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Silence in Market Reaction to Annual Reports

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Silence in Market Reaction to Annual Reports

by

Magdalena Kochanowicz

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To the memory of my Mother

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In concluding this study, I have found both peace and freedom. These feelings serve as my rewards, becoming more gratifying with every memory of the effort required to reach the point where I submit this thesis today.

14th September 2022

Author's Declaration

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Doctoral College Quality Sub-Committee.

Work submitted for this research degree at the University of Plymouth has not formed part of any other degree either at the University of Plymouth or at another establishment.

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Signed: *Magdalena Kochanowicz*

Date: 12/04/2024

Silence in Market Reaction to Annual Reports

Magdalena Kochanowicz

Abstract

Research problem - the literature suggests that the market either does not react or reacts with a delay to the content of annual reports, concerning notion given their importance for investment decisions due to the value relevance of the information they convey. According to the Efficient Market Hypothesis, the market should exhibit a prompt reaction to their release.

Rationale - this study aims to uncover the underlying reasons for investors' lack of response to annual report filings. It predicts that the reaction depends, among other factors, on the release of preliminary disclosures of financial results, the method of distribution of annual reports and the length of an annual disclosure.

The study examines the market reaction to FTSE100 companies' annual reports from 2006 to 2016. It also considers investor response to preliminary statements of annual. Specifically, it investigates whether investors react more promptly to preliminary disclosures compared to the more detailed annual reports, and how the absence of such preliminary reports might shift attention and reaction time to the information content of annual reports. Furthermore, the study examines changes in the market reaction associated with the shift from a paper-based submission system to the electronic National Storage Mechanism (NSM). This comparison aims to assess whether technological advancements in the dissemination method of corporate disclosure have improved market efficiency and accelerated investors' response time. Lastly, the study investigates the effect of report length on the market, specifically

looking at whether the market reacts differently to lengthier reports compared to those that are more concise.

Research methods - to test the efficiency of market reactions, the researcher employs a short-run event study methodology to assess the impact of filings of annual reports on companies' returns. The study determines whether the filing events captured abnormal returns compared to what would be expected if no filings occurred. If such abnormal returns are observed, it is concluded that the event impacted the companies' returns and that the market reacted efficiently to these filings. The event study, applied to all five enquiries, is followed by further tests on the impact of lengthy reporting on the market reaction using regression analysis. This additional analysis allows for the validation of findings by accounting for time, industry trends, and companies' specific characteristics. The model is tested for potential statistical issues, including non-stationarity, heteroscedasticity, multicollinearity and endogeneity, to ensure the reliability and consistency of the coefficient estimates.

Main results – the study's results are mixed. It reveals no immediate abnormal reaction to the information content of annual reports. In contrast, the market shows a strong response to preliminary statements of annual reports. Additionally, contrary to the prediction, there is no evidence of the market responding to the content of annual reports in the absence of preliminary statements. Regarding dissemination methods, an abnormal price change is noted, but only in the first year following the National Storage Mechanism (NSM) adoption. Lastly, the study finds evidence supporting the impact of reporting length; investors tend to discount lengthy annual reports while reacting positively to more succinct ones.

Conclusion - The study's findings challenge the Efficient Market Hypothesis by showing a lack of market reactions to the information content of annual reports. This suggests that policies should emphasise the importance of report readability and simplicity to prompt quicker and more efficient investor responses. Specifically, the market tends to react negatively to lengthy reports, while succinct reports cause a positive response, indicating a policy need for guiding companies towards more concise reporting, including setting standards for report length. In the final section[3], the study points out the potential of artificial intelligence AI and machine learning in improving market efficiency by condensing reports, processing complex information effectively and analysing underlying sentiments and patterns in financial reporting, which can be important for detecting anomalies or obfuscation. This can aid in developing more informed and timely trading strategies, especially when the market underreacts or reacts with a delay to new information. Overall, the study advocates for policy changes that promote report clarity, technological advancement for better access to corporate disclosures and the use of AI to enhance market efficiency and investor protection.

[3] Discussion with concluding remarks (section 5.3)

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CHAPTER 1: INTRODUCTION

1.1 Introduction to enquires of the study

If the market does not react to the wealth of information content of annual reports, then that is a puzzling matter.

The Efficient Market Hypothesis (EMH) states that markets are 'informationally efficient', meaning that security prices incorporate all publicly available and relevant information instantaneously (Fama, 1965; Grossman, 1995; Mitra and Mitra, 2011). However, evidence suggests that stock prices do not always adjust efficiently to all information (Li, 2012), due to the high costs and time needed to acquire it (Grossman and Stiglitz, 1980; Blankespoor, 2019). Furthermore, investors' ability to process vast amounts of information is impaired, which is further aggravated by the environment of more information, leading to 'information overload' (Li, 2012). This overload is problematic as it weakens investors' effective decision-making and delays their response time (Li, 2012). In the past decade, companies have released longer corporate disclosures (Li, 2008; Dyer, Lang and Stice-Lawrence, 2016). The high costs, economic and cognitive, of acquiring an excessive quantity of information, and the time needed to process it, could explain why investors underreact (Lee, 2012), or react with a delay, to the information content of newly released annual reports (Cready and Mynatt, 1991; Qi, Wu and Haw, 2000; You and Zhang, 2009). Therefore, in my first enquiry, I follow previous studies and once again test the market's reaction to filings of annual reports. Easton and Zmijewski noted as early as 1993 that the information content of annual reports is first communicated to the market in preliminary announcements and statements, several weeks prior to the annual report's release. These announcements, however, do not convey all value-relevant information. Often, they are only a snapshot of a company's performance (Li and Ramesh, 2009). This two-stage release of information provides us with the opportunity to test the initial market reaction to the preliminary information, and then compare it with the reaction to the latter, but complete, annual information.

In the second enquiry, attention shifts to technology. With the adoption of the National Storage Mechanism (NSM) in 2010, the UK's electronic information dissemination system (Blake, 2010) enabled market participants to access and process publicly available information more efficiently. Before the NSM, investors and analysts had to request accounting information from the FSA[4] Document Viewing Facility (now FCA), a paper filing system. Alternatively, they could access it via companies' websites or purchase it from intermediaries (Complyport, 2010). These varied points of information acquisition caused delays in disseminating annual reports (Asthana and Balsam, 2001), often resulting in a considerable lag between the filing day and the day when a report became publicly accessible (Qi, Wu and Haw, 2000). Currently, however, the NSM's online filing system provides almost immediate, free access to corporate filings for all market participants, marking a substantial advancement over the prior manual method. This immediate access is anticipated to reduce the time and costs associated with extracting information, thereby accelerating investor response time. Additionally, the format of financial information is now uniform and machine-readable[5], which significantly reduces processing costs. Research suggests that technological

[4] The FSA (Financial Services Authority) was replaced by the FCA (Financial Conduct Authority) in 2013.
[5] FCA requirement.

advancements, like those represented by the NSM, strongly contribute to greater market efficiency. This improvement is evident through faster and more widespread access to information, leading to quicker integration of corporate information into asset prices, higher market liquidity and reduced mispricing (Gao and Huang, 2020; Bharati, Crain and Jategaonkar, 2019). Therefore, in my next enquiry, I argue that the reaction to filings of annual reports is faster following the NSM's adoption.

My third enquiry builds upon the first one, attempting to explain why the market does not efficiently respond to the information content of annual reports. One potential answer is the readability of annual reports. These documents are known to be lengthy and complex (Schroeder, 2002; Li, 2008; Dyer, Lang and Lawrence, 2016), thus requiring higher cognitive effort to process them. Studies have shown that longer disclosures reduce investors' ability to assimilate information (Li, 2008 and 2012; Bloomfield, 2002), leading to the market not fully incorporating the content of information into a stock price (You and Zhang, 2009). Furthermore, complex and lengthy disclosures add to processing costs (Blankespoor, 2019). When the costs outweigh the benefits, trading activity is reduced (Bloomfield, 2002; Miller, 2010; D'Augusta, De Vito and Grossetti, 2023). However, if market participants decide to bear the higher costs (cognitive and economic), their response time is likely to be delayed (Cready and Mynatt, 1991; Qi, Wu and Haw, 2000; You and Zhang, 2009). But what if an investor discounts this type of reporting altogether? If, for example, he/she perceives a large amount of text as a sign of bad news, or even managerial manipulation of the company's market prices? (Bloomfield, 2002 and 2008; Li, 2008; DeHaan, Song, Xie and Zhu, 2021). In this case, the market's reaction should be negative. Those high acquisition and processing costs, combined with potential managerial manipulation, are likely to have a detrimental effect on the price change around filing dates. Therefore, my final enquiry assumes that the initial market response to lengthy annual reports is delayed or negative.

The focus of the study is the British market; there are three main reasons behind the choice of that market. Firstly, the market reaction to annual reports filings of companies listed on the British market is under-researched. Most of the empirical studies around the topic are US-centric. Therefore, examining the reaction efficiency of the British market is going to broaden our understanding of the price relevance of the information content of annual disclosures, whether 10-K reports (U.S.) or annual reports (U.K.). Secondly, to the researcher's knowledge, there has been no work done on the effect of a change in the information dissemination method on the British market. We know that EDGAR, the US equivalent filing method, has improved market efficiency in terms of the reaction time to releases of corporate disclosures (Asthana and Balsam, 2001; Griffin, 2003; Li and Ramesh, 2009; Gao and Huang, 2020; Gibbons, Iliev and Kalodimos, 2021; Goldstein, Yang and Zuo, 2023). On the other hand, we do not know whether the NSM had a similar efficiency effect on the British market. Thirdly, the content of annual reports in the U.K differs from that of 10-K reports in the U.S. There is a variation in risk and uncertainty related disclosure, use of graphs, and topical emphasis (Downar, 2021; Ernstberger, Reichelstein, Schwenen and Zaklan, 2021; Chircop, Gagnon and Young, 2022). These differences could be attributed to regulatory and cultural distinctions between the U.S. and the U.K. (Beattie, McInnes and Pierpoint, 2008). According to Chircop *et al.* (2022), in comparison to 10-K reports, management has more control and freedom over the presentation and the narrative in annual reports. Overall, the British sample provides a different setting for efficiency tests compared to the U.S. sample. Therefore, those structural and textual disparities between the 10-K reports and the annual reports could be reflected in different market responses to the information content of those annual disclosures.

Research problem

The literature suggests that the market does not respond to the information content of annual reports (Stice, 1991; Cready and Mynatt, 1991; Chircop *et al.,* 2022; Alduais, Almasria, Samara and Masadeh, 2022) or, if it does, the response is delayed (You and Zhang, 2009). This is a concerning finding, as we know annual reports are a key source of information for investment decisions (Gniewosz, 1990; Chircop *et al.,* 2022), due to the value relevance of the information they convey (Stice, 1991; Roychowdhury, Shroff and Verdi, 2019; Rahman and Oliver, 2022). Thus, the market should react strongly and quickly to their releases. This study, therefore, seeks to identify the underlying reasons for investors' lack of response to annual report filings. I argue that the reaction, amongst other factors, depends on the release of preliminary disclosures of financial results, the method of distribution of annual reports and the complexity and length of an annual disclosure. The method and length are related: on the one hand, the adoption of an electronic filing system should improve information dissemination time, which should increase market efficiency; on the other hand, if technology encourages higher informational complexity, then more complex and lengthier reports are submitted, which could lead to investors' underreaction, and, or delayed response, thus weaker market efficiency.

1.2 Research gaps

Based on the reviewed literature, I identified five gaps which have provided a research opportunity for this study.

Firstly, literature cannot agree whether the market is responsive or not to the information content of annual reports. Earlier studies, from the 1990s, documented a lack of investors' reaction (Stice, 1991; Cready and Mynatt, 1991; Easton and Zmijewski, 1993). This, however, was later dismissed. A new wave of researchers, in the 2000s, began reporting a significant price change (Qi, Wu and Haw, 2000; Asthana and Balsam, 2001; Griffin, 2003; Li and Ramesh, 2009; You and Zhang, 2009). More recently, however, we see, again, no reaction, or if any then statistically insignificant (Alduais, Almasria, Samara and Masadeh, 2023; Chircop *et al.,* 2022). Therefore, this enquiry will test, once more, investors' response to annual reports, but this time, the British market, proxied by the FTSE100[6], will be under investigation[7].

Secondly, abnormal price change is documented around preliminary earnings announcements (Easton and Zmijewski, 1993; De George, Phan and Stoumbos, 2019) and financial press commentaries on earnings (Stice,1991). Yet, there is little knowledge about the price change around releases of preliminary statements of annual reports.

Thirdly, the preliminary statements of annual reports are a voluntary disclosure (Li and Ramesh, 2009). In their absence, the market is not fully informed about the company's key financials until the release of annul reports. In this instance, investors should be responsive to the information content of annual reports. Surprisingly, we do not know how the U.K. market reacts when preliminary statements are not disclosed.

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[6] A justification of the FTSE100 choice is included in the 'research approach' section 1.4.

[7] A rationale for investigating the British market is presented in the above section 1.1. ("*The focus of the study….*")

Further, to the researcher's knowledge, there is no study which has examined the effect of the NSM adoption, the online filing system, on the British market. EDGAR, the U.S. electronic submission platform, equivalent of the NSM, has improved information accessibility, which increased efficiency in the market (Asthana and Balsam, 2001; Griffin, 2003; Li and Ramesh, 2009; Gao and Huang, 2020; Gibbons, Iliev and Kalodimos, 2021; Goldstein, Yang and Zuo, 2023). Surprisingly, there is no knowledge, in that respect, about the NSM.

Finally, prior studies examined the effect of complex reporting on the cost of capital (Athanasakou, Eugster, Schleicher and Walker, 2020), trading volume (Miller, 2010; D'Augusta, *et al.,* 2023), long-term abnormal returns (Li, 2008) and abnormal returns volatility (Loughran and McDonald, 2010). However, the impact of the excessive length of annual reports on the immediate price reaction remains unclear. To the researcher's knowledge, only You and Zhang (2009), briefly covered the issue. This study, therefore, is an extension of You and Zhang, however, of a different time frame and for a different market.

1.3 Research aim, objectives and research questions

1.3.1 Research aim

The current understanding of the market reaction to the information content of annual reports is unsatisfactory. This is mainly due to counterintuitive findings seen in the empirical literature. Furthermore, there has been a limited examination of the reaction on the British market. Therefore, the aim of this research is to investigate the response of the British market to filings of annual reports. The influence of three factors on the reaction: the two-stage release of the annual report information, the dissemination method of the disclosure and the length of annual reports, is examined to determine whether these factors change investors' response to the annual filings.

1.3.2 Research objectives

There are three objectives of the study:

(1) To investigate the U.K. market reaction to the filings of annual reports.

(2) To assess whether a change in the method of dissemination of annual reports had an impact on the market reaction.

(3) To examine whether the length factor of annual reports influences the reaction of the market to their filings.

1.3.3 Research questions

To address the research objectives, I pose the following questions:

(1) Is the British market responsive to the information content of annual reports ?

(2) Does the market react to preliminary statements of annual reports?

(3) In the absence of the preliminary statements of annual reports, does the market react to the information content of the final and full annual reports?

(4) Does the filing method, manual system vs electronic platform, make any difference to the British market? Could this technology improve efficiency of the reaction? Is the NSM as effective as EDGAR?

(5) Is more better than less, or less better than more? In other words, does the length of the annual reporting have an impact, in terms of speed and direction, on the market reaction?

1.4 Research approach

To address the research questions, I undertake an empirical study in which:

(1) I examine the immediate market reaction to annual reports of companies listed on the FTSE100 and provide new evidence based on reports filed between 2006 and 2016.

The FTSE100 index is chosen as a proxy for the British market because it is the most frequently traded stock index in the U.K., and thus has the strongest liquidity compared to other U.K. indices, e.g. the FTSE 350 or the FTSE All-Share Index. This is important from the efficiency perspective. Prices of highly liquid stocks tend to incorporate new information more completely and promptly (Fama, 1965; Machmuddah, Utomo, Suhartono, Ali and Ghulam, 2020). Furthermore, the FTSE100 index has the highest market capitalisation, so it is the most commonly used U.K. stock market indicator (Ftserussell, 2017; Kucera and Dvorakova, 2023; Osman, Galariotis, Guesmi, Hamdi and Naoui, 2023).

The market reaction is examined using the event study methodology[8]. This method assesses the impact of the annual report filing on the return of a company's stock (Kolari, Pape and Pynnonen, 2018). If the event captured an abnormal return in comparison to a normal return, or a return which would be expected if the event did not happen, then we conclude that the event had an impact on the stock return. In other words, the market reacted efficiently to the filing. This also indicates that the event of the filing was price sensitive, containing new and unexpected information (El Ghoul, Guedhami, Mansi and Sy, 2023).

The market reaction is determined based on stock prices, which are used to calculate daily returns on the security. These actual returns are assessed for their abnormality against normal returns, which are returns of the market (Martinez-Blasco, Serrano, Prior and Cuadros, 2023). In our case, the FTSE100 index is the proxy for the British market. The reaction, the abnormality in the price movement, is captured in a short event window around the filing dates of annual reports. Here, I employ several event windows to examine the timing of the reaction, i.e. the behaviour of the market. The longest window is 41 days (- 20; 20) and the shortest is two days (0,1). The T- test is applied to measure the statistical significance of the observed cumulative abnormal returns for the sample of 100 companies over the ten-year time period (Serra, 2004). The event study methodology is explained in detail in chapter 3, section 3.3.

(2) I analyse the price change around preliminary statements of annual results.

The same method, the event study, is applied as in the first hypothesis, but this time for dates of filings of preliminary statements of annual reports. The process and analysis are the same as above.

[8] Univariate analysis

(3) I test the market reaction to annual reports if no preliminary statements of annual results are made.

In order to examine the information content of annual reports in the absence of preliminary reports (PRs), I partition the sample into four groups. The first sample comprises annual reports which are not preceded by PRs, while the remaining three samples contain annual reports and PRs of different combinations, depending on the dates of the PR releases. This is a comparable method to the one used by Easton and Zmijewski (1993) and Li and Ramesh (2009). Section 3.2 explains the sample in detail. Then, I run the event study on these four partitions.

(4) I compare the response of the market to filings that were made during the old paper submission system with filings after the adoption of the new electronic platform, the NSM. As in the previous enquiries, I run the event study. I examine two main sets of data (two samples).

Sample one: (a) filings between 2006 and 2010, which are the pre-NSM annual reports; (b) filings between 2011 – 2017, the NSM reports. Then, based on the event study, I compare abnormality in the price change between these two groups.

Sample two: (a) first year filers of the NSM, from the 2011; (b) last year filers of the traditional system, from the 2010. The same as above, abnormal returns, determined based on the event study, are compared and differences in mean returns between samples identified.

There is also a sample three, which is a selection of filings made during the financial crisis (2008 – 2010). This is an additional test; its results and analysis are presented in Appendix 2.

(5) I explore the effect of the length of reporting on the market. Specifically, I investigate whether the market reacts differently in the case of longer reports, compared to those that are more concise.

The study sample is split into two groups based on the length of annual reports. One group is composed of reports with a high word count, and the other group is composed of reports with a low word count. An event study is then conducted for both samples and the results are compared.

In addition to the univariate analysis (event study) conducted for the fifth enquiry, two supplementary multivariate tests are implemented. The first regression aims to assess whether the length of annual reports can predict market reaction. The dependent variable, Cumulative Average Abnormal Returns (CAAR) for the time window (-1,1), is regressed against the word count of annual reports and five control variables. The role of controls is to show whether factors other than the filings, specifically determinants of returns, influence the market reaction. The main estimation method used is the Ordinary Least Squares (OLS) regression, which is subsequently compared with alternative models based on different standard error specifications – five different fixed effects models and a double cluster model have been employed. These models control for cross-sectional dependence, time-variant unobservable effects, and industry-specific effects. Additionally, to determine if the OLS model is unaffected by endogeneity, a non-parametric estimator, the Two-Stage Least Squares (2SLS) model, is also applied. This approach (employing different specification models) allows for a comparison of the magnitude and signs of the coefficient estimates across various estimation strategies.

The second regression focuses on exploring the relationship between the length of annual reports and a company's financial performance, as represented by ROA and net income. This analysis serves as a complement to the first regression model and is based on the association found in the literature review, particularly concerning the Management Obfuscation Theory (Li, 2008; Hassan, Abu Abbas and Garas, 2019; DeHaan *et al.,* 2021; Nadeem, 2022). In model 2, control variables, which are identified in the literature as determinants of reporting length, are included. To ensure robustness, various model specifications are employed, similar to model 1. These specifications include clustering standard errors at the year, company and industry levels. Additionally, to address potential endogeneity, the Two-Stage Least Squares (2SLS) estimation is incorporated.

It is important to note that both models were tested for potential statistical issues, including non-stationarity, heteroscedasticity, multicollinearity and endogeneity, to ensure that the coefficient estimates were unbiased and consistent. For model 1, these tests confirmed the time series as stationary. Although heteroscedasticity was detected, it did not significantly influence the results. The endogeneity test suggested that the model was free from endogeneity. In model 2, partial non-stationarity was addressed with a time trend adjustment. Heteroscedasticity, similar to model 1, was present but did not substantially impact the results. The multicollinearity tests indicated no significant correlations among the variables. To correct an endogeneity bias, the Two-Stage Least Squares (2SLS) method and instrumental variables were employed, improving the precision of the coefficient estimates.

A detailed explanation of the multivariate analysis is presented in chapter 3, section 3.4.

To summarise, to address the research questions, I have employed two methods: the event study and the multivariate analysis. The event study measures the impact of the filing event on the market in the five scenarios mentioned in the questions. If the market is efficient, then the effect of the event is captured in abnormal returns. The market reaction is determined using securities prices and observing their movements in a short event window around the filing dates of annual reports. The regression analysis is the additional test for the fifth question (two models are developed). Model one examines the strength of the relationship between the length factor and the market reaction; model two analyses the relationship between the length of annual reports and a company's financial performance.

1.5 Main results

A number of tests are run to address the above research questions. The main results are briefly discussed below.

(1) My first investigation revealed no signs of abnormal price changes around filings of annual reports, which is in line with the findings of Stice (1991), Cready and Mynatt (1991) and Easton and Zmijewski (1993). This suggests that the market is not responding to the information contained in the annual disclosures, implying that either the information is not price relevant or it is not of immediate concern to investors.

Another potential explanation for this result lies in the following.

(2) My next enquiry shows statistically significant evidence of the market reaction to preliminary statements of annual results. The reaction is captured on day 13 before the filing, on the day of the filing, and then it continues until day 8. This result indicates that, unlike annual reports, the information content of preliminary statements[9] is of value to investors. Investors seem to be finding most of the price-relevant information in those pre-disclosure statements, consequently, ignoring the release of the latter full annual information, or at large, do not respond to it immediately.

(3) There is no evidence of the market responding to the information content of annual reports when no preliminary statements of annual reports are made, which is contrary to the prediction. This lack of market reaction could be explained by investors being inattentive to the releases of annual reports, as they may not be seen as price-sensitive enough to act on them in a prompt manner. It is also possible that the key financial information is communicated with the market via other sources of information than preliminary statements, such as quarterly earnings announcements, which are also released prior to the filing of annual reports. An alternative interpretation relates to the complexity of annual reports causing difficulty in responding to them in an efficient (timely) manner, which is tested and analysed under the final enquiry on the length of annual reporting.

(4) In my further research, which investigates the method of disseminating annual information, I have observed no significant difference in the market response between the traditional paper filing system and the electronic platform. Investors do not react

[9] Preliminary statement of annual reports, in text further down, is shortened to 'preliminary statements' and 'preliminary reports'.

more strongly to annual reports filed with the NSM, which is in contrast to what has been reported for the U.S market (Qi, Wu and Haw, 2000; Griffin, 2003; You and Zhong, 2009). However, I have detected a significant price change for the first-year filings on the NSM. To ensure that this result was not based on differences across companies, it was compared with the market response to the previous year, which is the last year of the old system. No significant price change around non-NSM filings was found, which is similar to the result achieved by Ashana and Balsam (2001) for both samples (first year EDGAR and last year of non-EDGAR filings). On the other hand, the market appears to be responsive to the adoption of the new system, but only in the first year of its operation, after which the immediate response disappears. This suggests that the reaction occurs mostly during the transition period, from the old to the new technology. Nevertheless, the mean difference in the market reaction between those two groups was insignificant, thus the argument that the electronic filing system had increased the efficiency of the market in responding to the information content of annual reports has not been firmly proven.

(5) The final third enquiry documents a negative relationship between the length of annual reports and the market reaction. Here, I observe a positive, statistically significant response to short annual reports; cumulative average abnormal returns (CAAR) of 0.46% are captured over a 2-day event window, on the day of the filing and the day after. In contrast, the response to lengthy reports is significantly negative; CAAR of -0.41%, for the same event window. This result suggests that there is indeed an impact attributable to the length factor. A textual measure, such as a word count, can influence the responsiveness of investors, and the direction of the relationship is strongly negative.

