	.0150602
ROIC	.0358913	.0052305	6.86	0.000	.0255994	.0461832
_cons	-.0279107	.0024918	-11.20	0.000	-.0328138	-.0230077

ES 99% – Bottom half of ESGperformance

```
. reg ES99 RegulationInEffect ESG InteractionTerm MTBV MV Age DEratio PPEtotal SalesgrowthCAGR ROIC
```

Source	SS	df	MS	Number of obs	=	320
				F(10, 309)	=	10.12
Model	.080959229	10	.008095923	Prob > F	=	0.0000
Residual	.247259777	309	.000800193	R-squared	=	0.2467
				Adj R-squared	=	0.2223
Total	.328219006	319	.0010289	Root MSE	=	.02829

ES99	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
RegulationInEffect	-.0070766	.0053591	-1.32	0.188	-.0176214	.0034683
ESG	.0016698	.0047968	0.35	0.728	-.0077686	.0111083
InteractionTerm	-.0029192	.0065533	-0.45	0.656	-.015814	.0099756
MTBV	.000648	.0004298	1.51	0.133	-.0001977	.0014937
MV	3.22e-07	7.24e-08	4.45	0.000	1.80e-07	4.65e-07
Age	.0002298	.0001155	1.99	0.048	2.49e-06	.0004571
DEratio	.0003784	.000423	0.89	0.372	-.0004539	.0012107
PPEtotal	-.0238493	.0080016	-2.98	0.003	-.0395938	-.0081047
SalesgrowthCAGR	.0192996	.0085692	2.25	0.025	.0024381	.036161
ROIC	.0786995	.0127243	6.18	0.000	.0536622	.1037368
_cons	-.058416	.0060619	-9.64	0.000	-.0703438	-.0464882

Appendix 16 – Descriptive statistics - ESG model announcement

Control variables averages:

<i>ESG model announcement</i>	<i>MTB</i>	<i>MV €</i>	<i>PPE/total ass</i>	<i>CAGR</i>	<i>Total debt/equity</i>	<i>ROIC</i>
Mean	3,32	12150,35	0,23	0,02	1,99	0,08
Standard Error	0,39	1805,84	0,02	0,01	0,97	0,01
Median	2,33	4845,94	0,13	0,02	0,52	0,09
Standard Deviation	4,97	22842,32	0,24	0,14	12,28	0,10
Sample Variance	24,68	521771632,18	0,06	0,02	150,81	0,01
Kurtosis	95,88	26,26	0,46	32,34	153,31	2,92
Skewness	8,85	4,51	1,24	-0,55	12,26	-0,23
Range	58,36	188410,61	0,87	1,97	154,75	0,72
Minimum	0,02	75,39	0,00	-1,00	0,00	-0,28
Maximum	58,38	188486,00	0,87	0,97	154,75	0,44
Sum	530,80	1944056,33	36,21	3,23	318,56	13,31
Count	160,00	160,00	160,00	160,00	160,00	160,00

Dependent variable averages

<i>ESG model announcement</i>	<i>Var 95</i>	<i>Var 99</i>	<i>ES 95%</i>	<i>ES 99%</i>
Mean	-0,027	-0,038	-0,025	-0,042
Standard Error	0,001	0,002	0,001	0,001
Median	-0,024	-0,035	-0,023	-0,038
Mode	-0,020	-0,029	-0,020	-0,036
Standard Deviation	0,014	0,019	0,011	0,019
Sample Variance	0,000	0,000	0,000	0,000
Kurtosis	25,857	26,774	22,037	8,663
Skewness	-4,215	-4,280	-3,801	-2,557
Range	0,123	0,174	0,099	0,127
Minimum	-0,133	-0,189	-0,111	-0,143
Maximum	-0,010	-0,015	-0,012	-0,016
Count	160,000	160,000	160,000	160,000

Pearson correlation matrix for control variables

<i>Control variables</i>	<i>MTB</i>	<i>MV €</i>	<i>PPE/total ass</i>	<i>CAGR</i>	<i>Total debt/equity</i>	<i>ROIC</i>
MTB	1					
MV €	0,042082	1				
PPE/total ass	-0,13611	-0,10246	1			
CAGR	-0,01111	0,017132	-0,01171	1		
debt/equity	0,892209	-0,03949	-0,04817	-0,04851	1	
ROIC	0,109452	0,106742	-0,21576	0,211544	-0,13933	1