There are two possible interpretations of this finding:

(i) Discount of lengthy reporting

A disclosure of excessive length requires more time and effort to collect and analyse the information, and thus comes with higher processing costs. Consequently, such a report is negatively appraised by the market. This argument provides new supporting evidence for the notion that lengthy reporting is problematic for investors (You and Zhong, 2009; Miller, 2010; Loughran and McDonald, 2014). However, it does not explain the positive response. It appears that there is more to this than just investors preferring concise reporting and disliking verbose ones.

(ii) Managerial manipulation

It is also possible that 'obfuscation theory' (Bloomfield, 2002; Li, 2008) holds true; that lengthy annual reports represent a managerial opportunistic reporting, aimed at obfuscating or hiding poorer financial performance. However, the market is not taken for a fool; it recognises the bad fruit in hand, a 'lemon', and discounts such reports. In terms of the positive reaction to succinct reports, the opposite could be happening. Managers make sure that strong financial performance is clearly presented, in the form of short reporting. Bloomfield (2008) and Dyer *et al.* (2016) pointed out that good news takes much fewer words to communicate than bad news, as it does not require explanations, excuses or justifications.

Regardless of how we interpret the findings of this final inquiry, the results indicate that a lengthy annual report conveys a different message or sends a different signal to the market compared to a succinct report.

1.6 Contributions

This study contributes to the literature on the market reaction to a corporate disclosure along three dimensions:

Firstly, the study extends our understanding of the efficiency of the market reaction to the information content of annual reports, and it complements the literature with more updated results (2006–2016). Furthermore, the work documents the supremacy of unaudited preliminary statements of annual reports over the final annual reports, a finding not explicitly reported in other studies. It is worth mentioning that most of the previous enquiries analysed the American market; the British market, however, is under-researched. The U.K. empirical studies tend to examine the tone and textual characteristics of the narrative of annual reports (Miller, 2010; Lee, 2012; Seeback and Kaya, 2022; D'Augusta, *et al.,* 2023). Therefore, there is insufficient knowledge on the initial reaction of the British market to the actual information content of annual reports.

Secondly, this is the first enquiry on the effect of the adoption of a new filing system on the British market. During the early 2000s, researchers noted a significant price change in the U.S. market following the implementation of EDGAR (Qi, Wu and Haw, 2000; Asthana and Balsam, 2001; Griffin, 2003; Li and Ramesh, 2009). Subsequent studies have further investigated this enquiry, with recent research reporting similar findings (Gao and Huang, 2020; Gibbons et al., 2021; Goldstein et al., 2023). Surprisingly, no one has written about the NSM, the British equivalent of EDGAR. Accordingly, this study adds knowledge to the topic of market behaviour around the adoption of new technology, specifically, information distribution technologies.

Thirdly, the work provides new empirical evidence on the immediate price change around filings of lengthy annual reports. The previous studies document the impact of complex annual reports on the cost of capital (Athanasakou *et al.,* 2020), trading volume (Miller, 2010; Seeback and Kaya, 2022; D'Augusta, *et al.,* 2023), future long-term abnormal returns (Li, 2008), abnormal returns volatility (Loughran and McDonald, 2010), analysts' forecasting accuracy and their response time (Singh, 2018). However, the effect of the length of reporting on the immediate market reaction has been insufficiently researched.

Overall, this research contributes to our understanding of the market reaction to the information content of annual reports. It presents new evidence of the effect of technological change in the dissemination method of corporate disclosure on the British market. Further, it provides new insights to the literature on disclosure complexity, moreover, it highlights the consequence of lengthy reporting - the negative market reaction. In general, the study adds new knowledge to the vast debate on the efficiency of the market, and for that reason, in my view, it was important to undertake this enquiry.

1.7 Structure of the thesis

The enquiry is organised as follows:

Chapter 1 provides an overview of the study, outlining the research context and identifying research gaps. The research aim and objectives are then outlined, followed by an introduction to the employed method and a summary of the results. Finally, the chapter concludes with a discussion of the contributions to literature.

Chapter 2 reviews the literature and provides the basis for the hypotheses. Three main themes are discussed: (1) The market reaction to annual reports, with particular attention to the effect of the two-stage release of annual information, as well as the theory of market efficiency and informational inefficiency. (2) The association of a dissemination method of corporate filings with the market reaction following changes in the method. (3) The impact of reporting complexity on the market, captured in the word count.

In the same chapter (two), five hypotheses are formulated based on literature and the gaps in literature. Hypothesis one examines the market's response to the filing of annual reports, the main topic of this study. Hypotheses two and three consider the preliminary statements of annual information. Hypothesis four looks at the dissemination method and the potential impact of the implementation of a new system on the market. Hypothesis five investigates the relationship between the length of the report and the efficiency of the market reaction.

Chapter 3 outlines the research design. To empirically test the hypotheses, three methodological subject areas are addressed:

- Sample selection and a construction of subsamples: the preliminary subsample, the dissemination subsample and the wordcount subsample.
- The event study: the market reaction to each sample is measured by a short-run event study method.
- Multivariate analysis: two regression models are presented with the aim to assess the statistical validity of the event study for the third enquiry (reporting complexity).

Chapter 4 records the results of all three enquiries. Each of the five hypotheses is addressed (accepted or rejected) based on the results of the event study. The second part of the chapter covers the results of the multivariate analysis.

Chapter 5 provides an interpretation of the findings from Chapter 4 in relation to the literature and research questions and concludes with suggestions for further research. Practical and policy implications are also included. Finally, the limitations of the study are presented.

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CHAPTER 2: LITERATURE REVIEW WITH HYPOTHESES

The aim of this chapter is to review the literature, identify theoretical underpinnings, formulate research gaps and testable hypotheses.

2.1 Introduction

It has long been argued that, unless all price-relevant information has already been captured in preceding disclosures or announcements, the market should react to the release of annual financial reports (Healy and Palepu, 1993). However, this is not always the case. Despite the information richness and value relevance of those reports, researchers have found mixed evidence of the market's reaction to filings of annual reports.

This chapter reviews the literature on the market's reaction to annual reports. Several theories and an extensive range of empirical studies are included that together build the case for this inquiry. The review is divided into three parts discussing the topic from three different angles. Firstly, a general overview of what is known about the market response to corporate periodic disclosures is presented, with a discussion on market efficiency. Secondly, the subject of the information dissemination method is explored. Thirdly, the complexity of annual reports, an issue often raised in the literature, is examined.

For each of the study topics, research gaps are identified, and testable hypotheses are developed. The first hypothesis aims to examine the price change around filings of annual reports. The second and third hypotheses seek to understand the effect of preliminary information on the market. The purpose of the fourth and fifth hypotheses is to investigate the two factors, which could potentially have an additional impact on the market reaction: the method of disseminating annual reports and the length of the annual disclosure. Firstly, I test whether a filing method makes any difference to the market. Secondly, I check whether reporting length influences investor responsiveness. Empirical models which are applied to test these hypotheses are introduced and explained in Chapter 3. The results are presented in Chapter 4, and then discussed in Chapter 5.

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2.2 On Market Reaction

2.2.1 Annual reports

Annual reports, despite their historical focus, are the prime source of information for individual investors, institutional investors and financial analysts (Lee and Tweedie, 1981; Chang, Most and Brain, 1983; Gniewosz, 1990; Nadeem, 2022; Rahman and Oliver, 2022). They score higher, in the category of 'importance', than interim reports and communications with managers (Vergosseen, 1993). Their significance comes from the price relevance of the content of information they carry (Chang, Most and

Brain, 1983; Stice, 1991), which means they have an impact on the price of a stock and ultimately on the market value of a company (Roychowdhury, Shroff and Verdi, 2019). To institutional investors, the most important items of annual reports are financial statements, balance sheets and income statements (Chang, *et al.,* 1983; Arnold and Moizer, 1984; Olbert, 1994). While smaller investors, additionally, pay attention to 'summary of operations' (Chang, *et al.,* 1983).

The amount of information an annual report conveys is vast. Full yearly financial results and company-specific information, for example, research and development, management discussion of past and expected next year's earnings, auditors' opinions (Qi, Wu and Haw, 2000), review of business condition, company's operations and leasing policies (Loughran and McDonald, 2014, 2017) are only presented in annual reports. Disclosure of new and emerging risks, which often features under a separate risk section, is of particular importance to investors (Bharati, *et al.,* 2019; Gao and Huang, 2020). The annual content goes beyond what is reported in preceding summaries of earnings or in preliminary statements (Cready and Mynatt, 1991). Furthermore, annual reports are an important source of sentiment as well as textual information and managerial tone. This qualitative data can be a valuable indicator of the company's financial position, often reflected in returns, trading volumes and volatility (Loughran and McDonald, 2011). According to Barker (1999), most of the analytical work (company analysis) is anchored in the annual accounting information. Accounting figures, presented in annual financial statements, are the inputs in valuation models, fundamental and ratio analysis and in assessments of a company's creditworthiness. Forecasts of future earnings, cash flows and dividends, along with an assessment of growth prospects, are often undertaken based on annual reports. Moreover, a review of the accuracy of predictions and valuations that an analyst made earlier, using data from interim statements, is part of this process (Gniewosz, 1990). Possible takeovers and corporate investment strategies are frequently indicated there. Financial analysts process the vastness of annual information in their assessments and recommendations, which are further shared with the market (Vergosseen, 1993). ‘Buy, hold and sell’ decisions are made based on annual reports. This is important because it means that annual reports not only validate past 'buy' behaviour but also serve as a point of prediction for future value (Chang, *et al.,* 1983). This dual role makes them a valuable source for trading strategies (Chircop, Gagnon and Young, 2022). According to Gniewosz (1990), annual reports are *“central to the whole information use process in share investment decisions”.*

All that wealth of information reduces informational asymmetry between the management and investors (Roychowdhury, *et al.,* 2019). It is difficult, therefore, to question the usefulness and significance of annual reports for the investment process. A release of annual reports should be met with an efficient market reaction, and yet, there is overwhelming evidence that the reaction is not efficient, or even that there is no reaction.

Empirical evidence of the market reaction to filings of annual reports

Stice (1991), Cready and Mynatt (1991) and Easton and Zmijewski (1993) are some of the earliest studies reporting on the market response to annual reports.

The overwhelming consensus of the 90s was that the market was unresponsive to the content of annual reports. Stice (1991), Cready and Mynatt (1991) were trying to capture the initial price change around filings of SEC[10] 10-K but found none. Not even an abnormal movement in trading volumes could be seen, except for small trading transactions, which indicated that those who acted on the information content of annual reports were retail traders (Cready and Mynatt, 1991). According to Hakansson (1977), bigger and more sophisticated investors pay closer attention to interim disclosures, which are released prior to annual reports. Being wealthier and more resourceful allows them to access and process timelier disclosures, as this is where the informational advantage is to be found (Truong, 2023). This is, perhaps, one of the first indications of the link between preliminary information and institutions. As Hakansson argued further, smaller, individual investors, due to lack of resources, can only trade on the content of annual reports. Stice (1991), however, considers annual reports of no use to the market, regardless of the investor type. The stand he takes on the annual reports seems to be influenced by his additional finding of a significant price and trading response to earnings announcements made in The Wall Street Journal (WSJ) and published after filings of the 10-Ks. The difference between those two disclosures, journalistic and corporate, was the cost of their dissemination. Journals were widely distributed and cheaply accessible, allowing the market to be more responsive to them. Annual reports were the opposite, costly and of limited dissemination. Therefore, from Stice's point of view, the market was not responsive to the informationally rich 10-K reports; on the other hand, it was sensitive to the information published in simple and subsequent WSJ announcements. The method of information dissemination seems to be the factor here. Stice's work is put to the test in this study later on, where the market response to annual reports after the implementation of a new electronic filing system is examined. More on that in section 2.3 'On dissemination method'. Nevertheless, not all evidence is negative. Easton and Zmijewski (1993), for example, reported a price

[10] SEC – the U.S Securities and Exchange Commission

change around 10-K filings although the change was weak and conditioned to the lack of preceding earnings announcements. Otherwise, if preliminary information on earnings was released, no reaction was observed. That is to say, the market responded only to annual reports which were the first to announce news on earnings. This would imply that any other 10-K information was not of significant interest to investors. The richness of information in those reports seems, once again, to be ignored by the market. A similar problem to the one we observe in Stice's study. Even in more recent studies, thirty years later, we do not see much of an abnormality in the price movement around filings of annual reports. In Chircop *et al.* (2022), despite the expectation of a strong reaction to higher quality annual reporting, such is not captured. The cumulative abnormal returns around the publication date are zero, which implies that annual reports carry no price-relevant information. This is because, as Chircop *et al.,* claim, the report is not timely, and it provides confirmation of what is known rather than new information. Alduais, Almasria, Samara and Masadeh (2022), on the other hand, document a 10% movement in annual reports, but only in those that score low on a readability factor. The result, however, is statistically insignificant. Reports of standard readability capture no price change. Inventors' poor understanding of annual reports is the authors' justification for finding no reaction.

Overall, we have two contrary arguments. On one side, we see the usefulness of annual reports to retail investors but since those are small players, their response to the information content of the reports does not cause abnormality in the price change. On the other hand, we have evidence against annual reports due to their limitations, restricted and expensive access, which is claimed to be the reason for the unresponsiveness of the market to their releases. Loughran and McDonald (2017), in their study, provide a complementary perspective to the argument. They investigated the volume and timing of individual investors' response to 10-K filings and reported a low number of EDGAR server requests. Between 2003 and 2012, the filing day, on average, attracted only 4.7% of all calls (requests) in the calendar year. Those calls increased to 10% in the first week after the filing, and at the end of the first month they reached 21%. In the first calendar quarter, there were still only 41% requests, while the second quarter, cumulatively, accounted for 60% of all calls. If the server log activity was a proxy for fundamental research on stocks, this, according to Loughran and McDonald (2017), would indicate a lack of it. Yet, saying that annual reports are not of interest to investors would be incorrect. Loughran and McDonald further documented that 10-Ks were more popular than 10-Qs (quarterly filings). Based on the overall number of SEC requests, annual reports were over three times more frequently downloaded than quarterly reports. This finding corresponds with Griffin's (2003) results of a stronger reaction around 10-K dates than around 10-Q dates. The reason for the stronger response is not given, however, we could assume that it is related to the content of annual reports being more informative than quarterly statements. Contrary to the evidence reviewed so far, Griffin's work captures statistically significant market reaction to filings of annual reports. His study is discussed in the second part of the literature review, under point 2.3, where the EDGAR topic, together with the issue of dissemination method, is explored.

It is also worth noting that Stice (1991) and Easton and Zmijewski (1993) discovered a reporting lag, which is a gap between a filing day and the availability of 10-Ks to the public. Stice recorded a two-day lag, while Easton and Zmijewski found a nine-day lag. This is important because a delay in the publication of annual reports makes it impossible for the market to respond instantly, which could explain the slow reaction we see in Cready and Mynatt (1991). The highest trading response was captured as late as on days 5 and 6, after the release day of annual reports. No initial reaction could be found.

The above studies suggest that the market is unresponsive to the information content of annual reports or that the reaction is delayed. By contrast, earnings announcements receive an immediate response. This is a puzzling conclusion, as the sheer amount of price-relevant information contained in annual reports should provide profitable trading opportunities. To trade on the information content of a disclosure, market participants should act swiftly around the release and process the data almost instantly (Lo, 2007). But then perhaps, Chircop *et al.* (2022) was right, the main use of annual reports is not to provide price-sensitive information, such is already available in more timely disclosures (more on that in the next section, 2.2.3) but to reduce information asymmetry and to be a point of reference for investors. There is more contextual information in annual reports than in any other disclosure. Therefore, as Chircop *et al.* (2022) say, communicating long-term strategy with all shareholders could be the priority, while supplying price-relevant information, for the short-term benefit of the market, could be of less importance.

2.2.2 Theoretical perspective: informational efficiency

In order to appraise the response of the market to the filing of annual reports, we need to understand what an efficient reaction actually means. The actual market reaction is assessed by examining the efficiency (speed) of price adjustment to new information.

Informational efficiency: *“the degree to which market prices correctly and quickly reflect information and thus the true value of an underlying asset*” (Nasdaq, 2018).

The semi-strong form of efficient market hypothesis claims that market participants are rational and process information efficiently, therefore, new publicly available information is incorporated into security prices quickly (Hirshleifer and Teoh, 2003). This premise has been challenged by the behavioural school, psychologists and behavioural economists (Barberis and Thaler, 2003; Dreman, 2012), who claim that human behaviour is not rational, and that investors do not have the unlimited capacity to process information.

(i) Efficient market

A market is said to be 'efficient' when the current stock price fully and unbiasedly reflects all available relevant information and expectations about the value of a company and its future returns (Grossman, 1995; Clarke, Jandik and Mandelker, 2001). As Blankespoor, deHaan and Marinovic (2020) note, in this scenario the price is efficient, precise and informative. The notion of 'market efficiency' was developed in the 1960s, in two independent studies by Eugene Fama and Paul Samuelson. Fama (1965), who received more recognition than Samuelson, claimed that:

"On the average, competition will cause the full effects of new information on intrinsic values to be reflected 'instantaneously' in actual prices".

Here, we see that the 'instantaneous' price reaction, or price adjustment, to the arrival of new information is a result of a competitive market. Competition is an important element of the premise. The higher the number of market participants, the faster the change in price. Information-motivated investors will use a piece of new data for an investment or trading decision as quickly as possible, as it comes with a profit opportunity, and their action will be reflected in prices immediately (Lo, 2007; Machmuddah, Utomo, Suhartono, Ali and Ghulam, 2020), provided that the market is frictionless (Blankespoor *et al.,* 2020). The premise of 'market efficiency' quickly gained popularity. It has been extensively applied in theoretical models and thoroughly discussed and examined in empirical studies on price discovery (Lo, 2007; De George, Phan and Stoumbos, 2019). Rubinstein (1975), for example, in his interpretation of Fama's work, adds a condition of 'consensus belief'. Agents (traders, investors) make selling and buying decisions based on a piece of new information. Prices fall and rise until they reach equilibrium, until a consensus is attained about the new intrinsic value of a security, and, as later noted by Clarke *et al.* (2001), the risk associated with that security. Intrinsic value is *"value justified by the facts"* (Graham, Dodd and Cottle, 1963).

It is important to note that price efficiency is not a condition desirable by market participants. In efficient markets, all securities are fairly priced, thus it is impossible to detect a 'mispriced' one other than by chance (Fama, 1970). This has a counter-intuitive implication: if a price already reflects all new information, then there is no point in obtaining and analysing new information because it yields no profit. Or even if there are a few who try to acquire new information, they would still gain no compensation (Grossman and Stiglitz, 1980). Therefore, no one can consistently earn superior returns; returns above the market (Jensen, 1978; Stiglitz, 1981; Foster, 1982; Grossman, 1995). The paradox is that the agents[11] believe that prices do not truly represent intrinsic values. They see the market as being inefficient, which is why they spend a significant amount of time and effort to exploit the slightest inefficiencies, and this, according to Henfrey, Albrecht and Richards (1977), makes the market efficient.

[11] Market participants

Blankespoor *et al.* (2020) provides an alternative view, based on processing costs, but with the same end result. A processing cost is a cumulative expense of acquisition and integration of information. These costs, by counteracting each other, improve price efficiency. This is because, initially, integration costs reduce the number of market participants, and as a result, weaken the informativeness of the price. However, when the efficiency of the price is weakened, it attracts more investors, as there is room for profit opportunity when one acquires that piece of information. As argued above (De George *et al.,* 2019; Truong, 2023), a higher number of market participants improves the informativeness of the price, resulting in a stronger market efficiency. The efficiency, however, is prolonged as the price adjustment is delayed.

Not surprisingly, many academics have debated and proven flaws in the theory, indicating that the market is not fully efficient. One of the reasons is the impossibility of prices incorporating all available information. Prices cannot fully reflect all publicly available information because access to information is not universal to all agents, furthermore, it does not have zero cost (Lev and Ohlson, 1982), and this makes the information 'private' (Blankespoor *et al.,* 2020). According to the efficient market theory, information should be costless and public (Fama, 1970). If information is 'private', then it is not available to everyone, thus making it impossible for the market to be strongly efficient (Blankespoor *et al.,* 2020). Obtaining information, observing data in real time, and trading on that information all have an expense attached to them, and for that reason, new information is not used by all market participants (Beaver, 1981). This makes the price, on one side, not fully informative, and on the other, biased. As a result, securities are either over or underpriced (Lev and Ohlson, 1982). There is also Stiglitz's (1981) argument of the dimensionality of markets being smaller than the dimensionality of information, thus making it impossible for the market to fully disclose all information, even if it is costless. Finally, we have the issue of costs (transaction, research, trading, taxes) being too high, thus reducing gains earned from trading on the content of new information to levels not sufficient to make a sustainable profit (Beaver, 1981; Lev and Ohlson, 1982). There are many other factors contributing to the departure from price efficiency, however, of lesser relevance to this study.

(ii) <u>Limitations of information processing</u>

Besides the traditional arguments of information and transaction costs, a significant body of literature discusses investors' cognitive biases and limitations. We know, for example, that market participants cannot be fully attentive to all available information (Hirshleifer and Teoh 2003; Blankespoor *et al.,* 2020) as they do not have unlimited capacity to process information (Dreman 2012; Barberis and Thaler 2003; Wijayana and Achjari, 2020). Investors are (1) 'boundedly rational' and (2) partially attentive (Hopkins 1996; Hirst and Hopkins 1998; Elliott 2006; Lee, 2012; Mushinada and Veluri, 2019), and for that reason, they (3) underreact to information, especially when complex (You and Zhang, 2009). This impaired ability to process information, compounded with the environment of more information; companies release longer corporate disclosures, a trend observed in multiple time series analyses (Li, 2008; Dyer *et al.,* 2016), leads to a phenomenon of (4) 'information overload' (Lee, 2012; Chapman, Reiter, White and Williams, 2019). This is problematic because 'overload' and biased decision making (bounded rationality), even when rational beliefs are present, may lead to skewed security valuations, thus departing from the efficiency (Pernagallo and Torrisi, 2020); underreaction is one example of it. Moreover, it can lead to a reduced price discovery (De George *et al.,* 2019). This type of inefficiency can be significant and can last for a longer time (Barberis and Thaler, 2003).

(a) Bounded rationality

Investors are boundedly rational (Liang *et al.,* 2017)

'Bounded rationality' refers to impaired or 'bounded' cognitive ability, and is associated with information processing biases (Dietrich, Kachelmeier, Kleinmuntz and Linsmeier, 2001). Investors' judgment is bounded in their rationality due to a constraint, such as computation errors, inattention or disproportionate silence (Simon, 1956, 1986, 1991; Figlioli, Lemes and Lima, 2020). As a result, a choice of the best option is foregone in favour of a suboptimal one, which may contain a systematic error (Mushinada and Veluri, 2019). According to Chapman *et al.* (2019), investors rationally exclude relevant but costly information, knowing that this will impair their decision making. The trade-off, however, results in a satisfying outcome, not for the market, as it weakens its efficiency, but for the individual.

'Bounded rationality' differs from 'comprehensive rationality' because it accounts for cognitive and behavioural limitations (biases) of decision makers. In all cases, the agents are goal-oriented (Jones, 1999), however, boundedly rational ones adapt simplistic strategies (often not in accordance with principles of rational choice), which allow them to make a decision at a lower cognitive cost, e.g. reliance on rules of thumb (Simon, 1956, 1991), anchoring on a default, making a limited adjustment towards the truth (Tversky and Kahneman, 1974). Those strategies change accordingly to the environment (Payne, 1982). The trouble is, as Payne, Bettman and Johnson (1993) recognise, that the attempt to reduce a cognitive strain in decision making is in conflict with the aim of reaching the accurate decision.

Gabaix's (2014) used the concept of 'bounded rationality' in the development of his 'sparse max' model. The method, in addressing maximisation under a constraint, centres on the cognitive cost of information processing. A constraint is any mentioned above cognitive bias but also: information overload, costly information, scarce information, irrelevant information and time limits. Gabaix, for his model, chooses 'inattention', which means paying attention only to targeted parameters of a task. We can find relevance to this model when examining the way market participants work with information. According to Loughran and McDonald (2017), in order to arrive at a timely decision, investors are likely to employ a simplified pricing method. As they argue further, numerous factors play into a valuation; nonetheless, investors can only be attentive to selective variables. Full attention is too expensive, the cost of information processing is too high, therefore, in the decision making, market participants use an optimal number of factors. Those are adjusted to satisfy the current constraint, and this represents the 'sparse max' model.

The bounded rationality perspective has been applied in studies on financial disclosures. Dietrich *et al.* (2001) and Hirshleifer and Teoh (2003) found that market participants, in order to avoid cognitive effort, process information in a format that is provided by the management rather than modifying it accordingly. This implies that informationally equivalent disclosures, but presented differently, can have a different effect on the market. More specifically, Dietrich *et al.* (2001) show that the market reacts more efficiently when accounting results are explicitly displayed, compared to when they are presented in financial statements. Investors, rather than making accurate calculations, anchor their judgment on prior expectations; consequently, their results are in the right direction but of insufficient magnitude. This biased decision process is called the anchor-and-adjustment heuristic (Tversky and Kahneman, 1974). Similarly, in Hirshleifer and Teoh (2003), we see that when companies release reports of a more complex structure, investors, because of their information processing bias, fail to fully process their content. As a result, security prices are distorted, and this distortion often lasts until the accounting information is reported in a more accessible way, for example, in the form of a supplemental disclosure. The repackaged information lessens the cognitive effort of a computation, thus investors' valuations become more accurate, which in turn improves market efficiency. The problem is that the market values the same information differently, therefore, we have a situation of price inefficiency. This is in conflict with the assumption of semi-strong market efficiency, which predicts:

"No differences in market prices when informationally equivalent disclosures differ in form" (Dietrich *et al.,* 2001).

Even more problematic is the fact that the irrationality of the market can be present for a long time and alongside rational traders (Barberis and Thaler, 2003). As Wijayana and Achjari (2020) note, the fact that investors and traders buy stocks long after a disclosure of new information, because they failed to promptly assimilate newly released information, is the evidence of the bounded rationality.

Lastly, once again, I refer to Loughran and McDonald (2017) study. It is suggested that 'bounded rationality' could explain the unexpectedly low activity in the EDGAR server log. This limited request for annual reports, which explains the lack of initial reaction to filings of annual reports, could be a consequence of the cognitive effort that is required to process the vastness of annual reports. The large content of annual information is equivalent to information overload, thus it becomes a constraint. This is exactly the ‘bounded rationality’ argument; processing an annual disclosure comes with a significant challenge, a constraint, to the majority of market participants, therefore, initially, receives no attention.

(b) Inattention

“*The scarce resource is not information; it is attention”* (Simon 1996b).

“Investors are partially attentive” (Hirshleifer and Teoh 2003).

Inattention is a selective choice of information and ignorance of the remaining part. It is also an application of mental shortcuts in the processing of information, which is what the ‘sparse max’ model accounts for (Gabaix, 2014). According to De George *et al.* (2019), inattention is a natural consequence of a human cognitive constraint, therefore, it is not a surprise that both types of investors, retail as well as sophisticated institutional, are prone to inattention (Li, Wang, Yan and Zhao, 2019). On the one hand, inattention is ‘foolish’, as it may have an economic cost. Investors may bear a loss if they ignore relevant information. Paradoxically, however, those who apply full attention to a particular task are frequently not better off (Gabaix, 2014). In fact, according to Hirshleifer and Teoh (2003), it is economically beneficial to be inattentive. This is because attention uses too much time and has a high psychic and monetary opportunity cost (Gabaix, 2014). And this seems to be the case when analysing annual reports, inattention could be a useful tool in dealing with the vastness of annual information, and in fact, a rational choice (Blankespoor *et al.,* 2020). Investors, because of their finite processing capacity, and because of processing costs, choose to be attentive to one disclosure while inattentive to the other. As a consequence, there is a benefit from working with a disclosure number one and a forgone benefit from excluding a disclosure number two. Investors make a cost-benefit analysis, therefore, their inattention is rational rather than a cognitive bias. The concept of rational inattention is well-established in economics but is relatively new in the finance and accounting literature (Fischer and Heinle 2018; Lu, 2019).

It should be noted that the inattention strategy is worthwhile when an annual disclosure is transparent and free from manipulation. The problem arises, however, when the management attempts to exploit investors' attentional biases. In order to maintain the current stock price, or hide weak financial performance, managers may employ vague reporting, or opportunistically obfuscate the content of annual reports (Hirshleifer and Teoh, 2003). As further argued, investors - this includes expert analysts and institutions - rely on companies' disclosures. Due to limited attention, whether rational or biased, they may overlook management incentives to mislead. They may not notice purposely excluded accounting information or may perceive it as being 'appropriate'. Furthermore, evidence shows (Brenner *et al.,* 1996) that people do not compensate enough for incomplete disclosure, even when it is obvious that available information does not provide a full picture. This means that investors may fail to discount adverse information when stated incompletely, indirectly, or vaguely. In this scenario, security prices would not fully reflect the company's underperformance. This issue is addressed under the fifth hypothesis. And because prices are the weighted average of inattentive bias and attentive rational opinions, inattention has a direct impact on stock prices. The overvaluation of tech companies, which caused the internet bubble and then the crash in the 1990s, according to Hirshleifer and Teoh (2003), was partially due to investors' inattention.

(c) Underreaction

Underreaction is associated with prices that do not fully reflect values indicated by fundamentals (Bloomfield, 2002). This is the most commonly agreed explanation. Banerjee *et al.* (2020) provide us with a more nuanced understanding of the concept by presenting two underlying causes. Firstly, investors underreact to corporate announcements because they do not believe that prices are incrementally and perfectly informative. The other type of underreaction is caused by investors' uncertainty over relevance of information, which is referred to as 'unknowable relevance'. As they further explain, the market deals with irrelevant information better than with the price. When newly released information turns out to be of no value, shortly after the announcement, we see the ex-post underreaction.

A large body of evidence suggests that the market underreacts to new information and news events (no distinction is made between the causes). Investors fail to react fully to announcements of, for example, earnings news, which is evidenced in post-earnings announcement drift, as captured by Ball and Brown (1968) and Bernard and Thomas (1989). Similarly, the lack of initial market response to the information content of annual reports also represents underreaction (You and Zhang, 2009). Investors delay processing annual information, which, according to the researchers, happens because, firstly, they underestimate the importance of annual reports. Releases of preliminary statements contribute to this behaviour, a point explained under 2.2.3. Secondly, processing large volumes and the high complexity of annual information comes with a significant cognitive effort, so it is initially ignored. As a consequence, the pricing decision is delayed. Once again, we are back to the 'bounded rationality' argument. This corresponds with Hirshleifer's (2001) observation that cognitively costly information is weighted less, thus, it does not get to be fully incorporated into stock prices.

(d) Information overload

"In information processing, the receiver must attend to and interpret incoming information. Often, the problem for the receiver is not a lack of information but rather an overload" (Simon 1996b).

'Overload' is a problem as it weakens investors' decision making. The 'load' condition slows cognitive performance and impairs information processing (Simnett, 1996). When people deal with a significant amount of information, their judgment is often worse than when faced with less information. This is because human cognitive capacity is restricted. As Li *et al.* (2019) s*ay:*

"There is a limit to the central cognitive-processing power of the human brain".

Integrating a vast amount of information into decision making requires a high mental cost, a point made on several occasions now (Casey, 1980; Snowball, 1980; Shields, 1983; Blocher *et al.,* 1986; Paquette & Kida, 1988; Chewning & Harrell, 1990; Simnett, 1996). It seems reasonable to assume that analysis of an annual report would create mental overload. The disclosure is excessively lengthy (Chapman, *et al.,* 2019) and of high textual complexity, therefore, processing is prone to inefficiency and not free from errors (Lee, 2012). A reliance on simplification and heuristics, which are likely to be employed, are going to reduce the quality of processing a disclosure (Chapman *et al.,* 2019). The more complex a disclosure, the less transparent it becomes, and this makes an evaluation of risk, for example, less accurate (Lee, 2012). The problem is, as Pernagallo and Torrisi (2020) recognised, that information overload affects a significant part of market participants, especially when algorithms are not applied in making an investment decision. When faced with too much information, investors and traders distort security prices. The distortion comes from a reduced and delayed trading that is employed to avoid adverse selection. Information overload impairs a trading decision because it takes longer to identify higher order inferences among excessive and detailed information. This contradicts the purpose of an annual disclosure, which is a reduction of information asymmetry and facilitation of trading (Chapman *et al.,* 2019).

(iii) <u>Price invariance</u>

Price invariance is a special case of market efficiency. The notion of informational efficiency tells us that when a release of information does not lead to a significant price reaction, this could be interpreted as lacking value-relevant information (Beaver, 1968; Lo, 2007; Banerjee *et al.,* 2020). However, Cready and Mynatt (1991) argue that this interpretation may not be correct, as the market reaction could be indifferent to that information and exhibit 'price invariance'. Price invariance is when:

"Security prices are the same whether or not the informational item is known by all individuals in the economy" (Lev and Ohlson, 1982).

The 'price invariance' originates from a concept of 'belief invariance', which implies that an informational item does not necessarily have to alter investor beliefs. The converse is also true: information may impact some beliefs and yet, the price will be invariant with respect to that piece of information. It is important to note that 'belief invariance' does not violate the efficiency condition regarding this particular piece of information (Lev and Ohlson, 1982). Different reasons could lead to price invariance, one example being a number of passive investors, with inelastic demand, holding the market portfolio. This, according to the researchers, will not change the price structure; investors' 'ignorance' will not be reflected in the price.

Therefore, the absence of price change around the release of the information content of annual reports could indicate price invariance. However, according to Cready and Mynatt (1991), even though this notion is statistically plausible, it would be difficult to prove. On an intuitive level, when a sample is aggregated and analysed over a longer time frame, price invariance seems unlikely.

Research gap

The lack of an immediate market reaction to the information content of annual reports is puzzling, especially since these reports often contain the first public announcement of non-earnings information (Easton and Zmijewski, 1993). This phenomenon has perplexed academics for decades, with studies dating back to the 1990s (Stice, 1991; Cready and Mynatt, 1991) and continuing into more recent times (Chircop *et al.,* 2022; Alduais *et al.,* 2023).

The absence of an efficient market reaction suggests that investors might be overlooking the importance of these annual disclosures. This, however, seems counterintuitive, considering the importance of such disclosures from a value perspective, as noted by Stice (1991) and Chricop *et al.* (2022). Stice (1991) posits that a market response is expected, echoing Lo (2007) and Machmuddah *et al.* (2020), who point out the profit opportunities in trading on annual reports information. The apparent delay in market response could be attributed to high information processing costs and investors' cognitive limitations. Therefore, the issue of market reaction to annual reports warrants further investigation. Analysing new data in different markets, such as the under-examined British market, could provide fresh insights. Most of the existing studies focus on the American market, making an investigation of other markets important for a comprehensive understanding the subject matter.

Hypothesis development

The market is efficient when it reacts immediately to newly released information, which is then instantaneously reflected in security prices (Fama, 1965; Machmuddah *et al.,* 2020). This scenario, though, is hardly realistic due to the costs that market participants need to bear in order to access and process information (Blankespoor *et al.,* 2020), as well as extraction costs (Bloomfield, 2002, 2008). Moreover, for the market to be efficient, investors and traders need to be able to process information rationally (Chapman *et al.,* 2019; Pernagallo and Torrisi, 2020). However, human mental capacity is limited, thus, it is impossible to instantly analyse all relevant information. Additionally, investors' cognitive biases distort and delay information processing (De George *et al.,* 2019; Pernagallo and Torrisi, 2020). Consequently, security prices are likely to be biased and not fully reflect their intrinsic value, and the price adjustment is likely to be delayed (De George *et al.,* 2019; Pernagallo and Torrisi, 2020). Since annual reports, which are of high textual complexity, contain a vast amount of information, it is reasonable to expect that the reaction of the market to their releases will not be efficient. This notion is confirmed by Stice (1991); Cready and Mynatt (1991); Easton and Zmijewski (1993); Chircop *et al. (*2022). Accordingly, the first hypothesis states that:

Hypothesis 1: <u>*The market underreacts to filings of annual reports*</u>.

By underreaction, it is meant that there is no significant reaction. The reaction is determined in abnormal returns; thus, I expect to see no significant abnormality in returns around the filing dates. This is explained in Chapter 3, the methodology.

The first hypothesis is derived from several behavioural theories discussed in the literature review: underreaction, information overload, inattention and bounded rationality. The overall notion is that investors underreact to the information content of annual reports because they are informationally overloaded, are bounded rationally, and their attention is limited. The theoretical argument begins from recognising that the content size of an annual report prevents market participants from acting[12]on it in a timely fashion. As a result, stock prices do not immediately adjust to the information presented in those reports (You and Zhang, 2009; Chapman *et al.,* 2019). The market reacts slowly to filings of annual reports, resulting in underreaction, in other words, a delayed correction in prices. It is plausible to assume that one of the reasons for the underreaction is information overload, a human cognitive limitation (Chapman *et al.,* 2019), which is related to the excess in textual volume. The amount of informational content of an annual report is vast but not all presented information is market relevant (Chircop *et al.,* 2022). Therefore, on the day of the filing, investors are likely to experience informational overload (Pernagallo and Torrisi, 2020). As Simnett (1996) notes, because of a high mental cost, information overload slows down the cognitive processing capacity, thus, an assessment of the information takes longer, subsequently, it delays the response time. On the cumulative basis the market underreacts to the information content of annual reports (Pernagallo and Benedetto,

[12] Trade: buy/ sell / hold

2020).

In addition to the information overload, investors' cognitive processing is likely to be biased by inattention. According to You and Zhang (2009) and De George *et al.* (2019), human attention is limited, therefore, a release of an annual report, a lengthy and complex disclosure, competes for an investor's attention with other disclosures (Lu, 2019), often, not related to the annual report. The content of annual reports does not receive full and prompt attention (Loughran and McDonald, 2017; Athanasakou *et al.,* 2020), resulting in a delayed analysis and, eventually, underreaction at the time of the filing. Besides the textual complexity and volume, there is also the issue of the multi-day announcement of the annual information, which spreads investors' attention across several data points (De George *et al.,* 2019). To be equally attentive to each release would be economically non-viable (Gabaix's, 2014), therefore, investors are likely to pay attention to earlier announcements, while the latter ones receive less or no attention. According to Hirshleifer and Teoh (2003), when attention has a high opportunity cost, in this case, high cognitive and processing costs, it is beneficial to be initiative. Inattention becomes an intentional decision or a rational heuristic (Fischer and Heinle 2018; Blankespoor *et al.,* 2020). However, on the cumulative basis, as De George *et al.* (2019) say, there is a downside to it. A lower stock liquidity and a reduced company's market value are the market cost of inattention to a disclosure of a high value relevance like the annual report.

Finally, the release of the preliminary information, which is the subject of the following hypothesis, can also play a role in the underreaction. As De George *et al.* (2019) note, investors may underestimate the value of annual reports because they would have had access to earlier information, based on which they would have already made an investment decision. This goes back to Banerjee *et al.* (2020) claim that investors might consider information content of annual reports irrelevant, at least in terms of the initial pricing, which would be the reason of their underreaction. At this point, the bounded rationality notion would also explain the underreaction. Investors believe that they already possess relevant information, which would have come from the preliminary reports. According to the theory, they process the earlier information and forgo the latter one, even though it is more complete. Investors are satisfied with the suboptimal option of the simpler preliminary information content (Mushinada and Veluri, 2019). The compromise comes from the fact that the annual report does not offer a good trade-off between the processing costs and its communicate value, therefore, the report is not considered immediately after it is released (Beaver, 1981; Lev and Ohlson, 1982; Chapman *et al.,* 2019), resulting in the underreaction. This premise, to the contrary of Banerjee *et al.* (2020) argument, does not treat the information content of annual reports irrelevant, but rather too costly to act on it in a prompt manner.

Given the counterintuitive empirical findings observed in the market's reaction to annual reports, it is important to revisit this topic. The aim is to update the literature, provide new evidence, new arguments and new data. A significant aspect of this research will be the inclusion of the British market, a context that has been underrepresented in previous studies. This approach aims to deepen our understanding and offer a wider perspective on the issue of market reaction to annual reports.

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2.2.3 Preliminary statements of annual reports

(i) <u>Preceding announcements</u>

Based on the reviewed studies, it is evident that the market reaction to annual reports is weak. There are several arguments in the literature for the reasons behind it and one of them refers to the multiple-day period during which annual financial figures are released to the market.

As early as 1968, Beaver recognised the role of preceding announcements. He argued that by the time annual earnings are released, the market is already familiar with that information, as it would have been communicated earlier by other sources. Even more, the annual information is already processed by the market and is incorporated into the stock price. As a result, year-end reports carry little content value, thus the possibility of no price response to their releases. No price movement because, as he further claims, the released information does not change market expectations, nor does it alter investor beliefs about the value of an asset. Those would have been formed earlier, based on the preliminary reports and prior announcements. Despite providing a compelling discussion for no price change, Beaver in fact, records a reaction around releases of annual earnings reports, even when they are preceded by preliminary announcements. A contrary result to Easton and Zmijewski's (1993). To justify the finding, Beaver argues that investors use final annual reports to review their predictions and make adjustments to their positions and allocations. The preceding announcements serve the purpose of forming first forecasts, but they are neither final nor efficient. The efficiency becomes the strongest with the release of the annual report. Overall, Beaver concludes that when announcements convey value relevant information, they should evoke a market reaction, as long as they alter market expectations. Holthausen and Verrecchia, (1988) discuss the same idea in their theoretical study of the effect of sequential informational releases on the variance of price change. They claim that:

“The magnitude of price reaction to new information is a decreasing function of the informativeness of prior information and an increasing function of informativeness of the new information”.

This tells us that as the old information deteriorates, or is insufficient, investors learn more from the following (new) information. Consequently, the price around the later release is of a greater magnitude than around the first announcement. Referring back to Beaver’s (1968) point, this is when the market expectation of the value of an asset is changed. Similarly, if prior information is not available, the price reaction around the final annual information should be significant, as this is the only information that can impact the value of a security. However, as they further explain, the opposite can also happen. In a situation when less is learnt from the new (latest) disclosure, in comparison to what is already known, the change of price is less variable than the change around the prior disclosure, or there is no change, as there is nothing new to alter investor beliefs about the value of the asset. Beaver, Holthausen and Verrecchia discussed the issue from the informational efficiency point of view.

There is also a behavioural explanation. According to De George *et al.* (2019), the failure of a full appreciation (reaction) of annual reports is caused by a spread of investors’ attention across multiple announcement days. So far, the same argument as above, but the explanation is based on a behavioural mechanism of an investor. Because time is a costly resource, the later information, even though more complete, can be undervalued. Investors choose to allocate their attention to one source of information, more likely the earlier announcement. Earnings announcements (earlier disclosures), for example, receive coverage in the financial press, which attracts new retail investors and traders. This, in consequence, diverts the attention of market participants from the latter, the annual report. The implication of the reduced market attention to annual report filings is weakened stock liquidity and a compromised company's market value.

Based on those two arguments we can say that any piece of information, no matter if it is the first or the last one, can influence investors' beliefs, thus, can be reflected in the price. It all depends on whether it carries value to the market, and whether it attracts attention large enough to influence trading positions. Therefore, the change in the price around a corporate disclosure release can only be captured if the information alters investors' beliefs, expectations or attracts their attention.

(ii) Empirical evidence

An important study by Easton and Zmijewski (1993) (mentioned above, 2.2.1) examines the effect of preceding information on the price change around releases of annual reports. Firstly, we learn that the market reaction to 10-Ks is captured but only when no preliminary earnings announcements are made. It is argued that for the price response, annual reports need to be the first disclosure of earnings. Secondly, the authors also examine market reaction to preliminary announcements, which is found to be strong; moreover, it contrasts the weak and statistically insignificant response to subsequent annual reports. Similarly, a study by Li and Ramesh (2009) documents a lower price reaction around 10-Q releases that follow earnings announcements. While in De George *et al.* (2019), we find a stronger market attention around quarterly announcements than around semi-annual announcements, reflected in higher trading volumes. This multi-day disclosure release, according to Truong (2023), can be strategically beneficial. Companies compete for market attention, allocating a vast amount of resources to capture it as early as possible.

Truong observes that early and more frequent announcers gain a higher market recognition, moreover, a stronger analysts' following. This is important since a greater analysts' coverage attracts a new pool of investors, which in turn, has a positive impact on the stock price. A similar point to the one made earlier by De George *et al.* (2019).

Research gap

The prevailing evidence suggests that the market is unresponsive to the information content of annual reports, raising a couple of questions: which preceding disclosures capture investors' attention to the extent that they overshadow the significance of annual reports? Is there an earlier release that effectively substitutes the information typically found in annual reports? These questions have not been fully explored in existing literature, leaving a gap in our understanding of the role of prior disclosures in influencing market reactions to annual reports. While some research has examined the impact of earnings announcements on subsequent reactions to annual filings, the specific influence of preliminary statements of annual reports, particularly in the British market, remains an underexplored area.

This study aims to address this gap, bringing new insights into the dynamics of market response to the information content of annual reports in the context of their preliminary statements.

Hypothesis development

A generally accepted view is that companies disclose their key financial results to the market through more timely communication channels than annual reports: conference calls, interim management statements, half yearly reports, quarterly reports and preliminary annual statements (Easton and Zmijewski, 1993; Li and Ramesh, 2009; Lennox, Schmid and Thompson, 2021). Figures from the balance sheet and income statement are frequently announced in earnings press releases (Francis *et al.,* 2002; D'Souza *et al.,* 2010; De George *et al.,* 2019; Seebeck and Kaya, 2022). At the time a company submits its annual report to EDGAR or NSM[13], a significant amount of accounting information (e.g. earnings per share, dividends, sales growth) is already in the public domain (Firth, 1981; Foster, Jenkins and Vickrey, 1986; You and Zhang, 2009; Li and Ramesh, 2009). Anything 'major', as Chircop *et al.* (2022) argue, should be included in preliminary statements. This multi - stage release of information provides us with the opportunity to test the initial market reaction to preliminary statements of annual reports. If the market is satisfied with the pre-emptive information, it will react to it (Beaver, 1968; Holthausen and Verrecchia,1988). The reaction will happen even though a preliminary statement does not convey all value relevant information (De George *et al.,* 2019). Therefore, the premise of the second hypothesis is that prices will immediately incorporate the information content of a preliminary disclosure.

Hypothesis 2: *The market reacts to preliminary statements of annual reports.*

Here, the market's response to the preliminary statements of annual financial results

[13] U.S. and British filing systems

is examined. Specifically, I investigate whether investors react promptly to these preliminary disclosures and how this reaction compares to their response to the full annual reports, as examined under the first hypothesis. A significant reaction to the preliminary statements could indicate that the market might underreact or ignore the subsequent detailed information in the annual reports. Such a finding would support the first hypothesis and suggest that preliminary statements might act as a substitute for the full annual report, as proposed by Li and Ramesh (2009). This possibility carries a serious implication for the efficient market hypothesis.

The theoretical foundation for the second hypothesis builds on the concept of bounded rationality, previously discussed in relation to the first hypothesis. According to Jones (1999), investors are goal-oriented and aim for optimal decision-making. However, due to constraints such as cognitive biases, time limitations and limited access to information, they often resort to simplified strategies and heuristics, leading to suboptimal decisions (Simon, 1991; Figlioli *et al.,* 2020). It seems that market participants preferentially rely on preliminary statements of annual reports as their primary decision-making reference. This preference stems from the price sensitivity, informational simplicity and cost-effectiveness[14] of these reports (Stice, 1991; Truong, 2023), aligning with Gabaix's (2014) concept of a 'targeted parameter'[15] task in investment or trading decisions.

Bounded rationality acknowledges the limited processing capacity of investors, suggesting they favour less demanding and more accessible information (Simon, 1991; Hirshleifer and Teoh, 2003). This is where the preliminary statements have an advantage over more comprehensive annual reports. The benefits of focusing on

[14] Monetary and time more efficient
[15] Discussed in the literature review, under 'Bounded rationality'

preliminary reports, such as: reduced time, higher attention, lower cognitive load and fewer processing costs[16], outweigh the constraints associated with the more detailed annual reports. Consequently, preliminary statements become a satisficing choice (Chapman *et al.,* 2019). However, as Mushinada and Veluri (2019) point out, while this choice reduces cognitive effort and aids decision-making under time constraints, it is not necessarily the most efficient or optimal. It meets the minimum threshold of satisfaction due to its simplicity and timeliness, fulfilling the immediate goal of making an investment decision (Jones, 1999).

The inattention to annual reports and attention to preliminary statements is the investors' suboptimal choice. A suboptimal, or a satisfactory choice, carries less constraint than an optimal choice. The optimal choice cannot be made due to the complexity of the full disclosure and time limitation. In consequence, the preceding statements become the substitute for annual reports, in the context of market efficiency. The bounded rationality argument, therefore, would explain why the preliminary statements of annual reports move the market. Why do investors react to their releases rather than making the optimal decision based on the latter but complete information content of annual reports.

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My third hypothesis is a merger of the first proposition of the underreaction of the market to annual reports and the second prediction of the market's reaction to preliminary statements of annual reports.

[16] Time, attention, cognitive load, monetary cost

Research gap

If the preliminary statements of annual reports are unavailable, this suggests that the market should pay immediate attention to the subsequent release of the full annual reports. However, the market's reaction to annual reports is contingent upon the information being sufficiently unexpected and price-sensitive, as noted by Beaver (1986), Clarke *et al.* (2001), and Li *et al.* (2019). The literature review, including works by Gniewosz (1990), Stice (1991), Bharati *et al.* (2019), and Roychowdhury *et al.* (2019), agrees that there is considerable amount of new information in annual reports. Therefore, it is reasonable to anticipate that these reports are price-relevant and will induce a market response. This specific aspect, with few exceptions such as the studies by Easton and Zmijewski (1993) and Li and Ramesh (2009), remains underexplored in existing literature.

Hypothesis development

“If the information is relevant in revising beliefs about the cash flow of the firm, and no individuals have access to the information prior to disclosure, and all have access post disclosure, then it is virtually inconceivable that prices would be unchanged” (Lev and Ohlson, 1982).

What Lev and Ohlson mean is that the price should change around the release of an annual report, unless the information content of those reports is revealed to the market in pre-disclosure announcements. Annual reports provide information about expected cash flows and beyond (Chircop *et al.,* 2022), therefore, if there is no pre-emptive information available to the market, preliminary statements of annual reports are voluntary disclosures (Li and Ramesh, 2009), investors should respond to the information content of annual reports. This idea leads to the third hypothesis:

Hypothesis 3*:* *There is a market reaction to annual reports in the absence of preliminary statements of annual reports.*

The third hypothesis is underpinned by the Efficient Market Hypothesis (EMH). It posits that when preliminary statements of annual results are not available, making the annual report the main disclosure of a company's full financial metrics for the fiscal year (Easton and Zmijewski, 1993), the market is likely to react to this information.

The EMH suggests that new information should prompt an immediate price reaction (Fama, 1965; Machmuddah *et al.,* 2020). If this information is price-relevant, it presents a profit opportunity for market participants, leading to observable abnormal trading movements and price adjustments (Lo, 2007). This process continues until a consensus is reached on the new value of the security, including past information, the current release and future predictions based on this information (Rubinstein, 1975; Clarke *et al.,* 2001). According to the EMH, an efficient market quickly reaches this consensus (Clarke *et al.,* 2001), although the speed of reaction varies based on the price sensitivity of the information (Banerjee *et al.,* 2020). Empirical studies typically assign a ten-day event window (-5 to +5 days) to assess the efficiency of market responses to annual report filings (Qi *et al.,* 2000; Ashana and Balsam, 2001; Lee, 2012; Chircop *et al.,* 2022; Alduais *et al.,* 2022).

However, it is still reasonable to expect that the market might not react immediately to annual reports, even in the absence of preliminary statements. Stice (1991), Bloomfield (2002), and Blankespoor *et al.* (2020) suggest that the high processing costs of annual reports could inhibit the instant reaction. Blankespoor *et al.* highlight the necessity of frictionless transactions for market efficiency, a point echoed by Bloomfield with reference to low extraction costs[17]. Given the extensive and complex nature of annual report content, the market may require time to process this information, as noted by You and Zhang (2009), Singh (2018) and Blankespoor *et al.* (2020). Consequently, as Loughran and McDonald (2017) argue, based on their study of the EDGAR server log, stock prices may not immediately reflect new information. This scenario suggests a market inefficiency, characterised by underreaction or delayed reaction, aligning with the premise of the first hypothesis.

Another argument against market efficiency concerns the price relevance of annual report content. As previously discussed, if the market does not deem the information as value-relevant, then the price adjustment may be prolonged or might not occur at all (Banerjee *et al.,* 2020). According to the EMH, for information to be price-sensitive, it must be unexpected by the majority of market participants. If it is anticipated, then it is likely to be already incorporated into current prices, leading to a weaker or delayed response (Alzyadat and Asfoura, 2021).

In the third hypothesis, I propose that in the absence of prior information related to annual financial statements, the price reaction to the final information, as presented in annual reports, should be both prompt and significant, impacting the value of a security. This enquiry parallels the research conducted by Easton and Zmijewski (1993) and Li and Ramesh (2009)[18,] however, a key difference lies in the focus of this study. While earlier research concentrated on earnings announcements, this investigation centers

[17] Extraction costs: "*Costs of identifying, collecting, compiling and processing of data and information, or hiring others to do so*" (Bloomfield, 2002).
[18] As of 2022, to the best of the researcher's knowledge, no recent work has been conducted on the market reaction to annual reporting in the absence of a preliminary discourse of financial statements.

on the impact of preliminary statements.

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2.3 On Dissemination Method

For market efficiency, a robust method of information dissemination is crucial as it facilitates the receipt, acceptance and distribution of corporate disclosures. This section reviews literature on market reaction to the implementation of EDGAR (Electronic Data Gathering, Analysis, and Retrieval), an American electronic filing platform introduced in 1993 to replace the manual filing method. The evidence suggests that EDGAR has enhanced the efficiency of asset pricing, with the market showing immediate reactions to annual report filings. This case provides a solid reference for discussing the British method of corporate disclosure dissemination. Echoing the precedent set by the American transition to electronic filing, the United Kingdom, in 2010, similarly modernised its disclosure system by replacing its paper-based submission process with the electronic National Storage Mechanism (Blake, 2010). Consequently, it is anticipated that a similar improvement in market efficiency, specifically in terms of prompt market reactions to annual reports, can be observed following the adoption of the National Storage Mechanism (NSM).

2.3.1 EDGAR effect

The Stice (1991), Cready and Mynatt (1991) and Easton and Zmijewski (1993) studies were conducted two decades ago when access to SEC filings was limited. The distribution of annual reports and 10-K forms improved around 1993 with the adoption of the EDGAR system. This time, researchers began documenting stronger evidence for market efficiency. Ashana and Balsam (2001); Qi, Wu and Haw (2000); Griffin (2003); You and Zhong (2009), all managed to capture a market reaction to annual reports or 10-K filings.

In 1993, EDGAR, a new electronic filing system, was implemented by the SEC. It replaced the paper submission method. By 1996, submission on EDGAR became a requirement for all listed companies (Asthana and Balsam, 2001; You and Zhong, 2009; SEC, 2009). This technological development, compounded with the widespread use of the Internet, significantly improved disclosure dissemination time. It also lowered the costs and access to corporate filings (Banerjee *et al.,* 2020). Annual reports are now released to the market more quickly, on average, it takes 24 hours for a SEC filing to be available (via the Internet) to the public (Asthana and Balsam, 2001; Griffin, 2003). This contrasts with the two - nine-day reporting lag that was documented while the previous filing method was operational (Stice, 1991; Easton and Zmijewski, 1993). The EDGAR system provides investors with timelier access to financial disclosures (Qi, Wu and Haw, 2000), which in turn, has increased the responsiveness of the market to annual reports. Across the studies we see strong and prompt price and trading reactions to the information content of annual reports, lasting up to day 5 after the filing (Asthana and Balsam, 2001; Griffin, 2003; Li and Ramesh, 2009). On the contrary, no reaction is captured under the old, pre-EDGAR, filing system. Qi *et al.* (2000) offer two explanations for the lack of market reaction before the introduction of the EDGAR system. The first explanation suggests the absence of price-sensitive information in annual reports prior to EDGAR, prompting a question about why the content of these reports suddenly became price relevant with EDGAR's implementation. This perspective seems a weaker justification, as it does not adequately explain the shift in information relevance. Their second explanation relates to the classic argument that the pre-electronic submission methods were too costly and time-consuming for immediate information access and processing, thus impeding timely market reactions. A more recent work by Bharati *et al.* (2020) looks at the effect of the Regulation Full Disclosure (FD) and the Sarbanes-Oxley Act (SOX) implementation on the market behaviour around 10-K filings. In a similar fashion as the EDGAR studies, the subject of the investigation is the impact of the change on stock returns, this time, however, a regulatory change rather than technological. The FD and SOX regulations aimed at improving comprehension and transparency of financial statements, which as a result also meant strengthening facilitation of security pricing. The study captured, over a short-term event window, a significant difference in the reaction to the regulatory change. This means that the implementation of the FD and the SOX had a positive impact on the market; they improved the market reaction to 10-K filings. According to the authors, annual reports became more informative, moreover, carried lower information asymmetry.

Not all evidence, however, documents strong efficiency in the response to annual reports. There is still a significant amount of prolonged price adjustment lasting up to day sixteen (Qi *et al.,* 2000; You and Zhang, 2009). On the other hand, when annual earnings announcements are examined, the adjustment in price and trading volumes is more efficient, it reverts to the pre-event levels more quickly. The abnormality vanishes around day three, after the filing (You and Zhang, 2009). This means that investors assimilate the information content of annual reports over a longer period of time, which contrasts with the prompt processing of information on earnings. Among the reviewed studies, Griffin (2003) captures the strongest market efficiency. Neither prior nor delayed reaction around releases of annual reports is documented. An investor response to the annual information occurs at the time when it is exactly expected, on the filing day and immediately after, with no delays or any pre-event reactions. An additional observation reported in the study is an increase in the investor participation. Instant, cheaper and widely available electronic access, in comparison to the old paper method, accommodates more market participants. According to Griffin, the efficiency in the reaction and higher volumes of transactions is attributed to the EDGAR system rather than improvements in the reporting; as he further notes, the format and content of annual reports did not change much during the time frame of his study (1996 - 2001).

Qi *et al.* (2000), Ashana and Balsam (2001), Griffin (2003), You and Zhong (2009) show that the EDGAR system has improved the dissemination time of annual information. The 10-K reports are released to the market more promptly. Consequently, the market is more responsive and more efficient, which is something that had not been documented in earlier studies, before the implementation of EDGAR.

2.3.2 The Morningstar

Is Morningstar as effective as EDGAR?

Under the Transparency Directive (TD), which took effect in the U.K. in 2007, all EU

Member States were required to disclose regulated information through specific channels, and to appoint a mechanism for the central storage of that information. The aim of the directive was to facilitate the fast dissemination of inside information, in order to prevent market abuse (London Stock Exchange, 2009). The FSA's Document Viewing Facility (DVF), a physical terminal placed in the FSA building (current FCA), played that function until 1 September 2010, after which it was replaced by the National Storage Mechanism (Blake, 2010). The hard copy, a paper filing system (DVF), has been moved online and was given a new name, the National Storage Mechanism (NSM). All Regulatory Information Service Announcements (RIS), as well as the data previously held on the DVF, at the time this study is written, are stored in the NSM, and are available for online viewing on the Morningstar. Morningstar has been appointed by the FSA (current FCA) as an electronic provider of the service. The public can access corporate filings and announcements freely on the Morningstar platform or on the issuers' websites. Publicly listed companies instead of sending hard copies of their corporate disclosures to the FSA (FCA), email or upload them directly to the Morningstar website (Complyport, 2010; Csponline, 2019).

Qi *et al.* (2000), Ashana and Balsam (2001), Griffin (2003) and You and Zhong (2009) show that investors react to annual reports more efficiently when they are more accessible, when the time of their dissemination is shorter. The EDGAR system has provided those efficiencies; therefore, it can be assumed that the effect of Morningstar should be similar. This is because Morningstar provides investors with free and more instantaneous access to corporate disclosure in comparison to the previous DVF paper filing system.

2.3.3 Digital future of corporate reporting

The adoption of EDGAR aimed at improving the dissemination time of corporate disclosures, moreover, to provide open and free access to the companies' information. The above reviewed literature indicates that those aims have been met. The market seems to be reacting to periodic filings more efficiently, in comparison to the pre-EDGAR era when the paper filing system was operational (Qi *et al.,* 2000; Asthana and Balsam, 2001; Griffin, 2003). While the main objective of EDGAR appears to be achieved, a new issue arose, an increase in complexity and length of financial reports (Miller, 2010; Loughhran and McDonalad, 2010) compounded by a decrease in their readability (Dyer *et al.,* 2016). Those factors elevated the costs of processing a disclosure, which furthermore has compromised markets' ability to assimilate information. It is important to understand the implication of the problem; because of the high processing costs, investor response to a corporate disclosure has weakened again (Blankespoor, 2019). The market, once more, became less efficient. I discuss this matter in greater detail in the next section (2.4).

As always, a problem like this one would be of concern to academics and regulators. Indeed, both parties stressed that the cost, time and effort required to analyse financial statements was too high (Singh, 2018). Accordingly, calls for more efficient disclosure of data have been issued. This, of course, is a very similar issue to the one above, when the request for greater efficiency in reporting was answered with the introduction of EDGAR. This time, the SEC in 2009 and recently, the European ESMA in 2016 addressed the problem by requiring companies to submit their quarterly and annual reports in a new interactive and machine – readable format, the XBRL[19] (Blankespoor,

[19] XBRL- eXtensible Business Reporting Language

2019; Singh, 2017; ESMA, 2017).

The intention of this regulation is to reduce information processing costs (Blankespoor, 2019), furthermore, to shorten, yet again, the dissemination time, and improve readability, forecast accuracy and usability of periodic reports (Yen and Wang, 2015; Singh, 2018). In other words, it is expected that the XBRL will facilitate efficient access to information and processing time. Under the new system, there is no need to search and collect financial data manually; this is now done electronically. The XBRL software classifies data, facilitates comparisons across time and companies, moreover, provides contextual information (Blankespoor, 2019). The technology is meant to support analysts and investors in their research, collection and processing of financial data, and ultimately, in their decision making (Singh, 2018). According to SEC (2009), the XBRL helps market participants to *"capture and analyse information more quickly and at less cost"*. And indeed, several studies have reported that with the XBRL adoption, it was easier to access and incorporate data into the analysis (Baldwin and Trinkle 2011; Liu, Wang and Yao, 2014).

Given that the XBRL has the potential to improve the speed and lower the costs of information processing, it could, therefore, be expected that it will also increase investor responsiveness to annual reports filing dates. This assertion has been examined by Yen and Wang (2015), who found that the market reaction to SEC filings, both 10-Qs and 10-Ks, increased over the three-year phase of the XBRL adoption. It is claimed that when investors became more familiar with the new technology, their responsiveness to the information content of periodic reports elevated. Yen and Wang (2015) have provided one of the first evidence that the XBRL has actually improved information accessibility, which in turn, increased efficiency in the market.

The XBRL initiative, however, has also brought criticism, mainly from corporations. It is said that XBRL reporting can be more a burden than an advantage, as it is perceived as a costly compliance exercise. The cost comes with the preparation and reviewing an XBRL report (Yen and Wang, 2015). According to Singh (2018), producing a filing in this format, in particular, adopting a taxonomy (a dictionary) for tagging and mapping requires the application of an additional software. Thus, many smaller companies, not being self-sufficient, lacking skills and knowledge, are forced to outsource the task of producing an XBRL disclosure. This contrasts with the straightforward preparation of an annual report in the traditional PDF format. Academics, as they keep finding mixed results, are also not fully convinced. While one side reports higher information efficiency (Cong, Hao, and Zou 2014; Yen and Wang, 2015) and greater accuracy in analysts' forecasts (Liu, Wang and Yao 2014), the other side, however, finds larger bid-ask spread (Blankespoor, Miller and White 2014).

To conclude, the XBRL has become a similar research enquiry to the EDGAR. Researchers ask the same questions whether this new technology improves efficiency in the market (Cong *et al.,* 2014; Liu *et al.,* 2014; Blankespoor *et al.,* 2014; Yen and Wang, 2015). We need to remember that the system is in its early stage. In the U.S., it has been subject to mandatory adoption since 2009 (Blankespoor, 2019). While in Europe, it has only been implemented recently, in 2020 (Singh, 2018). Therefore, more time needs to pass to be able to assess to what extent hopes of: (1) reduced time and processing costs; (2) improved accessibility to information; (3) higher accuracy in analysis, have been met. The full assessment of the contribution of the XBRL to the efficiency of markets, especially European markets, is a future area for research.

Research gap

There is a noticeable gap in the literature regarding the impact of the National Storage Mechanism (NSM) on the British market since its implementation in 2010. The NSM, which serves as the British electronic filing method, provides free and immediate access to corporate disclosures for all market participants. This contrasts with the previous method that required companies to file their reports manually. The distribution of information, therefore, took several days, significantly limiting informational efficiency. This situation mirrors the experience in the U.S. with EDGAR, its electronic filing counterpart implemented in 1993. Studies have shown that EDGAR significantly enhanced information accessibility, distribution and reception, leading to increased market efficiency (Asthana and Balsam, 2001; Griffin, 2003; Li and Ramesh, 2009). Given the transformative effect of EDGAR on the U.S. market, it is reasonable to suspect that the NSM might have had a similar impact on the British market. Yet, the effect of the NSM's adoption and its subsequent influence on market efficiency in the U.K. remains an underexplored area of study.

Hypothesis development

The EDGAR system provides instant, open to all market participants and cheaper access to corporate disclosures. It accelerates analysis of time-sensitive information, resulting in a stronger market responsiveness to filings of annual reports. Most, if not all, reviewed studies managed to capture a significant price change around the releases of annual reports. Qi *et al.* (2000) documented abnormal price movement around submissions of annual reports to EDGAR. By contrast, no abnormality was found when submissions were made via the old filing method. Ashana and Balsam

(2001) recorded price and volume reactions to 10-K's filed for the first time with EDGAR, and similarly to Qi *et al.,* no response was captured under the traditional method. The difference in reaction between the first year of EDGAR filings and the last year of the old system filings was statistically significant. Griffin (2003) provides yet another evidence of the market reaction captured under EDGAR. Excess in returns was significant and immediate. Increased efficiency, shorter and stronger response time was attributed to less costly and more timely access to filings, "*within minutes of SEC receipt* ", under the electronic system. You and Zhong's (2009) findings are also consistent with the EDGAR premise of an instant change in trading volume and stock returns around filing days. Finally, Bharati *et al.* (2020), in a more recent study, report a change in the price behaviour in the new regulatory environment. Improved efficiency in the market reaction to 10-K filings is documented for the first year of the FD and SOX implementation[20]. Bharati *et al.* work despite examining a new regulation rather than a new technology, is a comparable study to the above. Both changes in the filing environment (EDGAR and FD/SOX) aimed at improving clarity and transparency of the corporate disclosure, and both, as a result, enabled the market participants to price the information content of annual reports in a more efficient way.

The focus of this thesis is the National Storage Mechanism, the British electronic filing system implemented in 2010. As documented by Blacke (2010), the NSM provides free and nearly immediate access to corporate filings, marking a considerable advancement over the prior manual (paper-based) filing method. Theoretically, this development is expected to reduce extraction costs, thereby accelerating the assimilation of information and shortening the delay in investor response times. Consequently, it should lead to enhanced market efficiency in responding to newly

[20] Full Disclosure (FD)- SEC regulation implemented in 2000; Sarbanes–Oxley Act (SOX) adopted in 2002.

released corporate disclosures post - NSM adoption. In light of these considerations, it is reasonable to posit that the NSM brings similar benefits to the market as observed with the introduction of EDGAR in the United States. Therefore, the fourth hypothesis anticipates a more rapid price adjustment in response to annual reports filed through the NSM.

Hypothesis 4: *The market reaction to filings of annual reports is faster after the adoption of the NSM.*

The advantage of the NSM over the traditional manual filing system is argued in support of the hypothesis, particularly regarding the increase in market efficiency. The improvement is expected to be realised through the NSM's electronic filing method, which facilitates faster receipt, acceptance and dissemination of time-sensitive information.

The theoretical underpinning of this hypothesis is related to the Efficient Market Hypothesis (EMH), with a specific focus on the role of technology. Studies by Yen and Wang (2015), Singh (2018) and Blankespoor (2019) highlight that technology significantly influences market operations. For instance, for asset prices to accurately reflect their intrinsic value, information must be promptly and completely integrated into prices once it becomes publicly available. This requires free and widespread access to information (Singh, 2018; Blankespoor, 2019). A robust information dissemination system is essential for achieving informational efficiency, as it reduces information asymmetry (Gao and Huang, 2020) and limits the information advantage, thereby contributing to fewer market anomalies and reduced mispricing (Chapman *et al.,* 2019). Furthermore, an efficient dissemination method positively affects market liquidity, as evidenced by higher trading frequency and volume, a quicker liquidation of a position and narrower bid-ask spreads (Chapman *et al.,* 2019).

It is widely acknowledged and substantiated by research that technological advancements improve market efficiency (Griffin, 2003; Yen and Wang, 2015; Bharati *et al.,* 2020; Gao and Huang, 2020). Given that the dissemination of information is central to the EMH (Santoso and Ikhsan, 2020), the NSM's implementation presents an opportunity, paralleling the impact of EDGAR, to investigate whether prices more efficiently incorporate new information. This is expected to manifest as a quicker market response to annual reports filed via the NSM, compared to the reactions under the prior paper-based filing system.

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2.4 On Reporting Complexity

2.4.1 The issue of length of reporting

“More is not always better” (Levitt and Snyder, 1997).

Results of the above pre-EDGAR studies imply that the market reaction to filings of annual reports, if captured, is weak and/or delayed. The magnitude of the response is lower than expected from a document with this level of price relevance information. Apart from the already discussed preliminary statements and the dissemination method, there is another possible explanation. The information content of an annual report is vast and complex, therefore, processing this type of discourse takes time, and in fact, it can be difficult to achieve (Bloomfield, 2002; You and Zhong, 2009). As Nadeem (2022) notes, on the one hand, a provision of more information might be a managerial safeguard against a lawsuit, on the other hand, due to its volume, it could be unprocessable for market participants, particularly individual investors.

The issue has been recognised by academics and regulators. Many questions have been posed regarding readability, clarity, the length of annual reports (and 10-K reports) and their effectiveness in communicating value relevant information to the market. Those concerns echoed the SEC's long-lasting criticism of information overload, redundancy, lack of specificity and clarity, lower levels of hard information and the use of complex language in annual reports (Schroeder 2002; Li, 2008; Miller, 2010; SEC, 2013; Loughran and McDonald, 2010; Dyer, Lang and Lawrence, 2016). Consequently, in 1998, the SEC implemented a regulation that advocated the use of plain English[21]. Despite the regulatory advice, the length and complexity of financial reporting, and of annual reports in particular, has been increasing (Li, 2008; Miller, 2010; Dyer *et al.,* 2016, 2017; Nadeem, 2022). The question is whether this increase in information content of reporting has been beneficial to investors. The traditional view is that more information improves the transparency of the market and reduces information asymmetry (Athanasakou, Eugster, Schleicher and Walker, 2020; Nadeem, 2022). Equipped with technological advancement, investors should have the unlimited capacity to process any length of information (Dyer *et al.,* 2016; Nadeem, 2022). More recently, however, it has been argued that excessive length of corporate disclosures weakens investors and analysts' ability to assimilate information content

[21] The FD and SOX regulations, mentioned in Bharati *et al.* (2019), followed the 1998 SEC guidelines.

(Lehavy, Li and Merkley, 2011; Nadeem, 2022). This means that lengthy reporting impairs the effective conveyance and movement of information. It compromises the incorporation of value relevant information into a stock price (Bloomfield, 2002) by slowing down and adding noise to price discovery (Bhattacharya, Olsson and Park, 2021). Thus, once again, we have a problem of inefficiency in the market.

The matter is well captured in Dyer *et al.* (2016). It was documented that during the period 1996-2013, the median word count in 10-Ks doubled from around 23,000 to 49,000. This increase in the textual volume of reporting could not be justified by changes in the companies' characteristics. More importantly, the greater length of annual reports did not enhance the value relevance of information, and in fact, quite the opposite. Greater redundancy, boilerplate, fog and stickiness in annual reports were found, coupled with reduced readability and a decrease in hard information. From a perspective of an investor, this is highly problematic because a redundant discourse lengthens price discovery (Radin, 2007). Low quality disclosures, in terms of the readability factor, cause higher returns volatility (D'Augusta, De Vito and Grossetti, 2023) and stock price crashes (Nadeem, 2022). The re-use of the same text from a previous year ('sticky' disclosure) weakens market responsiveness, while the overuse of generic and standardised disclosure ('boilerplate') is associated with lower liquidity, moreover, with a decrease in analysts following and a decline in institutional ownership (Dyer *et al.,* 2017). All those textual limitations add inefficiency to the market. There is plenty of empirical evidence in the literature about the adverse effect of reporting complexity on the market. D'Augusta, *et al.* (2023) in their study demonstrate that low textual readability of a disclosure is likely to cause disagreement between investors and traders about the company's valuation. Skilled investors are able to work with lengthy and complex information to determine the intrinsic company value.

Unsophisticated (retail) investors, however, are unlikely to process that information, or if they do, their interpretation may contain errors and inaccuracies. This asymmetrically informed market, as D'Augusta *et al.* argue, is a source of market risk. Higher abnormal returns volatility and unexplained trading volumes, up to five weeks after earnings announcements, were reported around filings that scored low on the readability factor. Similarly, Miller (2010) documents reduced trading around complex 10-Ks. You and Zhang (2009), on the other hand, found that the immediate abnormal price change around filings of complex annual reports took place only 56% of the time, and the remaining change was incorporated into the stock price gradually, over the following 12 months. This represents a significant underreaction of the market. The strength of the underreaction depends on the level of informational complexity. By contrast, disclosures of low complexity are associated with little, if any, underreaction. Lee (2012) reports a stronger market reaction to more readable annual reports around filings of quarterly reports (10-Qs). While in Seeback and Kaya (2022) we see significantly positive price and trading response to more specific audit risk disclosures. This is important because more specific, hence less complex and more succinct, information increases communicative value to investors; disclosures are easier to process. In consequence, information is more promptly incorporated into the stock price.

The above studies were written from the perspective of an investor or a trader, meanwhile, Lehavy *et al.* (2011), Loughran and McDonald (2014) and Singh (2018) take the view of an analyst. The first two papers examine 10-Ks 'readability'[22] and its effect on analysts' responsiveness and their forecast accuracy. The results of those two enquiries are the same, both found that the longer and the more complex report,

[22] Measured in the file size and the 'Gunning Fog Index'.

the greater difficulty analysts had in assimilating the content of information. This, in turn, led to greater errors and wider dispersions in earnings forecasts. Less readable 10-K reports were also associated with analysts' assessments and recommendations being published with a delay. In addition, Singh (2018) in her study finds that it takes as much as 80 hours to collect and analyse information on untaxed foreign earnings from financial statements. The spread of the data across many sections of a report, notes and footnotes, reduces readability. It is not difficult to see that such an inefficient way of reporting creates high economic costs for analysts and investors.

We need to bear in mind that the purpose of annual reports is to inform prospective investors about the company value and the corporate proposition, and for that the disclosure needs to be strongly communicative (Haleem, Ahamed and Kumarasing, 2020). This cannot be achieved if a report has an extensive textual volume and a complex narrative (Chircop *et al.,* 2022). The management, as Nadeem (2022) argues, has a legal and ethical responsibility to investors, the company's shareholders, to provide transparent, clear and concise information in their regulatory filings. The evidence, however, is to the contrary. Lengthy and costly to process annual reports are released to the market. The implication of that is that the content of that information cannot be fully and immediately incorporated into stock prices, adding informational inefficiency to the market. This issue is captured in the Incomplete Revelation Hypothesis (IRH), a theory developed by Bloomfield in 2002, and in the Management Obfuscation Theory (MOT), which was later derived from the IRH by Li (2008).

2.4.2 The Incomplete Revelation Hypothesis

In a nutshell, the Incomplete Revelation Hypothesis (IRH) states that investors are subject to limited information extraction capability so that information that is more costly to extract from disclosures is impounded into share prices less completely (Bloomfield, 2002).

What this means is that information which is more expensive to collect and process - here, Bloomfield places emphasis on financial statements - is not fully reflected in prices. This is exactly what You and Zhang (2009); Lee (2012) and Miller (2010) documented in their studies. Bloomfield explains why this occurs: firstly, limited attention and cognitive difficulty prevent some traders from considering all available information (especially, costly and more difficult to extract). This idea has been discussed in detail under the 2.2.3 section. Secondly, higher acquisition costs negatively affect dissemination, which is then reflected in delayed reaction, like in Stice (1991), Cready and Mynatt (1991) and Easton and Zmijewski (1993). Thirdly, demand for information decreases with costly information; consequently, there is less trading interest because of the opportunity cost, which is higher when collecting complex information. The other, cheaper, option, preferred by the market participants, is making an investment decision based on a more straightforward information set, e.g. earning announcements. This notion refers to the bounded rationality notion (Barberis and Thaler, 2003; Mushinada and Veluri, 2019; Wijayana and Achjari, 2020). It is important to note that the IRH also works the other way, the price reaction is stronger to information which is easier to acquire and process (Bloomfield, 2002).

Bloomfield's theory is firmly based on a link between information processing cost and price change, more precisely, between the degree of inefficiency and costly information

(Bloomfield, 2002). It is important to note that expensive information is problematic because according to Grossman and Stiglitz (1980):

"The highest the cost of information, the smaller will be the equilibrium percentage of individuals who are informed".

Only those who are fully informed can ensure efficiency (Grossman and Stiglitz, 1980). Bloomfield's notion, therefore, runs counter to the EMH, which assumes that all relevant information is reflected in prices, no matter the complexity of the information.

2.4.3 Management Obfuscation Theory

"*The way how information is written is likely to influence the reader*" (Seebeck and Kaya, 2022).

The Incomplete Revelation Hypothesis is based on the extraction costs in a general sense. It implies that costly to process information contributes to price inefficiency. There are several reasons why information content of a corporate disclosure can be costly. Complexity of the content is frequently cited (You and Zhang, 2009; Miller, 2010; Singh, 2018) but there is also another possibility, the information presented in those disclosures is obfuscated. The obfuscation theory, which is an extension of the IRH, says that management, strategically, makes bad information costly to extract and process. Li (2008) discusses the issue in detail and demonstrates evidence that managers, knowing that the market reacts with a delay to lengthy and complex disclosure, opportunistically structure the annual report with the aim of obscuring adverse information.

It is worth noting that management is rewarded in stock options. Higher stock prices not only increase the value of their holdings but may also contribute to an increase in their bonuses (Bloomfield, 2002). According to the obfuscation proposition, management has an incentive to manipulate the markets by emphasising good news and hiding weak financial performance (Hassan, Abbas and Garas, 2019; DeHaan, Song, Xie and Zhu, 2021) or a risk-related content (Seebeck and Kaya, 2022). The objective is to uphold the company's market value. This can be done, as stated above, by writing longer corporate disclosures or by obscuring information among redundant, irrelevant and sticky narrative (Bloomfield, 2008; Li, 2008; Demaline, 2020; Dyer *et al.,* 2017). As Nadeem (2022) notes, excessive executive compensation can be hidden among a high textual volume. Earnings management, undertaken because of missing earnings forecasts, can be obscured in a complex and less readable disclosure. While shareholders require to be informed about risky projects and initiatives, that information, however, can be obfuscated by the use of technical language. That way, managers make it harder for investors to extract and process information which may negatively affect the price of their company's stock (Bloomfield, 2008).

Lengthier, complex and foggy disclosures increase extraction and analysis costs (Li, 2008). So, the fact that bad news may initially escape the market's attention is precise because it is buried among information content that is hard to extract and that carries high extraction costs. On the other hand, when management wishes to communicate 'good news', for example about a strong future performance, it will do it in a transparent way. In order to limit information processing costs, and thereby ensure that positive information is reflected in the stock price as soon as possible, the company produces a high-quality disclosure (well readable and concise). This strategic reporting helps in distinguishing the company from others, from those who underperform, from, as Li puts it, ‘lemons’. Li’s study is a confirmation of the link between a financial performance and readability of a disclosure, measured in the length of a narrative and the Fog index. It shows that annual reports, which are longer and foggier to read, are filed by companies that experienced lower earnings, compared with the previous year. On the contrary, companies that have persistent positive earnings write fewer complex reports.

2.4.4 Paradox of IRH

Interestingly, there is a paradox to the Incomplete Revelation Hypothesis (IRH). For an informed investor to execute a trade, the gains of analysing information must outweigh the extraction and analysis costs. Therefore, a trader will employ all available information if, firstly, she/he is able to process it (Pernagallo and Benedetto Torrisi, 2020), secondly, if the cost is lower than the return (Dyer *et al.,* 2016). Consequently, if costs are too high or benefits too low, then only a few will trade, and this is what was said above (Incomplete Revelation Hypothesis paragraph). Now, we should appreciate the fact that those who stay and trade are more likely to be wealthier, those who have more capital, better technology (e.g. more advanced data processing software), and better access to financial analysts (Dyer *et al.,* 2016). This means that costly information is concentrated in the hands of the wealthiest and the most resourceful, predominantly institutional investors or big trading houses. The other, smaller and less skilled investors and traders will opt out because they do not have access to an array of analysts and, or sophisticated technology. The paradox is that high extraction costs cause information asymmetry in the market (D’Augusta, *et al.,* 2023), which gives a trading advantage. This is because information that contains high extraction and processing costs will generate more gains (Dyer *et al.,* 2016). The gain comes from exclusivity, and exclusivity comes from being expensive. And if we take the obfuscation theory into account, we could argue that those wealthy participants are also likely to detect the bad fruit in hand (Dyer *et al.,* 2016).

2.4.5 Alternative explanations of the 'strategic reporting'

The management obfuscation theory is a plausible notion, however, there are a few alternative explanations why we see longer annual reports for companies that experience weaker financial performance. All of them are briefly discussed in Bloomfield's later paper (2008).

Firstly, it could be argued that communicating a loss year, or in general, the company's weaker financials require more words. It takes longer, more textual disclosure, to explain bad news and adverse events than positive ones. Bloomfield names this occurrence 'ontology'.

A similar concept to ontology is 'management by expectation'. A strong performance, or in line with analysts' predictions, does not need clarification. However, when a company does not meet expectations, or underperforms, investors will question and will expect some sort of explanation (Caglio, Melloni and Perego, 2020), thus, a greater length of reporting will be put in place. This idea, in fact, has been confirmed in literature. Matsumoto *et al.* (2007) and Frankel, Mayew and Sun (2010) show that companies which failed to meet earnings forecasts will run longer conference calls. It is claimed that during those calls, the management rationalises, or excuses, weak performance, subsequently attempting to shift the focus to future-oriented terms. Thus, the content of the conference calls is longer in comparison to calls of companies with strong financials.

‘Attribution’ is also another possible explanation. Poor earnings and returns are often attributed to other sources than mismanagement, to events outside managers’ control (Munyon, Jenkins, Crook, Edwards and Harvey, 2019). These, again, would require a justification: additional longer paragraphs would be applied to discuss, for example, unforeseen economic or political surprises, or an over competitive marketplace, which is also what Dyer *et al.* (2016) note in their study.

The last reason, which would fit this scenario, is ‘misdirection’. Management may try to distract the market from bad news by including longer discussions about other positive news that happened that year, or writing about future prospects, plans and projects. The intention is to direct inventors’ focus on positive events which happened or may happen. This strategy would require producing a longer disclosure as additional content on ‘what lies ahead’, for example, would be included.

Research gap

There is a considerable body of literature that discusses the adverse effects of lengthy and complex reporting on the market. This impact has been examined in various contexts, including trading volume (Miller, 2010; You and Zhang, 2009), returns volatility (Loughran and McDonald, 2010) and long-term abnormal returns (Li, 2008; You and Zhang, 2009). However, a gap remains in the literature; to the researcher’s knowledge, only You and Zhang have attempted to link verbose annual reports with the initial market reaction, and their treatment of this issue was brief, serving as a complementary analysis in their broader examination of trading volume and 12-month stock returns. Therefore, I investigate this relationship in greater detail, aiming to provide a more comprehensive understanding of how verbose annual reports influence the immediate market response.

Hypothesis development

The fifth hypothesis brings the length of a disclosure as the final explanatory factor in this study of the market's reaction to annual reports.

The information content of annual reports is vast and complex; therefore, it takes a considerable amount of time, cognitive effort and cost to process all financial and corporate data presented there (Bloomfield, 2002; You and Zhong, 2009; Singh, 2018; Chircop *et al.,* 2022). As a result, fewer participants trade on that information, for others, it is too expensive (Miller, 2010; D'Augusta, *et al.,* 2023). As long as those high costs keep some investors on hold, the information content of a report is revealed incompletely and with a delay. The stock price, initially, is not fully representative of the company's fundamentals. This inefficiency in the market reaction is documented in Miller (2010), where longer and less readable financial reports are associated with reduced trading activity. In You and Zhang (2009), on the other hand, we see underreaction to complex 10-K filings. While in D'Augusta *et al. (*2023), abnormally high returns volatility around earnings announcements of low readability are observed. Surprisingly, we do not have much evidence for the current price response, therefore, the immediate market reaction to verbose annual reports is the subject of the last premise of this study. The hypothesis claims that investors react with a delay to lengthy annual reports, alternatively, such reporting has a negative impact on the market.

Hypothesis 5: *<u>The market reaction to filings of lengthy annual reports is delayed or negative.</u>*

Building upon the Incomplete Revelation Hypothesis (IRH), the hypothesis predicts that the length of annual reports delays the market's response to their filings. According to IRH, as articulated by Bloomfield (2002) and supported by Ejaz, Jalal and Fayyaz (2022), high extraction costs result in market inefficiencies, such as prices not fully reflecting costly information. Consequently, I posit that a greater textual volume, which is not only costlier but also more time-consuming to process[23], will lead to delayed price reactions (Radin, 2007). Bloomfield (2002) specifically notes that IRH accounts for market underreaction to information.

Additionally, I make an alternative second prediction: the market tends to discount lengthy annual reports. This claim is based on the Management Obfuscation Theory (MOT), which suggests that management might structure annual reports in a complex manner to obscure poor financial performance[24] (Li, 2008; Nadeem, 2022; Seebeck and Kaya, 2022). According to the Incomplete Revelation Hypothesis, as detailed by Bloomfield (2002), information that induce higher extraction and processing costs is less fully revealed in the market. Lengthy textual structures contribute to this by reducing clarity and readability, thereby compromising the informational content. This added complexity increases the cost of text and data analysis and prolongs investors' response time (You and Zhang, 2009; Lee, 2012; D'Augusta *et al.,* 2023). Further, if we consider the lengthiness of reports as a deliberate reporting strategy, this aligns with the obfuscation theory. This theory posits that management tends to present favourable information, such as positive financial performance, with greater clarity, while obfuscating unfavourable information, like poor financial outcomes (Li, 2008;

[23] This has been discussed in the literature review.
[24] The relationship between the financial performance of a company and the length of annual reports is examined in the additional analysis (see section 3.4.2) and is not explained in detail under the fifth hypothesis.

Nadeem, 2022). The intention behind this tactic, as Bloomfield (2002) suggests, is to make it more challenging for investors to detect information that could negatively affect the company's stock price. Employing information overload as a reporting tactic serves to obscure details, making the disclosure more difficult and costly to process, particularly in time-constrained environments. The obfuscation of financial information often results in reduced trading activity, as the cost of extracting valuable information may outweigh the potential profit from trading based on that information (Miller, 2010; D'Augusta *et al.,* 2023). Consequently, prices fail to reflect concealed adverse information, leading to stock overvaluation (Bloomfield, 2002; De George *et al.,* 2019). These market dynamics provide management with a strong incentive to 'preserve' the company's stock price. However, the market might perceive the obfuscation as a managerial manipulation, an attempt (unsuccessful if discovered) to hide poorer financial performance. In that case, it is likely that the filing will be discounted and that the market will react negatively. This will only happen if those who trade on that information recognise the 'bad fruit' in hand.

Obfuscation strategies can include adding textual clutter, increasing narrative volume, amplifying textual complexity or relegating adverse information to footnotes (Athanasakou *et al.,* 2020). Given the high sensitivity of the financial content[25] in annual reports, these disclosures are particularly vulnerable to managerial obfuscation, as Nadeem (2022) suggests.

It is important to note the interconnection between the two theories: management obfuscation is motivated by the desire to exploit the incomplete revelation notion to preserve the market value of their company. However, this hypothesis does not

[25] Financial performance, executive compensation, risk factors, etc.

investigate managerial intentions or motivations; instead, it examines the relationship between processing costs and price behaviour.

The importance of the final inquiry lies in its potential to validate key theoretical concepts. If lengthier reporting diminishes the communicative value of disclosures, price discovery becomes more time-consuming, consequently reducing informational efficiency. Such an outcome would provide support to the Incomplete Revelation Theory. Conversely, the alternative scenario considers the efficiency of the market. In scenarios where lengthier reporting is employed to obfuscate information, the market may interpret this as a negative signal, consequently leading to the discounting of such information. While this scenario is consistent with the obfuscation theory, it should be noted that such alignment, although indicative, is not definitive proof of the theory.

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2.5 Summary of the Literature

The reviewed literature implies a lack, or at best weak and delayed, market response to filings of annual reports. This is unexpected, given the significant price-relevant information these reports typically contain. It appears that investors do not promptly process the information in annual reports, indicating that the efficiency of the market, in this instance, is weak. In the above discussion, I have identified three themes that explain this under responsiveness of the market to the information content of annual reports.

Reliance on preliminary information: there is a multi-day period for communicating annual financial results to the public. Market participants seem to focus on this preliminary information rather than the subsequent annual reports, leading to underreaction or insignificant reaction to the latter.

Impact of dissemination methods: the traditional paper-based dissemination method caused delays in distributing annual reports, preventing an efficient market response. A reporting lag lasting several days was not uncommon, making it impossible for the market to efficiently respond to the content of reports on the day of their filing, or the day after. Consequently, we saw, once again, a delayed response. The introduction of EDGAR in the U.S. marked a significant improvement, as it reduced the reporting lag considerably. Now, the time between filing and making it available to the public is counted in hours rather than days, leading to a more efficient and prompt market response.

Complexity and length of reports: the complexity and length of annual reports contribute to informational overload, causing investors to take more time processing them. This delay is reflected in a lagged price change. Additionally, the format of these reports, its significant size, allows management to obfuscate negative information, further prolonging the market's response.

Based on these findings, five testable hypotheses have been developed. The first predicts no change in abnormal returns around the filings of annual reports. The second anticipates an abnormal change in response to preliminary statements. The third foresees a significant price movement around filings of annual reports in the absence of preliminary statements. The fourth hypothesis suggests a stronger investor response following the adoption of the NSM, the British electronic filing system. Finally, the fifth hypothesis expects a delayed or a negative market reaction to lengthy annual reports.

Existing studies on market reactions to annual reports have predominantly focused on the U.S. market, thereby leaving a gap in our understanding of the efficiency of the British market in this regard.

❖

CHAPTER 3: METHODOLOGY

3.1 Introduction

Chapter 3 presents the research design and discusses the methodology and methods central to the study. It focuses on the main task of determining the market's reaction to annual reports, an enquiry that concerns each of the five hypotheses presented in the study. Furthermore, it introduces an additional test, which, while not included in the original hypotheses, arises from the discussion in the literature review in relation to the management obfuscation theory. This test is designed to investigate the hypothesis that there is a negative relationship between the length of annual reports and a company's financial performance.

The chapter begins with the introduction of the sample, followed by a detailed description of the three main subsamples that are employed to test the hypotheses. It proceeds to outline the methodology used to assess reporting length, along with presenting summary statistics for both the length of reports and the cumulative average abnormal returns (CAAR). Following this, the focus shifts to the event study methodology, which is the main statistical method applied to investigate the five hypotheses. This section details the process of determining the market's reaction to the filing of annual reports and explains the calculations involved in the short-run method.

The concluding section introduces two regression models, outlining the key variables, determinants, controls and examining the correlations among them. It also discusses the statistical specifications of both models. The first model complements the event study by providing a multivariate analysis of the market reaction to the length of annual reports. The second model acts as an extension, it expands on the issue of reporting length and a company's financial performance.

❖

3.2 The Sample

3.2.1 Sample selection

(a) The main sample (annual reports)

This study focuses on filings of annual reports for 100 companies of the FTSE100 index, over a ten year period, from January 2006 to December 2016[26]. The selection of 2006 as the commencement year for the sample is informed by the availability of data on Morningstar, which serves as a complementary source of information for this study. This starting point is dictated by the constraints in data accessibility, as annual reports prior to 2006 were not accessible through non-subscription searches on the Morningstar platform.

In the process of forming the sample, filing dates, for each of these 100 companies

[26] The end year of the sample, 2016, is the year when the researcher began collecting the data.

across the ten-year time frame, were manually extracted from a database. Following Stice (1991) and D'Augusta *et al.* (2023) for a company to be included in the sample, it had to had at least 20 days of trading around the filing date.

Over 200 observations were excluded due to unavailability of filing dates or listwise deletion. Overall, 884 entries[27] (company- year observations) were found. The eleven years of data gave us a sample that represents 80% of the initial set. Asthana and Balsam (2001), de Souza *et al.* (2019)[28] and Seebeck and Kaya (2022) worked with a similar number of firm-year observations, 975, 1297 and 664, respectively.

For each company, the date of the annual filing and daily stock prices were identified and extracted. The source of filing dates is Bloomberg. When the date is not found then the Morningstar is employed. To maintain consistency in the data collection, and for resource efficiency, stock prices and financial control variables are exported from Bloomberg. Beaver *et al.* (2020) also employed Bloomberg for their earnings announcements.

Sample selection criteria

The initial sample of 1100 is reduced to the final 884 observations based on the following selection criteria:

[27] More observations would have been recoded if the researcher worked with a bigger index. However, due to the manual search of filing dates of annual reports, it has been decided that the FTSE100 was sufficient. In addition, each report had to be manually converted from the PDF format to a Word document (for the complexity study), hence the choice of the FTSE100.

[28] The 1297 firm- years sample is de Souza et al. (2019) second sample used to verify the results of the first sample, which contains 1643 observations.

1) Annual reports filing dates are available from the Bloomberg terminal or the Morningstar.

2) Daily prices in a 41- day period, around the date of the annual report filing, are available from Bloomberg. The +/- 20 days[29] is the boundary of the event window set by the Stata 'eventstudy2' command (Kaspereit, 2015), which is used for the market reaction analysis. Sharda (2022) employed the same event window (-20 to + 20). While D'Augusta *et al.* (2023) worked with an event time frame of (- 30, -5) for the pre-announcement widow and (+ 2, + 25) for the post- announcement window, a similar window to our study.

The aim of the second criteria is to eliminate companies that either are not listed or are delisted from the index during the event period, therefore, making the calculation of the cumulative average abnormal returns possible.

The sample is then split into three subsamples, according to the tested hypothesis, plus a control sample: (i) preliminary subsample; (ii) dissemination subsample; (iii) complexity subsample; (iv) control subsample.

It should be noted that the 884 observations is the initial sample used for the first and the fourth enquiry ('market reaction to annual reports'; 'change in the dissemination method'). When the preliminary reports and the length factor are examined, the number of observations changes.

[29] - 20 specifies the lower boundary of the event window, measured in trading days relative to the event date; + 20 specifies the upper boundary of the event window (Kaspereit, eventstudy2, Stata, 2022); day 0 is assigned to the event day 0. Cumulatively, - 20, 0 and + 20 create the 41- day event window.

(b) Subsamples

(i) Preliminary subsample

To test the impact of the preliminary statements of annual reports[30] (PR), the sample has been split into four groups. This is based on availability of preliminary reports and the time (dates) of their release in relation to the annual reports filings.

1) Annual reports without preliminary reports, or when preliminary reports are unknown *(AR when PR unknown)*
2) Annual reports and preliminary reports the same dates *(AR & PR the same dates)*
3) Annual reports following preliminary reports *(AR following PR)*
4) Preliminary reports only *(PR)*

Group (1) consists of 133 annual reports without the preliminary reports. Group (2) represents 56 annual reports that are released on the same day as the preliminary reports. This is where we have the concurrent preliminary results and annual filings. Group (3) contains 661 annual reports that are preceded by the preliminary reports. In other words, the PR release date is before the filing date. Group (4) is exclusively represented by 666 preliminary reports, which precede the filings of annual reports. The sample is divided in a similar way to the one which was presented in Easton and Zmijewski (1993), Li and Ramesh (2009) and Beaver, McNichols and Wang (2020). All three studies examined the impact of sequential and concurrent quarterly earnings announcements on the market[31].

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[30] Preliminary statements of annual reports - shortened to preliminary reports, hence the PR acronym.
[31] Easton and Zmijewski (1993) and Li and Ramesh (2009) computed the price change; Beaver *et al. (*2020) examined the volume change.

Based on the sample of 884 filings:

- 15.05% of the time, preliminary information was unknown[32] (133 observations) – group 1
- 6.33% of the annual filings were made concurrently with the releases of preliminary reports (56 observations) – group 2
- 74.77% of annual reports followed the releases of preliminary reports (661 observations) – group 3. This high number indicates that most filings are published after the release of preliminary reports.
- The high number of preliminary reports (666 observations), which represents 75.34% of the entire sample, the group 4, is a surprising finding because publication of those reports is not mandatory. The number of those observations, in fact, naturally corresponds with the third sample of annual reports that follow the preliminary reports.

(ii) Dissemination subsample

This subsample is used to examine the effect of NSM, which is the new disclosure filing method. Abnormal stock returns are measured both prior and after the adoption of the NSM system.

The sample is split for two and the division point is 2011, which is the year of the NSM implementation. In the same year, 'Morningstar' is appointed as the electronic provider of the service. The first subsample contains annual reports that were submitted via the

[32] I have not found the filing dates for preliminary statements of annual reports.

traditional paper method, during the 2006-2010 period. It comprises 325 annual reports, constituting 37% of the total sample. The subsequent subsample, of 2011-2016, includes 559 reports filed electronically via the NSM, accounting for the remaining 63%.

An additional phase of analysis examines market responses during the transition year. For 2010, the final year under the old system, filing dates are compiled for 78 reports. For the following year, 2011, marking the NSM's inception, 74 reports are collected. Approximately 50 observations are excluded due to unavailable filing dates, resulting in a final sample of 152 firm-year observations, which represents 75% of the initial aggregate sample for those two years.

(iii) <u>Complexity subsample</u>

The ‘complexity’ sample is created for the third enquiry, which examines the relationship between the length of annual reporting and the price change around filing days.

The process began by downloading PDFs of annual reports from either Bloomberg or the 'investor relations' section of company websites, covering 2006-2016. The length of a report was quantified using a word count, requiring the conversion of PDF documents into word format using 'Adobe Acrobat' software. However, due to security settings on some files, not all PDFs were convertible, reducing the initial sample of 884 to 763 observations, or 86% of the original collection.

Subsequently, the sample was divided into two categories based on word count: high and low, using the mean word count as the dividing criterion. Reports exceeding the mean were categorised as a 'high word count' group (H_WC), while those below the mean formed a 'low word count group' (L_WC). This approach is similar to that adopted in Miller (2010) and He and Plumlee (2020). However, in the latter study, the mean word count was calculated for specific words and items within a filing, as opposed to the entire report. You and Zhang (2009), on the other hand, created their sample using the median word count.

Of the adjusted sample of 763, the 'high word count' subsample (H_WC) contains 356 annual reports, making up 47% of the group. The 'low word count' subsample (L_WC) comprises 407 reports, representing 53% of the sample.

(iv) Control subsample (regression subsample)[33]

Model 1

For the regression model one five additional variables are included to control for other factors that can influence the market reaction: book-to-market, share turnover, institutional ownership, cumulative average abnormal returns (CAAR) of the previous 4 weeks and the abnormal return (AR) from day 2 prior to the filing.

Each of the identified determinants exerts an influence on stock returns. The BM relationship with returns is associated with risk and earnings perspectives, suggesting a positive direction (Chan and Chen's, 1991; Fama and French, 1992; Ishtiaq, Tufail,

[33] The constraints in data availability have led to a reduction of the sample size to 287, which constitutes 38% of the original sample.

Muneer and Sarwar, 2019). The 'share turnover', influenced by market sensitivity and liquidity, also tends to positively affect stock prices (Broadstock and Zhang, 2019; Duz and Tas, 2021; Liao, Luo and Tang, 2021). The 'institutional ownership', through informational advantage and corporate governance, is associated with higher returns (Koijen, Richmond and Yogo, 2020; Cao, Dong and Ma, 2020). Finally, the CAAR and AR capture the full price effect of corporate filings (Tetlock *et al.,* 2008; D'Augusta, De Vito and Grossetti, 2023).

Model 2

For the second model, two determinants and four controls are included:

- Determinants*:* return on assets, net income (dummy variable),
- Controls: company size, market-to-book ratio, research and development, leverage

Return on Assets (ROA) and net income (INCOME) are found to influence the readability and length of annual reports. Studies suggest a negative relationship: lower ROA and negative INCOME (indicating weaker financial performance or losses) are associated with poorer readability and more extensive reporting (Hassan, Abbas and Garas, 2019; Xu, Pham and Dao, 2020). This trend aligns with the obfuscation theory, where companies with less favourable financial results tend to produce lengthier and more complex reports, potentially obscuring their financial standing (Li, 2008; Dyer *et al.,* 2017).

In terms of the four determinants: larger companies tend to have lengthier reports due to their complex operations and need for extensive disclosure (Wardhani, Widianingsih and Karundeng, 2019; Fahad and Rahman, 2020). Higher MB ratios, indicating growth, often lead to more detailed and complex annual reports (Li, 2008; Bai, Dong and Hu, 2019). R&D activities usually result in more comprehensive reporting due to their technical nature and operational complexity (Lehavy *et al.,* 2011; Lim, Chalmers and Hanlon, 2018). Increased leverage often requires more detailed disclosures, aimed at mitigating increased risk and enhancing transparency for shareholders and creditors (Vitolla, Raimo, Rubino and Garzon, 2020; Boshnak, 2021; Lastiningsih, 2021).

In conclusion, these control variables were selected based on existing literature that documents their explanatory power on returns, as well as on the overall length of reporting. For a more detailed justification of the variables selected in model one, please refer to section 3.4.1.2. Similarly, the rationale behind the variable choices in model two is explained in section 3.4.2.2.

3.2.2 Measures of length of reporting

Similar to Li (2008); You and Zhang (2009); Miller (2010); Loughran and McDonald, (2010); Lawrence (2013); Dyer *et al.* (2016); Fang-Klingler (2019); Plumlee (2020) and Suttipun and Yordudom (2022), the document length is measured by applying a 'word count'. According to Loughran and McDonald (2010), the length of a disclosure is a good measure of a textual ambiguity, which investors and analysts are sensitive to. The word count has often been used in the above studies as a proxy for complexity and readability of a financial disclosure.

I use WORDS + tables + footnotes and endnotes. Miller (2010) included tables but excluded footnotes and endnotes. You and Zhang (2009), on the other hand, excluded tables but it seems that footnotes were applied, although this is not explicitly stated.

The decision to use both tables and footnotes is based on a research indicating these elements can hold significant information. Bloomfield (2002), for instance, notes several potential uses of footnotes. They can be used to conceal negative information, a strategy associated with opportunistic reporting by management to inflate their company's stock prices. Another instance of strategic reporting involves the under-disclosure of stock options expenses, which may be overlooked by the market if only mentioned in footnotes.

To mitigate potential skewness in the word count, the method employed by Li (2008), Miller (2010), and Lawrence (2013) is followed. This involves applying the natural logarithm to the number of words.

3.2.3 Distribution of filing dates

(a) Calendar time clustering: regulatory due-date cluster

The calendar-time clustering is an institutional phenomenon that has been reported in several studies (Easton and Zmijewski, 1993; Asthana and Balsam, 2001; Griffin, 2003; Li and Ramesh, 2009; Loughran and McDonald, 2010; Bartov and Konchitchki, 2017[34]; Brooks, Cheng, Liu and Yu, 2021). Regulatory authorities mandate that

[34] In their supplementary analysis, the researchers observed a clustering of 10-K and 10-Q filings, which is suspected to have emerged following changes in accounting regulations.

publicly listed companies release their audited financial statements within a designated timeframe following the conclusion of their accounting year (Mitra, Al-Hayale and Hossain, 2019; Askoy, Yilmaz, Topcu and Uysal, 2020). Due to the mandatory submission deadline, therefore, many companies file their annual reports around the same date, which creates a calendar-time cluster (Li and Ramesh, 2009; deHaan, de Kok, Matsumoto and Rodriguez-Vazquez, 2023). Li and Ramesh, Asthana and Balsam, Griffin[35] and Brooks *et al*. for example, found that filers clustered 90 days after the end of a calendar year. In the U.S., March is the regulatory due- month for an annual report filing (Griffin, 2003). For the sample of this study, the cluster is to be captured at the end of April, which is the filing deadline in the UK, providing a company's fiscal year ends on December 31st (FCA, 2020).

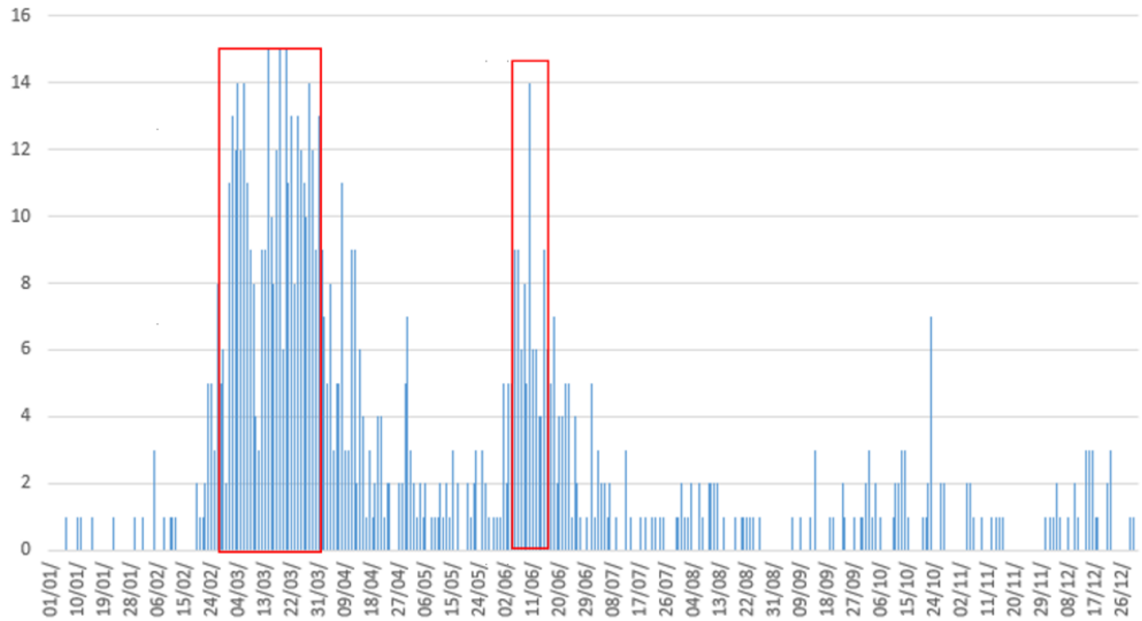
However, the calendar-time clustering of filings, which de facto leads to overlapping of event windows, can be problematic. It may create a cross- sectional dependence (deHaan, *et al.,* 2023), therefore, violating the statistical assumption of independence of observations (MacKinlay, 1997; Monaco, 2023). Furthermore, it may impact the market reaction by increasing investor attention to annual reports (MacKinlay, 1997; Griffin, 2003; Li and Ramesh, 2009; Brooks *et al.,* 2021). In the subsequent chapter 4.2.3, the investigation focuses on whether clustering affects the abnormal returns of the sample.

Figure 3.1 presents daily distribution of filing dates, of the full sample over the time frame of the study (2006-2016). For illustrative purposes, the data is represented using a 12-month bar chart. Griffin (2023) has applied the same method of showing the

[35] In Li and Ramesh (2009), Asthana and Balsam (2001), Griffin (2003) the strongest clustering of annual reports was reported in March.

frequency of his filings.

Figure 3.1: Calendar year distribution of annual reports filings between 2006 and 2016



Distribution of annual report filings per year. Frequencies show the average number of filings per day per year (12 months), based on all annual reports filings in 2006 up to 2016.

The daily distribution of the filings is very similar to the other four distributions presented in Griffin, Li and Ramesh, as well as, in Asthana and Balsam, Loughran and McDonald, Brooks *et al.* The highest intensity of filings is depicted in March (the first red bracelet). 40% of the sample (356 reports) were filed this month. This indicates that many companies submitted their reports about a month before the statutory due date. This clustering, in fact, begins in the last days of February, around the 26th, and ends, as predicted, on April 30th, which is the last regulatory due date. Together, these three months account for 57% of all submissions of the sample. In Griffin, Li and Ramesh, filings are more densely captured with their spikes, 35.3% and 24.9% respectively, accumulating only on the last 4 days of the regulatory due date, March 31st. In contrast, 59% of the filings in Loughran and McDonald's study and 56% of those in Asthana and Balsam's are submitted in March. This is a higher percentage compared to the 40% observed in this study.

One of the reasons why companies may choose to file their annual reports prior to the statutory deadline is the potential reinforcement of investor confidence. Such approach is often interpreted as a signal of operational efficiency, transparency and a commitment to timely and accurate financial disclosure, attributes that are generally viewed favourably by shareholders and prospective investors (Brooks *et al.,* 2023). It is also worth noting that a timely filing encourages analyst coverage. Analysts depend on recent financial data to formulate insights and recommendations for investors. Companies that file their reports early are likely to benefit from more extensive coverage and potentially favourable analyst commentary (Truong, 2023). An earlier submission could also contribute to maintaining positive shareholder relations, especially with institutional investors, who expect timely and transparent communication (Cho, Choi and Kim, 2023; Truong, 2023).

Figure 3.1 also shows the second most popular time of submissions, June (the second red bracelet), which accounts for 17% of all filings. The June cluster was also documented by Griffin. Collectively, those two clusters, March (extended for February and April) and June, account for 74% of filings of our 884 sample. One potential explanation for the clustering of filings in June is attributed to delayed submissions. Brooks *et al.* (2021) observe that companies often face difficulties in complying with statutory deadlines (e.g., submitting within 60-90 calendar days following the fiscal year-end). Such delays may arise from various factors, including auditor-related postponements, the need for financial restatements and corrections. Additionally, Mita *et al.* (2019) highlight that complex financial transactions and restructuring activities can require extended periods for comprehensive financial reporting.

(b) Calendar time clustering: calendar quarter-end cluster

A second type of clustering is a calendar quarter- end is well documented in Brown, Sotes-Paladino, Wang and Yao (2017), moreover, in Li and Ramesh (2009), where we see a significant market reaction to periodic filings around the ends but also the beginnings of the calendar quarters.

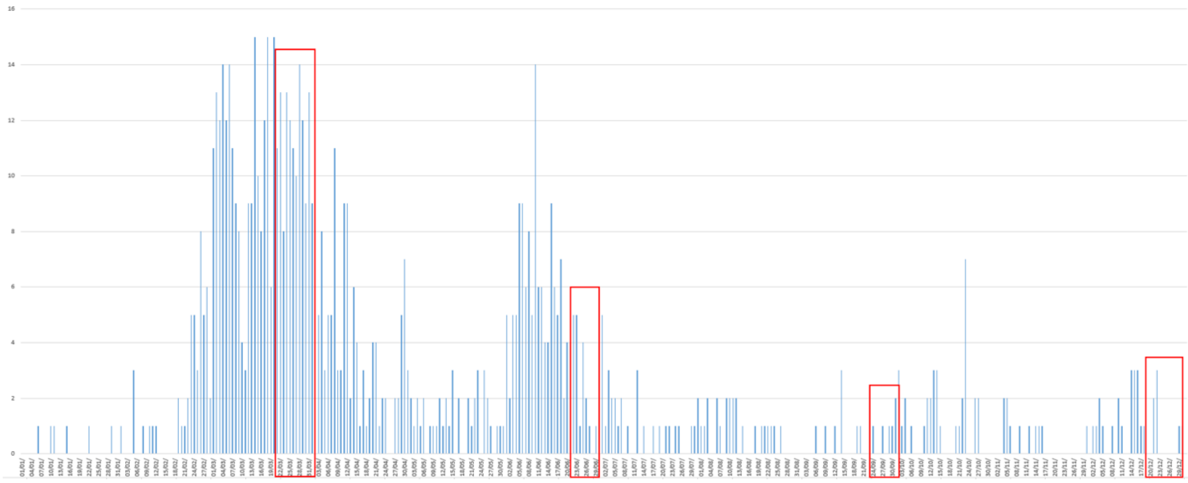
Trading near quarter-ends is mainly a combination of performance and operational related factors. Institutional investors commonly undertake reviews of their portfolios and positions at these intervals, in alignment with the standard practice of reporting portfolio performance to clients on a quarterly basis. The primary objective of these reviews is to evaluate the performance of individual assets and the overall portfolio, subsequently leading to portfolio rebalancing. As a result, active management of positions occurs before quarter-end, characterised by the divestment of underperforming securities and the acquisition of new ones that present more favourable return prospects (Bai, Ma, Mullally and Solomon, 2019; Hung, Lien and Kuo, 2020).

Moreover, portfolios are often benchmarked against specific indices, therefore, adjusting portfolios near quarter-ends allows investors to align their holdings with any changes in the benchmark composition (Brown, Sotes-Paladino, Wang and Yao, 2017). Additionally, quarter-ends frequently align with redemption or subscription cycles in certain investment vehicles, such as mutual funds. This timing prompts institutional investors to modify their portfolios to address liquidity requirements or to channel funds into new investment opportunities (Witmer, 2019). Lastly, investors' trading or investment decisions may be influenced by information that is typically disseminated on a quarterly basis, such as earnings announcements (De George *et al.,* 2019).

Cumulatively, these factors are likely to increase trading volumes. When annual reports are released near quarter-ends, such clustering introduces extra volatility (noise) into stock prices (Kolari *et al.,* 2018), potentially skewing the results of this study. The prevailing market condition, notably the calendar time clustering, is likely to influence investors' reaction. However, there is a risk that this reaction might be mistakenly attributed to the information content of the annual reports rather than to the underlying market dynamics.

In order to learn whether the study's sample is also a subject of this clustering, the sample has been partitioned into four groups: 1) March quarter; 2) June quarter; 3) September quarter; 4) December quarter. Each subsample contains annual reports filed in the last week of each quarter.

Figure 3.2: Calendar quarter distribution of annual report filings between 2006 and 2016



Distribution of annual report filings per year. Frequencies show the average number of filings per day per year (12 months), based on all annual reports filings in 2006 up to 2016.

Figure 3.2 presents a yearly distribution of the filings. The quarter-ends are captured by the red bracelet. 19% of all annual reports were submitted over the four calendar quarter ends. This is a smaller figure compared to the one reported by Li and Ramesh (2009); 26% of their sample was filed at the calendar quarter- ends.

The first quarter has the biggest number of observations, 127, which represents 14% of the initial sample. Presumably, this is the effect of the March cluster that has been identified above, figure 3.1 (40% of all annual reports were filed in March). The second quarter, June, received 28 reports, which is only 3% of the full sample. This is the second highest number of filings, which, once again, corresponds with the results from figure 3.1, with the June cluster (17% of all submissions were recorded in June). Further, 9 reports are filed at the end of the third quarter, and finally, 6 at the end of the fourth quarter. Those results, except for the first quarter, are marginal.

Overall, it seems that when investigating the calendar quarter-end clustering, we have instead captured clustering related to regulatory due dates. As a result, at this juncture in the analysis, the premise that the filings of annual reports demonstrate a quarter-end pattern in submission clustering is rejected.

3.2.4 Sample characteristics

3.2.4.1 Descriptive statistics for the length factor

Table 3.1: reports characteristics of the sample. Descriptive statistics: means, medians, standard deviations and percentiles, for the cumulative average abnormal returns (CAAR) of high word count (H_WC) and low word count (L_WC) are documented.

a) Cumulative average abnormal returns (CAAR) for the high and low word court samples

Table 3.1: Summary statistics

		N	Mean	Median	Std. Deviation	25th Percentile	75th Percentile
H_WC	CAAR1	356	-0.41% ***	-0.23%	0.031	-0.014	0.007
	CAAR2	356	-0.32% *	-0.20%	0.039	-0.016	0.010
L_WC	CAAR1	407	0.46% ***	0.21%	0.032	-0.011	0.017
	CAAR2	407	0.53% ***	0.42%	0.042	-0.016	0.024
WORDS		764	11.31	11.28	0.47	11.02	11.59

* N- observations; CAAR1 (0,1); CAAR2 (-1, 1); r.n - raw number

CAAR1 represents a 2-day window (0, 1); CAAR2 captures a 3 day-window (-1, 1). Miller (2010) and Loughran and McDonald (2010) apply similar time frames for the calculation of their CAARs[36].

CAAR1 (0,1): captures the immediate market reaction, on the event day and the day after. A statistically significant market response is reported for both samples, H_WC and L_WC. **CAAR2 (-1,1):** in addition to the first CAAR, a pre-event activity on day -1 is included. Statistical significance in the market response is also recorded for both samples, H_WC and L_WC.

The cumulative average abnormal returns (CAAR) means of the H_WC sample show a negative trend: -0.41% (CAAR1); – 0.32% (CAAR2). On the contrary, means of the L_WC group are positive: 0.46% (CAAR1); 0.53% (CAAR2).

It is evident that the market reacted positively to shorter annual reports, while lengthy reports have been discounted. This finding is consistent with You and Zhang (2009) and Miller (2010) studies, both recorded a negative effect of lengthy reporting on the market. It should be noted that the strong and positive investor response to the concise reporting is new evidence, previously, not documented. This point is discussed in the 'interpretation of results', section 5.2.

The absolute values of returns for CAAR1, in both samples, are very similar: 0.41% (H_WC) and 0.46% (L_WC). The values for CAAR2 are more disperse 0.32% (H_WC) vs 0.53% (L_WC). However, those figures are not nearly as high as those reported by Miller (2010), who documented 4.8% of abnormal returns for the event window of (-1, 3). There are several possible reasons for this discrepancy in results. For instance, Miller analysed a much larger pool of companies listed on American stock exchanges

[36] Miller (2010) and Loughran and McDonald (2010) windows: (0,1); (0,3); (-1, 3)

spanning the years 1994-2006 (a different time frame). Furthermore, his sample construction differed from the approach taken in this study; refer to section 3.2.2 for details.

Note: the CAAR windows are presented in results of the univariate analysis (table 4.7) However, for the multivariate regression only CAAR2 (-1, 1) has been applied (see 4.4.2.1). CAAR1 (0, 1) did not generate significant results, therefore, was not included in the regression analysis.

b) The averages for the length factor (WRDS)

The mean (median) of the natural logarithm *WORDS* is 11.31 (11.28), which after the conversation into a raw number is 91,728 (79,503). Those are much bigger figures than in Miller's (2010): 10.39 (10.38) / 32,533 (the median raw number was not provided), and in Li (2008): 10.08 (10.05) / 31,034 (23,122). They are also higher than figures reported in Dyer *et al.* (2017): 45,349 (37,370). Logarithmic values are not reported.

The standard deviation of the *WORDS* is not substantial, 0.47. This is a similar figure to Miller's (2010) 0.57, but smaller than Li's (2008) 0.70. The 25th and the 75th percentile of the word count are 11.01 and 11.59, respectively. Miller (2010) documents similar results, 10.51 and 11.16; while Li's (2008) values are smaller, 9.63 and 10.52.

3.2.4.2 Over time analysis (time period effect)

Table 3.2 shows data of the report length captured in WORDS over the sample period of 2006 - 2016.

Table 3.2: Mean and median WORDS over time

	Obs.	WORDS			
Year	WORDS	Mean	r.n	Median	r.n
2006	66	10.95	60,144	11.00	59,822
2007	61	11.09	74,577	11.01	60,358
2008	70	11.15	77,181	11.10	66,066
2009	71	11.22	83,331	11.12	67,573
2010	65	11.27	87,883	11.16	70,246
2011	60	11.31	94,995	11.16	70,328
2012	71	11.35	95,850	11.26	77,363
2013	79	11.42	103,118	11.35	85,320
2014	81	11.47	103,413	11.39	88,864
2015	76	11.48	106,455	11.43	91,850
2016	78	11.54	109,626	11.50	98,828

* r.n - raw number

A regular increase in the word count (WRDS), year by year, can be clearly observed. In 2006, the mean number of words in annual reports was 60,144 (logarithm of 10.95), while eleven years later, in 2016, it was 109,626 words (11.54). This is an increase of 83%, in logarithmic terms, 5.4%, over the ten-year period. This finding is consistent with Li (2008) and Miller (2010) studies, where an increase in the number of words in

10-K reports has been also documented, with the difference of a smaller rate 46% (in logarithmic terms 2.2 %).

However, when analysing the median, the increase in the word count is smaller, 65%. In 2006, the median was 59,822 (11,00) then it rose to 98,828 (11,50) in 2016. This rate of change is similar to the one reported by Miller (2010), approximately 62.5%, for his 1995–2006 time frame. On the contrary, Dyer *et al.* (2017) and Loughhran and McDonalad (2010) report a smaller rate of change, 54% for the years 1996-2013, and 56% for 1997- 2007, respectively.

Surprisingly, Miller's median in 2006, 39,000 words is a much smaller figure than in this study: 59,000, for the same year. While Dyer *et al.* (2017) figure from 2013 reaches 50,000, which again, is much lower in comparison to the 2013 figure of this study, 85,320.

If we compare the median rate of increase in this study, 65%, with the median rate of Loughhran and McDonalad's, 56%, it seems evident that over the 2006-2016[37] decade, increase in the length of reporting has been happening at a greater rate than in the earlier years of 1994-2006 (Loughhran and McDonalad sample). However, before making those comparisons, it is important to remember that different time frames[38] could be an influencing factor of this overall disparity between results. This means that some critical events, presented in one sample but not in the other, could affect the disclosure length. For example, in Dyer *et al.* (2017), it becomes clear that there is a substantial increase in the length of reporting in the early 2000s, around the

[37] 2006 -2016 is the time frame of this study.
[38] 1994 -2006 (Miller); 1994 - 2004 (Li, 2008); 1997- 2007 (Loughhran and McDonalad, 2010); 1996- 2013 (Dyer et al., 2017); 2006- 2016 (Kochanowicz, 2022)

SOX[39]. This would explain the much shorter annual reporting in the years up to 2002, reflected in results of Li (2008), Miller (2010), Loughhran and McDonalad (2010) and Dyer *et al.* (2017), but not captured in this study (our sample starts from 2006).

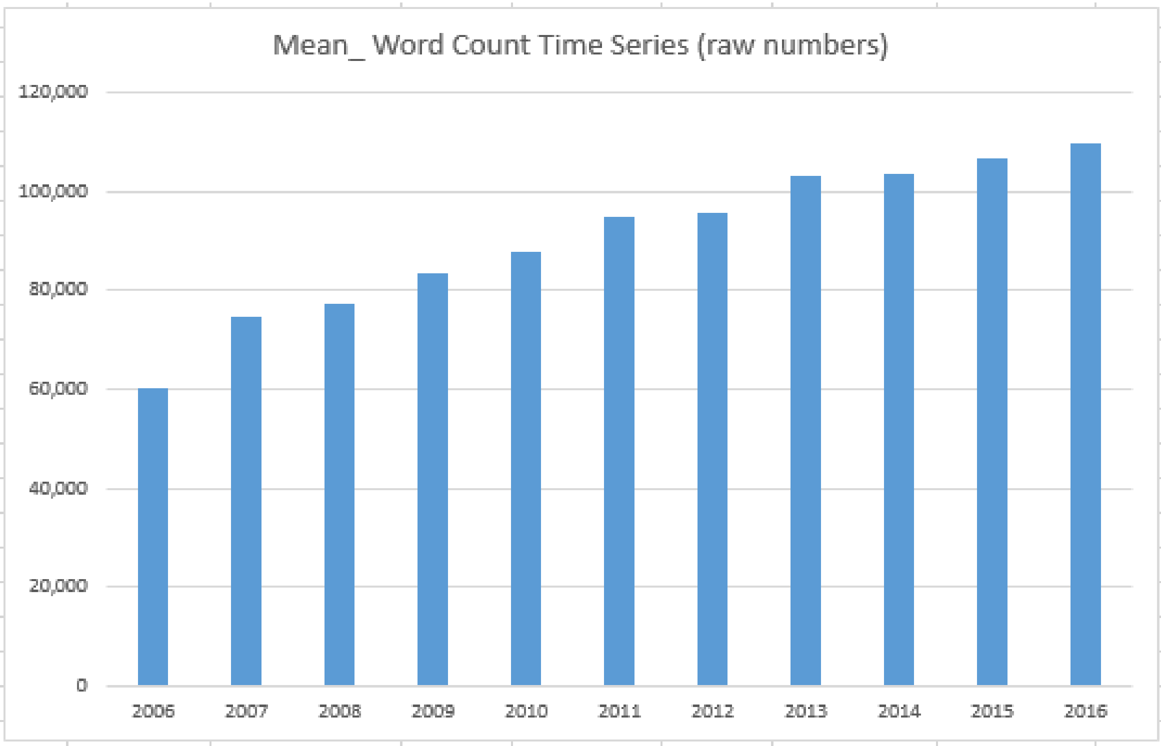
This discrepancy in results is also more likely to happen when comparing samples of different origins (different populations). The other four studies examined companies from the American indices, while this study analyses companies listed on the British index. Therefore, the U.S. sample may not be entirely comparable with the U.K. sample. Another important factor is the method of word counting used. Miller (2010) only includes words and tables, while this study also takes into account textboxes, footnotes and endnotes. This would explain the greater number of words captured in this enquiry. In Li (2008) and Dyer *et al.* (2017), the method of measuring the word count is not clearly stated.

Figure 3.3, both panels A and B, graphically, capture the trend in reporting over the period of this sample (2006- 2016). Panel A shows the gradual and steady increase in the mean of the word count for each year. Panel B compares the mean and the median values.

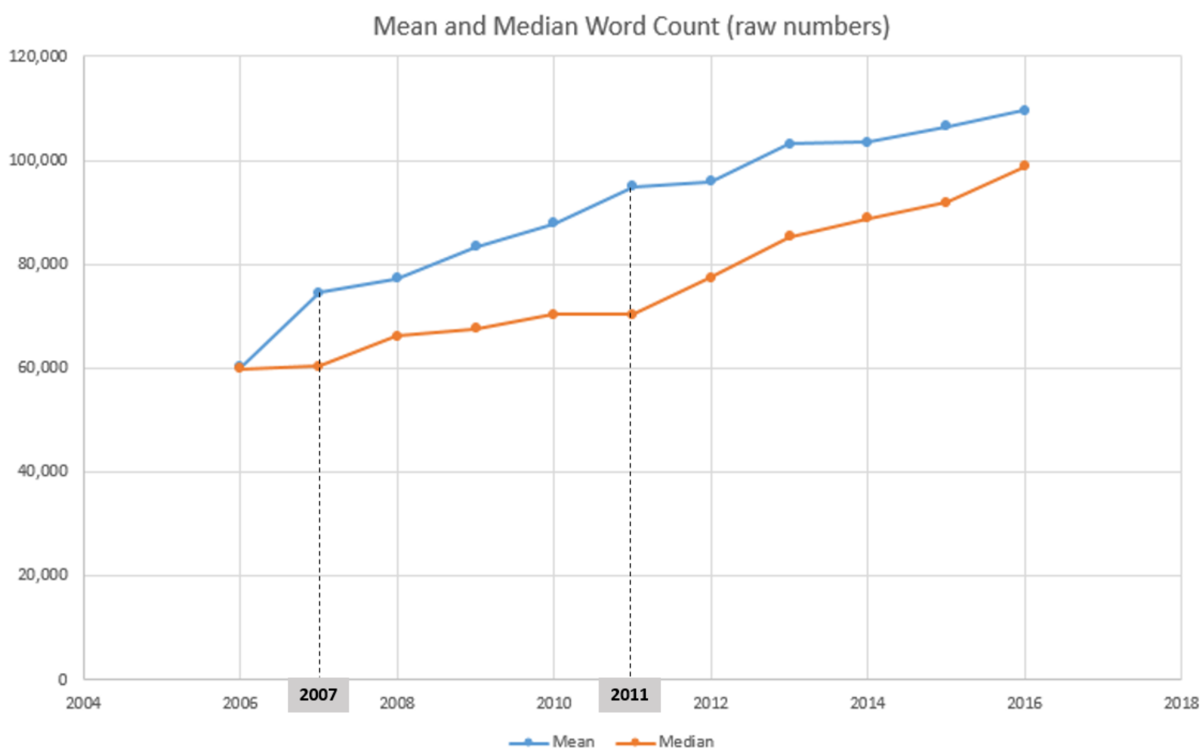
[39] SOX - SFAS 157, Sarbanes and Oxley Act of 2002

Figure 3.3. Trend in the word count over time

Panel A: Histogram of the mean word count (expressed in raw numbers)



Panel B: Comparsion of the mean and median of the word count (raw numbers)



Both graphs illustrate a clear monotonic increase in the word count. In addition, looking at panel B, it seems that the mean plot (blue) captures the 2007-2008 financial crisis, which is reflected in the larger spike around the 2007. The median plot (orange), however, does not register that. A similar situation is observed in 2011 when the mean plot (blue) records another spike, while the median plot remains flat. This anomaly could be associated with the 2011 fall in the global stock market, which reached its peak on the 8th of August, known as 'Black Monday' (Bowley, 2011).

❖

3.3 Event Study Methodology (Univariate Analysis)

"Event studies are the cleanest evidence we have on efficiency" (Fama, 1991).

In finance studies, the impact of a firm-specific event, such as the filing of an annual report, on the price of a security is often assessed using a method known as an 'Event Study'. The application of this methodology is directly related to the Efficient Market Hypothesis (EMH), as it aims to determine the immediate market reaction to the event in question, reflected in the repricing of a security. The goal of the event study is to capture abnormal price changes, typically observed for a short period, usually a few days, around the event (Kothari and Warner, 2007).

Short-run event study methodology

To examine the price effect to filings of annual reports, the standard short-run event study method is employed for a short time window. The method is applied for all three enquiries. The null hypothesis is that the event has no effect on stock returns (MacKinlay, 1997). Daily closing stock prices are used in calculations of the abnormal returns. Results are specified by running STATA's command 'eventstudy2' (Kaspereit, 2015).

The impact of the filing event on the study sample is to be identified by determining: (1) stock returns (actual returns); (2) abnormal stock returns; (3) normal (expected) returns, serving as a benchmark for the movement in normal returns; (4) average abnormal returns; (5) cumulative average abnormal returns; (6) event window.

(1) Stock return (actual return, R)

The logarithmic returns, which represent the percentage change of a price, are employed in the analysis (Kliger and Gurevich, 2014; Sharda, 2022). 'Eventstudy2' command assumes that input returns are discrete (Kaspereit, 2015), i.e. calculated by the formula:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}} \qquad (1)$$

where:

R_{it} - is stock *i* return at period *t* (from time *t* - 1 to time *t*)

P_{it} - is stock *i* price at time *t*

P_{it-1} - is stock *i* price at time t - 1

More precisely, '*P'* is the dividend and stock splits adjusted share price.

'Eventstudy2' then transforms those returns to:

$$R_{it} = Ln(P_{it}) - Ln(P_{it-1}) \qquad (2)$$

where:

Ln - is the natural (base '*e'*) logarithm

(2) The abnormal return (AR)

An abnormal return refers to a stock return that exceeds the returns observed on other 'normal' days (Kliger and Gurevich, 2014; El Ghoul, Guedhami, Mansi and Sy, 2023). The identification of abnormal returns is the primary goal of the event study, as it serves as the most important indicator of the market's reaction to the event. The level of abnormal returns determines the strength of the effect, the strength of the market reaction (Corrado, 2011; Sharda, 2022).

The abnormal return (AR) for a security *'i'* on day *'t'* is the difference between the actual return of a stock on a particular day *'t'* ($R_{i,t}$) and the normal return ($R_{m,t}$), which is believed to be typical, over the estimation period. Abnormal returns can only be assessed in a relation to a benchmark, which represents normal (expected) returns (Kliger and Gurevich, 2014; Chircop *et al.,* 2022; El Ghoul *et al.,* 2023).

(3) Normal returns (NR)

There are several predefined methods, benchmarks, to calculate normal returns, including: the constant mean return model, the market- adjusted return model, market model and factor model (MacKinlay 1997; El Ghoul *et al.,* 2023; Martinez-Blasco, Serrano, Prior and Cuadros, 2023). Brown and Warner (1985)[40], in their examination of different event study methodologies, found that basic models, which do not adjust for the risk or market-wide factors, perform as well as the more complex methods. For instance, this is documented in their Table 1, where three performance measurement methods are compared (*means adjusted returns*; *market adjusted returns; market and risk adjusted returns).* Based on the t-tests, the rejection rates on all three levels of significance (0%, 1%, 5%), for the three methods, are very similar. This is probably why, in literature, the selection of the benchmark seems arbitrary. Jong (2007) appears to have a similar view. For this enquiry (all five hypothesis), following Chircop *et al.* (2022), the market- adjusted return model (MAR) is used.

- **Market- adjusted return model (MAR)**

The normal return is a return that would be expected if the event did not take place. It comprises a benchmark (market index) against which actual returns are evaluated. The assumption of the model is that the normal returns (NR), before the event (ex-ante), are constant across the sample of stocks, moreover, they equal market return (Brown and Warner, 1985), which is represented by a stock market index. This relation is showed in the following formula:

[40] One of the most classic papers on the Event Study

$$R_{i,t} = R_{m,t} + \varepsilon_{i,t} \qquad (3)$$

where:

R_{it} - is stock *i* return at period *t*
R_{mt} - is the market return at period *t*
ε_{it} - is the model's error term

Therefore, the formula for determining normal returns (NR)[41] is:

$$\widehat{NR}_{i,t} \equiv R_{m,t} \qquad (4)$$

where:

$\widehat{NR}_{i,t}$ - is stock *i* estimated normal return at period *t*
$R_{m,t}$ - is the market return at period *t*

* The MAR is an approximation of the market model.

$$* \; R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \qquad (5)$$

The model assigns 0 to the coefficient ($\alpha_i = 0$) and 1 to beta ($\beta_i = 1$). This is because, as Firth (1975) claims, α_i are often very small and the β_i averages to 1 across all companies. In addition, weighting the market return by the company's β (like in the market model) does not produce much stronger estimation. For those reasons, according to Brown and Warner (1985), the MAR model generates reasonably good results.

In more general terms, the MAR is a return on a market index, in our case, the FTSE100. It considers the stock price movements influenced by the entire market, but

[41] Normal returns based on the MAR model

only those movements occurring concurrently with the event (Brown and Warner, 1985). The FSTE 100 is a market - capitalisation weighted index (value weighted index). According to Brown and Warner, there is no significant difference in results between value-weighted and equally weighted indices.

The sought-after abnormal return, as defined by Kolari *et al.* (2018) and Sharda (2022), is calculated as the difference in the performance (return) of the study sample and the performance (return) of the market index, representing the event-related performance (formula 5). Accordingly, the estimated abnormal return[42] is calculated based on the following formula:

$$\widehat{AR}_{i,t} \equiv R_{i,t} - \widehat{NR}_{i,t} = R_{i,t} - R_{m,t} \qquad (6)$$

where:

$\widehat{AR}_{i,t}$ - is stock *i* estimated abnormal return at period *t*

$R_{i,t}$ - is stock *i* return at period *t*

$\widehat{NR}_{i,t}$ - is stock *i* estimated normal return at period *t*

$R_{m,t}$ - is the market return at period *t*

- Abnormal returns (AR) for the period of 41 days (– 20 to + 20)[43] surrounding the filing date are determined.
- The normal (expected) return is the market return (index return) estimated as the percentage change in the FTSE100 value weighted index.

[42] Based on the chosen benchmark model, which in our case is the MAR. The abnormal returns could also be referred to as market- adjusted returns.

[43] This is the setting of the STATA command 'eventstudy2' (Kaspereit, 2022).

(4) Average abnormal returns (AAR)

"Because abnormal returns are all centred around one particular event, the average should reflect the effect of that particular event. All other information, unrelated to the event, should cancel out on average" (Jong, 2007).

What Jong means is that stocks are constantly affected by various events, leading to continuous changes in their prices. It is probable that the study's sample has incorporated information not relevant to the examined event. Consequently, the observed returns, influenced by unrelated factors, are likely to contain 'noise' (Kothari and Warner, 2007). To control for this 'noise', the 'law of big numbers' is applied, and the abnormal returns are averaged[44] (Kliger and Gurevich, 2014; Sharda, 2022).

$$\widehat{AAR}_t = \frac{\sum_{i=1}^{n} \widehat{AR}_{i,t}}{n} \tag{7}$$

where:

$\widehat{AAR}_t$ - is the estimated average abnormal return at period *t*

$\widehat{AR}_t$ - is stock *i* estimated abnormal return at period *t*

n - is the number of observations in the sample

If the average abnormal returns deviate significantly from zero, it will indicate the detection of abnormal performance.

(5) Cumulative average abnormal returns (CAAR)

The average abnormal returns (AAR) are aggregated over the event window[45],

[44] Arithmetic average of ARs across the sample is applied.

[45] Event window is explained under point 5

spanning from the start of the window (t_1) to the end of the period (t_2), in order to arrive at the cumulative average abnormal returns (CAAR) for the sample (Sharda, 2022). This approach captures the effect of the filing, reflecting the accumulated price reaction over the time period of the event. The detection of irregular and substantial non-zero CAAR around the event date serves as an indication of a market reaction (Kliger and Gurevich, 2014).

$$\widehat{CAAR}_{s,t} \equiv \sum_{\tau=s}^{t} \widehat{AAR}_{\tau} \quad (8)$$

where:

$\widehat{CAAR}_{s,t}$ - is the estimated CAAR from period s to *t*

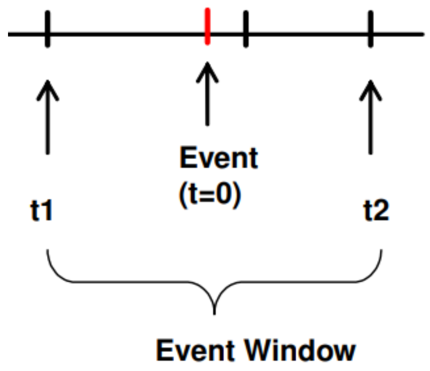
$\widehat{AAR}_{\tau}$ - is the estimated AAR at period τ

* The AARs and CAARs are computed for the 41-day event window (Sharda, 2022).

This recursive computation represents the $\widehat{CAAR}$ as *"accumulators of the price reaction over selected trading periods"* (Kliger and Gurevich, 2014). Irregularities **before an event** imply a leakage of information ahead of the event, or alternatively, could be related to the market's anticipation of the event. A positive or a negative irregularity in CAAR **on the event date**, or immediately after, suggests that the event was a surprise, prompting a market reaction. On the other hand, any abnormality in returns a few days **after the event** indicates a delayed market response, revealing market inefficiency. The absence of irregularities in CAAR around the event date implies that the market may not perceive the event as carrying new price-relevant information, or it may simply be insensitive to the event or the released information (Kliger and Gurevich, 2014).

(6) Event window

This is a graphical representation of the timeline around an event. The event is the filing of annual reports. Day 0, or t = 0, is the date of the filing.



The analysis is conducted for the 41-day window (-20, +20) around the filing event. To avoid contaminating the results with too much unrelated (company-specific) information, such as earnings announcements, the examination period is kept up to 4 weeks before the filing (-20 days) and 4 weeks after the filing (+20 days). To ensure a more comprehensive understanding of the price change behaviour in the sample, the 41-day window has been divided into several shorter ones. The utilisation of multiple event windows is not uncommon, as demonstrated in the work of Barakat *et al.* (2019), for example.

Event windows applied in the study:

Table 3.3: Event windows

		Period	**CAAR**
1.	Pre-event windows	6 -day	(-20, -15)
2.		6 -day	(-15, -10)
3.		6 -day	(-10, -5)
4.		5- day	(-5, -1)
5.		3 -day	(-3, -1)
6.	**Event day**	**1-day**	**0**
7.	Post- event windows	2- day	(0, 1)
8.		3- day	(1, 3)
9.		5 -day	(1, 5)
10.		6 -day	(5, 10)
11.		6 -day	(10, 15)
12.		6 -day	(15, 20)
13.	Pre & post event windows	3-day	(-1, 1) for the regression model
14.		5-day	(-1, 3)
9.		7-day	(-3, 3)
10.		11-day	(-5, 5)

The pre-event windows, up to day 0 (event day), test for the market anticipation of the event, or leakage of information. The post-event windows, beyond day 0, capture a delay in the reaction of the market (Griffin, 2003; Barakat *et al.,*2019). As indicated in the literature review (Cready and Mynatt, 1991; Qi *et al*., 2000, Bhattacharya *et al.* 2021), there is a possibility of a delay in the incorporation of the information content of annual reports into the stock price.

(7) Testing abnormal performance

According to Brown and Warner (1985), the t-test is sufficient for assessing the results of an event study for statistical significance. It is worth noting that this test is conservative compared to other methods, such as non-parametric tests. The t-statistic tests the null hypothesis that the mean abnormal returns are equal to zero (at the chosen statistically significant levels). In other words, no excess performance has been detected for the sample.

$$H_0 : E(AR_{it}) = 0$$

The t-statistics are estimated based on assuming the cross-sectional independence (Serra, 2004). They are computed by the STATA 'eventstudy2' command (Kaspereit, 2015). The t- figures are reported in tables with the univariate results for AAR and CAAR (chapter 4). With the t-statistics, the statistical significance of p-values is included, which is represented by the asterisk: 10% / 0.10 level (*); 5% / 0.05 level (**) and 1% / 0.01 level (***). The lower the p-value, the stronger the result indicating that the mean AAR or CAAR is different from zero.

Results of the event study, for all three enquiries, are reported in chapter 4, while the discussion and conclusion is presented in chapter 5.

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3.4 Multiple Regression (Multivariate Analysis)

This section presents two regression models, which serve as supplementary analyses to the third enquiry regarding the length of annual reports.

Further to the univariate analysis and the attempt to capture the negative market reaction to filings of lengthy annual reports (fifth hypothesis), the first regression is conducted to test whether the reaction is impacted by other factors, by determinants of returns. The second regression is carried out to analyse the negative association between reporting length and company financials, and it also includes determinants of reporting length and company characteristics. Those variables have been chosen because the literature documents their explanatory power on the price change around releases of corporate disclosures, furthermore, on the reporting length.

Regression 1:

The first model determines further whether the *'length'* factor has the ability to predict the market reaction. The OLS regression is used as the main estimate which is then compared with other estimates of fixed effects and the 2SLS method. The dependent variable CAAR, a 3-day event window (-1,1), is regressed on the word count of annual reports and five control variables.

Regression 2:

The second model examines the relationship between the length of an annual report and a company's financial performance. This test has not been designated as a separate enquiry, nor a separate hypothesis has been formulated for it. Serving as a complementary analysis to the first regression model, it is grounded in the association identified in the literature review and is related to the Management Obfuscation Theory (section 2.4.3).

3.4.1 Market reaction and length of annual reports (Regression 1)

The second part of the fifth hypothesis predicts a negative relationship between the length of annual reports and the market reaction: '*The market reaction to filings of lengthy annual reports is delayed or negative'.*

This is measured in the main univariate analysis. The multivariate analysis is an additional test. It accounts for time trends and company characteristics, both factors can have an effect on the relationship and can influence the final results (You and Zhang's, 2009).

3.4.1.1 Determinants of returns (control variables)

Five control variables are chosen based on their potential explanatory power in relation to returns[46]: (1) book-to-market (BM); (2) share turnover (ST); (3) institutional ownership (IO) and (4), (5) two measures of recent stock returns. A very similar set of variables is applied in Tetlock *et al.* (2008) and Loughran and McDonald (2011).

[46] Those five control variables, potentially, could influence returns

1) Book-to-market (BM)
2) Share turnover (ST)
3) Institutional ownership (IO)

Based on Tetlock *et al.* (2008), past returns of the sample are also included:

4) Cumulative average abnormal returns (CAAR) of the previous 4 weeks CAAR (-20,-3)
5) Abnormal return (AR) from day 2 prior to the filing (CAR -2)

Those two abnormal returns are based on the same event study method used for the univariate analysis, explained in section 3.3. They end just before[47] the examined event window CAAR (-1,1), therefore, they should capture recent returns; returns from the pre-filing period.

All five variables (book-to-market ratio, share turnover, institutional ownership and the two past returns) have been found to be associated with expected (average) returns (Ball and Kothari, 1991; Fama and French, 1992; Jegadeesh and Titman, 1993; You and Zhang, 2009; Loughran and McDonald, 2011). In addition, the share turnover (trading volume) controls for liquidity (Tetlock *et al.,* 2008).

3.4.1.2 Motivation behind the control variables

[47] One day before the examined event (CAR -2) and two days before the event CAAR (-20, -3)

- **Book-to-market (BM):** two primary explanations are posited for the observed relationship between the Book-to-Market (BM) ratio and returns: risk-based and earnings-based. Firstly, the risk-based approach: Fama and French (1992) argue that the BM ratio is a strong proxy for a risk factor, as risk is inherently priced in. Greater risk, associated for example with Chan and Chen's (1991) distress factor (higher probability of bankruptcy) or lower earnings on assets, results in a lower stock price. Since the market value is the denominator of the BM ratio, riskier stocks have a higher ratio (price relative to book value). Ishtiaq, Tufail, Muneer and Sarwar (2019) add to this argument by associating a high BM ratio with higher sensitivity to systematic risk. They categorise stocks with high financial and business risk as lower investment ranks. Therefore, a positive relationship between the BM ratio and returns is expected, as investors need compensation for taking extra risk (You and Zhang, 2009; Ishtiaq *et al.,* 2019). The second explanation, earnings-based, suggests that the book-to-market ratio is a proxy for earnings yield because the numerator (the value of equity) is computed based on the average of past earnings. Here, retained earnings, which are a part of past earnings, carry information about expected returns (Ball, Gerakos, Linnainmaa and Nikolaev, 2020). Brookfield, Boussabaine and Su (2020) argue that the ratio substantially forecasts cash flows and subsequent returns. Hence, the BM ratio has been used as a predictive tool for returns for two different reasons: risk and earnings. Consistent with the findings of Fama and French (1992), Ishtiaq *et al.* (2019), Ball *et al.* (2020), and Brookfield *et al.* (2020), a positive relationship between BM and returns is expected. This relationship is confirmed in the study by Hou and Qiu (2022), where a stronger market reaction during a (-1, 3) post-event window was recorded for stocks with higher BM values, although the change was statistically insignificant.

- **Share turnover (ST):** the relationship between share turnover (trading volume) and abnormal return is generally expected to be positive, as supported by Gallant, Rossi and Tauchen (1992); Griffin, Nardari and Stulz (2007); and Gebka and Wohar (2013). This aligns with the notion that *"it takes volume to make price move"* (Kapoff, 1987; Chen, 2012). Evidence of strong price sensitivity to trading activity is found in the work of Chordia, Huh and Subrahmanyam (2007), who observed that a 1% monthly increase in returns over a year correlates with an additional 1.51% annual share turnover. Further evidence is seen in Duz and Tas's (2021) study on market sensitivity, specifically the S&P500's reaction to Twitter posts, an alternative channel for information diffusion. They discovered that stock returns were influenced by trading strategies based on Twitter sentiment, with abnormal returns realised during a five-day holding period following social media announcements. This suggests that trading strategies, which generate significant trading volumes, can predict stock returns positively in short-term event windows (Broadstock and Zhang, 2019). Another manifestation of this relationship occurs with the arrival of controversial new information, which must provoke significant differences in traders' opinions, strong enough to induce a liquidity shock. In such instances, an abnormally high trading volume over a short period often leads to a positive shift in absolute abnormal returns (Amihud and Noh, 2021). The common thread in these studies is liquidity, which mirrors market sentiment and aggregates information about the stock. Higher sentiment stocks, traded more frequently (higher turnover), affect absolute price changes and, consequently, returns (Liao, Luo, and Tang, 2021).

- **Institutional ownership (IO):** institutional investors, particularly short-term institutions, have the capacity to predict future profitability with reasonable accuracy. As a result, they select stocks that are likely to provide higher expected returns.

Additionally, their abnormal trading around corporate announcements, driven by an informational advantage, elevates stock prices, leading to higher returns (Koijen, Richmond, and Yogo, 2020). In contrast, retail traders, lacking the resources for high-volume trading, have a minimal impact on prices (Gompers and Metrick, 2001; Yan and Zhang, 2009). Gompers and Metrick explain that in equilibrium models with finite supply and demand elasticities, significant demand shocks lead to increased prices and returns. This positive association between institutional investors and returns is attributed to their consistent demand and possession of superior information. Fisch and Momtaz (2020) note that superior information is derived from effective investment opportunity screening, aiming to minimise information asymmetries and focus on expected returns. Hedge funds, for instance, are particularly strong at identifying high-potential stocks, with their trading strategies geared towards generating returns above market averages, irrespective of market conditions (Koijen *et al.,* 2020).

A stewardship is another perspective on the relationship between institutional investors and stock returns. Song, Yeon and Lee (2021) explain that during times of crisis, like for example the COVID-19, a high proportion of institutional ownership reassures other investors about soundness and safety of a stock. Retail investors observe actions of the bigger players, so if stocks are being held by the institutions, despite the market destress, they are also less likely to be sold by the smaller market participials. This herd mentality prevents prices from the decline. The opposite would also hold true. Therefore, it could be argued that the institutional ownership plays a moderating role on stock returns.

Lastly, Cao, Dong and Ma (2020) offer a corporate governance view. Institutional investors, because of their substantial ownership, tend to have an active voice in the governance of a company. Their motivation is to maintain positive returns. By active monitoring of the company's operational and strategic activates, they mitigate asymmetry of information between the management and investors, which reduces the agency problem. In such environment, predicting expected returns is more accurate. Therefore, going back to the previous point of the stewardship role, the higher the institutional ownership the stronger influence on the direction of returns. The positive relationship between institutional ownership and a company's returns is confirmed in studies cited throughout this enquiry, Yan and Zhang (2009), Lehavy *et al.* (2011), Loughran and McDonald (2011), Nazari *et al.,* 2017.

- **CAAR & AR:** following Tetlock *et al.* (2008), the recent cumulative average abnormal returns from twenty days before the filing (-20, -3), and the abnormal returns from day two before the event (-2), are applied in this study. Those two controls are expected to capture the full price effect (returns) of the filing, and potentially, predict future returns (Ball and Brown, 1968; Jegadeesh and Titman, 1993). Similarly, Bochkay, Hales and Chava (2020) and D'Augusta, De Vito and Grossetti (2023) included short term, pre-announcement, abnormal returns as a control variable in their studies, however, they did not provide specific explanations for the choice of those controls.

The table below presents the definitions and computations for the variables identified as determinants of returns:

Table 3.4: Definitions and computations of control variables

Variable	**Computation**
Book-to-market (BM)	The natural logarithm (ln) of BM, which is a ratio of the book value of equity divided by the market value (total market capitalisation), as specified in Fama and French (2001), Ball *et al.* (2020), Hou and Qiu (2022). The variable is computed based on data from 1 year before the file date (the end of the previous fiscal year) (You and Zhang, 2009; Loughran and McDonald, 2011; Barakat *et al.,* 2019).
Share turnover (ST)	The logarithm (ln) of volume of shares traded in days (- 256, - 6) prior to the file date divided by shares outstanding on the file date (Loughran and McDonald, 2011; Liao *et al.,* 2021).
Institutional ownership (IO)	The percentage of the company's shares owned by institutional investors for the most recent quarter before the file date (Lehavy *et al.,* 2011*;* Boshnak, 2021*;* Coa *et al.,* 2020). For negative values, the variable is reported as missing and winsorised to 100% on the positive side (Loughran and McDonald, 2011).
Abnormal returns (CAR_1)	Abnormal return for the day 2 prior to the event, calculated the same method as the main event study (see section 3.3), based on Tetlock *et al.* (2008) and D'Augusta, *et al.* (2023).
Cumulative average abnormal returns (CAR_2)	Cumulative average abnormal return of the 18-day event window (-20, -3), calculated the same method as the main event study (see section

	3.3). Tetlock *et al.* (2008) applied a longer event window (-30, -3), our software (STATA), however, produces a sample up to 20 days before the event day (Bochkay *et al.,* 2020; D'Augusta, *et al.,* 2023).

* Variables, or data items required to compute those variables, are download from Bloomberg terminal.

3.4.1.3 Pearson correlation

Figure 3.4.1: Correlation of CAAR (-1, 1) with WRDS and control variables

	CAR	WRDS	BM	ST	IO	CAR_p1	CAR_p2
CAR	1.0000						
WRDS	-0.0596	1.0000					
BM	-0.0577	0.2530*	1.0000				
ST	0.0473	-0.1254*	0.1385*	1.0000			
IO	0.0118	-0.3310*	-0.0429	0.1458*	1.0000		
CAR_p1	-0.0383	0.0374	-0.0281	-0.0339	0.0707	1.0000	
CAR_p2	0.0429	-0.0719	0.1078*	0.0426	0.0409	-0.0600	1.0000

Figure 3.4.2: Correlation of CAAR (0, 1) with *WRDS* and control variables

	CAR_1	WRDS	BM	ST	IO	CAR_p1	CAR_p2
CAR_1	1.0000						
WRDS	-0.0837*	1.0000					
BM	-0.0648	0.2530*	1.0000				
ST	0.0565	-0.1254*	0.1385*	1.0000			
IO	0.0646	-0.3310*	-0.0429	0.1458*	1.0000		
CAR_p1	-0.0269	0.0374	-0.0281	-0.0339	0.0707	1.0000	
CAR_p2	0.0011	-0.0719	0.1078*	0.0426	0.0409	-0.0600	1.0000

The Pearson correlation matrix, figure 3.4.1, shows that the association between the 3-day market reaction, CAAR (-1,1) and the length of annual reports (WRDS) is negative, confirming the premise of the fifth hypothesis. The results, however, statistically, are not significant. The strength of the relationship is relatively weak –0.060, although not as weak as in You and Zhang's (2009), where a coefficient of 0.01 is reported for a similar event window of 3 days (0,2), also insignificant. Interestingly, we achieve a statistical significance for the shorter 2- day event period, CAAR_1 (0, 1), figure 3.4.2. The coefficient here is slightly higher -0.084. This latter result suggests that the relationship between length of annual reports and the market reaction does exist.

In terms of the control variables, BM, share turnover, institutional ownership and the two abnormal returns, the strength of their correlation with CAAR is not significant. This indicates that those company characteristics are not strongly associated with the variation in CAAR. When we compare this result with the one documented in Yekini *et al.,* and You and Zhang, we see that their correlation coefficients are also very low, between 0.01 and 0.04. However, You and Zhang achieve significance in their values, but then Yekini *et al.,* does not. Surprisingly, two highly cited papers by Tetlock *et al.* (2008) and Loughran and McDonald (2011), based on which the below regression model has been built, do not report Pearson correlation coefficients.

3.4.1.4 Regression model (1)

The hypothesis is the same as in the univariate analysis: '*The market reaction to filings of lengthy annual reports is delayed or negative'.*

If the length of an annual report is consequential, its effect on abnormal returns should be detectable in the multivariable analysis. The following Ordinary Least Squares (OLS) regression is used to assess that.

$$CAAR\ (-1,1)_{i,t} = \beta_0 + \beta_1\, WRDS_{i,t} + \beta_2\, BM_{i,t} + \beta_3\, ST_{i,t} + \beta_4\, IO_{i,t} + \beta_5\, CAR\_1_{i,t} + \beta_6\, CAR\_2_{i,t} + \varepsilon_{i,t}$$

The dependent variable CAAR, the 3-day event window (-1,1), is regressed on the word count (WRDS) of annual reports and five control variables (see table 3.4).

Several event windows have been derived in the univariate analysis (3.3. ‘Event window’), for this regression model, however, the CAAR (-1, 1) has been chosen. This symmetrical window, one day before and one day after the filing, produces the strongest results, moreover, it captures the pre-event returns and post event returns. This window is also the closest to the one suggested by Fuller *et al.* (2002), the (-2, +2).

The t-statistics assess the significance of predictor variables, while the model fit is apprised though the adjusted R^2 and F - test. The results of the regression are based on standard errors that are robust to heteroscedasticity, and which are clustered at different dimensions, depending on the model. Year and industry dummies are applied in order to control for the cross- sectional (within- industry) and over time differences (time-variant unobservable variation). The specifications of the regression model are explained in the further section (3.4.1.6).

3.4.1.5 Statistical issues checks

Before progressing further, the model needs to be tested for non-stationarity, heteroscedasticity and endogeneity. These are statistical issues which can distort results of the regression (Brooks, 2019). In the dataset, the following will be examined:

(i) Non-stationarity in the mean and variance - lack of stability over time in the panel data
(ii) Heteroskedasticity - unequal variances in the error term[48]
(iii) Endogeneity - explanatory variables correlating with the error term

These three issues, when not corrected may distort coefficient estimates causing: biasness, inconsistency (non-stationary and endogeneity) and inefficiency (heteroskedasticity). Even if coefficient estimates are unaffected, in the case of heteroskedasticity or endogeneity, standard errors could become underestimated and biased, which in turn may weaken statistical significance of the coefficients. Each of those statistical problems, if detected, can be controlled, or corrected.

(i) Stationarity test (Panel Unit Root test)

A stationarity check, in the panel data, helps to ensure reliability of the estimated parameters. Testing for stationarity involves examining properties of individual-specific effects and / or time-series variables. The time- series should be free from time-dependent behaviour, such as a trend or seasonality. In other words, the means and variance should be time-invariant, should not change over time (Choi, 2001;

[48] Heteroskedasticity – error term not independently distributed

DeFusco, McLeavey, Pinto, Runkle and Anson, 2015).

In this section, the second type of stationarity is examined, the stability of the variables over time, as the first type (individual-specific effect) is dealt under the fixed effects method (see 3.4.1.6 section, model 5).

The model used to characterise the non-stationarity [49]:

$$y_t = y_{t-1} + u_t$$

Where: u_t is the standard white noise disturbance term; y_{t-1} regression of *y* on its previous values. The model can be further expressed as an auogregressive model of order I:

$$y_t = \emptyset y_{t-1} + u_t$$

Here, the same as in the first model, we regress the current value of y on it previous values. The model is determined whether is stationary or not based on the value $\emptyset$ coefficient (Brooks, 2019). The null hypothesis states that a given series contains one or more unit roots:

H_0: $\emptyset = 1$, versus the alterative hypothesis: H_1: $\emptyset < 1$. Therefore, if $|\emptyset| = 1$ then the series includes a unit root and is non- stationary. On the other hand, if we reject the null hypothesis, if $|\emptyset| < 1$, then the series is stationary, as it does not contain a unit root (Brooks, 2019).

In practice, according to Brooks (2019), we regress:

[49] This is actually stochastic form of non-stationarity, which empirically is the most relevant form of non-stationarity to this study. The series is drawn from a random walk or a random walk with drift. The efficient market hypothesis expects that stock prices follow a random walk (Brooks, 2019).

$$\Delta y_t = \psi y_{t-1} + u_t$$

H0: $\psi = 0$ (since $\psi = \emptyset - 1$)

H1: $\psi < 0$

This equation is easier to work with because the test statistics focuses on the usual t-ratio of the slope coefficient of the regression.

A common test for stationarity in a panel data is the Dickey-Fuller test, however, it is applicable for balanced panel datasets. To accommodate the unbalance in the panel of this study, the Fisher-type unit root test is employed, which augments the Dickey-Fuller test (Maddala and Wu, 1999). The Fisher- type Augment Dickey Fuller (ADF) test [50] runs a unit-root test for each panel *i* (each company in the dataset) and combines their individual p -values to generate the overall test. The chi- squared is then distributed with two degrees of freedom (Maddala and Wu, 1999, Choi, 2001).

$$P = -2\sum_{i=1}^{N} \ln(p_i)$$

The Fisher method performs four different tests and generates four outcomes: inverse chi-square (P); inverse normal (Z); inverse logit (L*) transformation of the p-values; modified inverse chi-square (Pm), which is suitable for a bigger sample size. It is important to be cautious of low Z and L* values and large P and Pm values, as they weaken the null hypothesis of unit roots and non-stationarity. According to Choi (2001), the Z- statistic performs best, it shows the most efficient trade-off between size and power, thus it is recommended over the other three tests.

[50] The ADF test is also called the 'inverse chi-square' test.

Panel unit root results

Figure 3.5: Panel unit roots test results for y (CAR)

	CAR	Test Statistic	Statistic	P-value
Fisher ADF	Inverse chi - squared	P	585.82 ***	0.000
	Inverse normal	Z	-12.83 ***	0.000
	Inverse logit	L*	-17.09 ***	0.000
	Modified inv. chi-squared	Pm	25.56 ***	0.000

*, **, *** rejection of null hypothesis of non-stationarity at 1%, 5% and 10% level.

Figure 3.5 shows that y_t (CAR) is stationary for all four tests. Each statistic rejects the null hypothesis of a unit root at the 1% level of significance. This means that the data-set is not trending. This is not surprising; we should recall that the first order differencing is used to calculate daily returns of the sample.

$$R_{it} = (P_{it} - P_{it-1})/P_{it-1}$$

The differencing induces a stationarity in the series. Therefore, the y_{it} should be close to being stationary, which is what the ADF test confirms. In addition, from the theoretical perspective, there is no reason to expect that an immediate market reaction, which is what the CAR represents, will have a trend attached to it. Over time, it should behave as an independent random series, a random walk or a random walk with a drift. This would be the case if the markets were efficient (Brooks, 2019).

(ii) Heteroscedasticity test

Heteroskedasticity in the panel data refers to a violation of the assumption that the errors are homoscedastic. In other words, the variance of the error terms are constant across time and all observations (Brooks, 2019). In the presence of heteroskedasticity, an OLS estimator can be still consistent [51] but no longer efficient. The inefficiency comes from standard errors, which are likely to be biased when affected by heteroskedasticity. As a result, any inferences we make, based on computations that use standard errors, t-test or the F-test statistics[52], could be unreliable (Baltagi, 2008). In heteroskedastic financial data, the estimated standard errors are likely to be smaller, which inflates t- statistics, and in consenqnce, we may find a statistical significance when such does not exist (DeFusco *et al.,* 2015).

Testing for heteroskedasticity (based on DeFusco *et al.,* 2015)

To accept validity of the model results, we need to test whether errors are homoscedastic.

Based on a regular regression model:

$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + u$

The *u* residuals are changed for expected $\hat{u}$, then squared $\widehat{u^2}$, and finally regressed on the independent variables (Breusch- Pagan test), or on predictive values (Alternative White test).

[51] The error variance plays no part in the proof that the OLS estimator is consistent and unbiased (Brooks, 2019).

[52] For the t- test and the F- test to be valid, we need the variance of the error term *u* to not differ with the independent variables (DeFusco *et al.,* 2015).

Tested hypothesis:

H_0: The expected value of u^2 does not vary (is uncorrelated) with the independent variables (homoscedasticity).

H_a: The expected value of u^2 varies (is correlated) with the independent variables (heteroscedasticity).

We need a stable and constant variance of u, which would indicate homoscedasticity, and this is tested under the Breusch-Pagan (DeFusco *et al.,* 2015) and the Alternative White test (Katchova, 2013).

- The **Breusch – Pagan** test uses the regression model:

$$\widehat{u^2} = \delta_0 + \delta_1 X_1 + \delta_2 X_2 + \delta_3 X_3 + u$$

- The **Alternative White test** uses the regression model:

$$\widehat{u^2} = \delta_0 + \delta_1 \hat{y} + \delta_2 \widehat{y^2} + u$$

For homoscedasticity, we need both regressions to have no explanatory power. Jointly, the independent variables should not be explaining the squared residual regression ($\widehat{u^2}$). Both heteroskedasticity tests are run on the regression model 1:

$CAAR_{i,t} = \beta_0 + \beta_1 WRDS_{i,t} + \beta_2 BM_{i,t} + \beta_3 ST_{i,t} + \beta_4 IO_{i,t} + \beta_5 CAR\_p1_{i,t} + \beta_6 CAR\_p2_{i,t} + u_{i,t}$

<u>Results for heteroscedasticity</u>

Figure 3.6: Heteroscedasticity tests for CAR

CAR	Observations n	R-squared $R^2_{\hat{u}^2}$	k	F-stat	P-value for F-test	LM-stat	P-value for LM test	Conclusion
Breusch-Pagan test	371	0.086	7	4.86	0.000	31.8	0.000	heteroscedasticity
Alternative White test	317	0.005	2	0.93	0.395	1.867	0.393	homoscedasticity

The Breusch – Pagan test indicates heteroskedasticity for CAAR. The p-value of the F-test of the joint coefficients is 0 (< 0.05). This means that the independent variables, jointly, explain the squared residuals, therefore, we have a case of heteroscedasticity (Brooks, 2019). The LM-statistics[53] also indicates heteroscedasticity (Baltagi, 2008; Brooks, 2019).

LM- test $LM - stat = n\, R^2_{\widehat{u^2}} \sim X^2_k$

- If p-value > 0.05 then homoscedasticity
- If p-value < 0.05 then heteroscedasticity

The LM value is large, 31 and the p-value is < 0.05. Therefore, we reject the null hypothesis of homoscedasticity in favour of the heteroskedastic alternative.

The Alternative White (AW) test, on the other hand, does not confirm heteroskedasticity. The p-value of the F-statistics is 0.395, which is greater than 0.05, therefore it does not confirm the joint significance of the coefficients. This is also reflected in the LM-statistics. The F-statistics is low, 1.87, and the p-value of 0.39 is, again, greater than the 0.05.

[53] LM statistics stands for Lagrange Multiplier statistics.

This is a case where the Breusch – Pagan test indicates heteroscedasticity in CAAR, while the Alternative White test rejects it. For that reason, homoscedasticity cannot be confirmed and heteroskedasticity corrections need to be employed.

Heteroskedasticity corrections

To correct for heteroskedasticity, following the suggestion of Katchova, (2013), two methods are applied: (1) heteroskedasticity- robust variance of the coefficients, where we calculate robust standard errors (third column in figure 3.7). Siddik *et al.* (2017) rely on this method alone. (2) Feasible Generalized Least Squares (FGLS) method, which corrects for heteroscedasticity when its form is not known (fourth column in figure 3.7).

Figure 3.7: OLS, OLS with robust standard errors and FGLS

CAR	OLS	OLS with robust se	FGLS
Variables			
WRDS	-.008 (.003) **	-.008 (.004) *	-.009 (.003) ***
BM	-.002 (.001)	-.002 (.001)	-.001 (.001)
ST	.003 (.002)	.003 (.003)	.003 (.002)
IO	-.000 (.000)	-.000 (.000)	-.000 (.000)
CAR_p1	.199 (.090) **	.199 (.097) **	.186 (.090) *
CAR_p2	-.032 (.020)	-.032 (.023)	-.046 (.019) **
Constant	.052 (.049)	.052 (.066)	.068 (.048)
Observations	371	371	371
R-squared	0.059	0.059	0.065

Figure 3.7 shows coefficients of independent variables, in brackets, standard errors. Significance levels of p-values, at 1%, 5% and 10% levels, are captured by ***, **, *

Figure 3.7 presents results for heteroscedasticity adjustments. The application of the robust function and of the FGLS method accounts for heteroscedasticity. Both methods, at large, have not changed coefficients of the regression, nor standard errors or significance levels. This indicates that heteroscedasticity in the error term is not significant to influence results of the panel data (DeFusco *et al.,* 2015).

(iii) Endogeneity test

The OLS regression requires that the word count and the rest of control variables are orthogonal to the error terms[54], which means that errors are independent and identically normally distributed with a mean of zero and a variance equal to σ^2. If one of those assumptions is broken, endogeneity is likely to be present in the model. In consequence, the coefficient estimates will be biased and inconsistent causing spurious results (Schultz, Tan and Walsh, 2010; Gippel, Smith and Zhu, 2015). Based on a simple regression model, $y = \beta_0 + \beta_1 x + u$, if 'x' is exogenous, not correlated with the error term, covariance (x, u) = 0 and the β_1 is unbiased and consistent (Brooks, 2019).

There are several sources of endogeneity, however, three are the most relevant to this study: (1) the omitted variables, (2) unobserved heterogeneity and (2) the measurement error.

<u>Omitted variables</u>: when variables, which are strongly related to regressors, are omitted from the model, they are likely to become a part of the error term. This, in consequence, makes the error term correlated with independent variables, which

[54] Are not correlated with the error term.

distorts the relationship between them, resulting in biased and inconsistent estimates (Papies *et al.,* 2017).

<u>Unobserved heterogeneity</u>*:* occurs when an unobserved or difficult-to-quantify factor, which may not necessarily be constant over time, influences the relationship between variables in the model (Schultz *et al.,* 2010).

<u>Measurement error</u>*:* when variables in the panel dataset are measured with an error (imprecise measurement), they can be a cause of endogeneity. An error could induce a correlation between the mismeasured variable and the error term, which would lead to biased coefficient estimates (Roberts and Whited, 2015; Papies *et al.,* 2017).

To correct for the endogeneity bias we can apply one of the econometric techniques:

(i) Two Stage Least Squares estimation (2SLS) – an instrumental variable estimation. This method replaces the endogenous variable with an instrumental value that has only exogeneous information (Papies *et al.,*2017).

(ii) First Difference or Generalized Method of Moments (GMM) estimators. These estimators rely on differencing or moment conditions to address endogeneity. They exploit the information within the panel structure to provide a consistent estimate (Schultz *et al*, 2010).

(iii) Fixed Effects (FE) or Random Effects (RE) method. By including entity-specific fixed effects or random effects, we can eliminate individual specific effects, constant over time, that might be correlated with the error term. This method can mitigate endogeneity (Schultz *et al.,* 2010).

Two Stage Least Squares estimation (2SLS)

Following Wooldrige (2015) and Siddik *et al.* (2017), the 2SLS method is employed to test for endogeneity in the model. Additionally, the Fixed Effects method is applied in section 3.4.2.5 (model 4); however, it is not as effective at addressing the endogeneity issue as 2SLS. In some cases, it can only help to control it (Schultz et al., 2010).

The 2SLS procedure is more complex than the OLS estimation method. Moreover, is based on instrumental variables, which do not feature in the OLS. Below, the estimation method is explained in detail.

(1) Instrumental variables

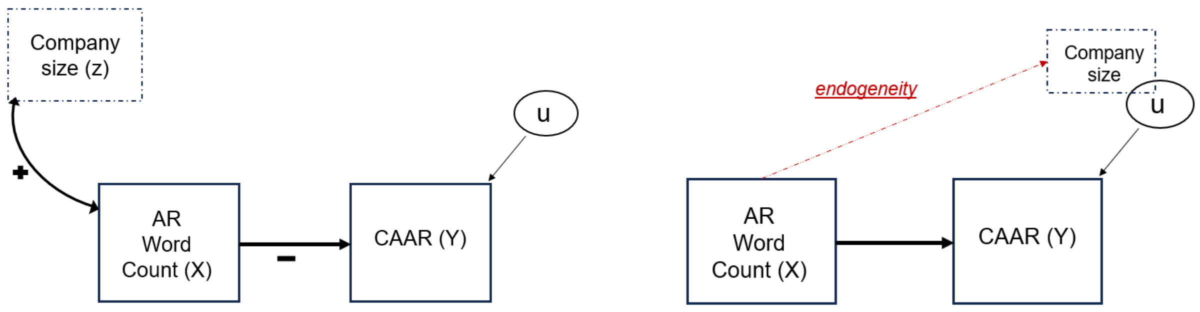
An instrument '*z'* is a variable that is correlated with the endogenous variable '*x'*, Cov (z, x) ≠ 0, however, does not belong in the model for '*y'*, and is not correlated with the error term '*u'*, Cov (z, u) = 0. (Katchova, 2013; Papies *et al.,*2017).

A 'company size'[55] has been assigned as an instrument '*z'* for WRDS. I argue that the market reaction (captured in abnormal returns) and the word count of an annual report are both determined by the company size. The bigger a company, the greater amount of information is presented in an annual report (Lang and Lundhol, 1993; Li, 2008;

[55] Company size- natural logarithm of the market capitalisation at the end of the preceding calendar year - the year which is addressed in the annual report (Li, 2008).

Wardhani, *et al.,* 2019; Fahad and Rahman, 2020). And as it is argued throughout this thesis, the length of an annual disclosure impacts the market reaction (You and Zhang, 2009; Lee, 2012; Miller, 2010, Nadeem, 2022; D'Augusta *et al.,* 2023). Therefore, the company size is likely to determine the word count of an annual report, which, further, has an impact on the magnitude of the market reaction around the report filing. In other words, more lengthy annual reports, which are likely to be produced by larger companies, receive negative market reaction. This relationship is depicted in figure 3.8, the first image. The company size is positively correlated with the word count of annual reports, and the word count of annual reports has a negative association with the CAAR. The correlation matrix, figure 3.11, confirms these two relationships.

Figure 3.8: Illustration of omitted variable bias



Excluding the company size from the equation will lead to an omitted variable bias. In consequence, the company size will become an omitted cause and will be included in the error term, the second image. Moreover, the company size, now in the error term, will be correlated with the 'x', the word count of annual reports. If this process takes place, we have a case of endogeneity, which is likely to cause biased and inconsistent results (Papies *et al.,* 2017), unless the company size is employed in the model as an instrumental variable. Company size fulfils three required properties of an instrument.

(2) Properties of an instrument '*z*': (Gippel, *et al.,* 2015; Papies *et al.,*2017)

I. The instrument '*z*' does not appear in the original regression model: $y = \beta_0 + \beta_1 x + u$

When testing for endogeneity, the *company size* is not an explanatory variable of the regression model.

$$CAAR = \beta_0 + \beta_1 WRDS + \beta_2 BM + \beta_3 ST + \beta_4 IO + \beta_5 CAR\_p1 + \beta_6 CAR\_p2 + u$$

II. The instrument '*z*' is correlated with the endogenous variable X (see the correlation matrix, below, figure 3.11)

$x = \delta_0 + \delta_1 z + v$, so cov(z, x) ≠ 0 , where $\delta_1 \neq 0$

$$WRDS = \delta_0 + \delta_1 company\ size + v$$

Company size is correlated with the endogenous variable *WRDS*, therefore, cov(company size, WRDS) ≠ 0.

III. The instrument '*z*' is uncorrelated with the error term '*u*' [56].

cov(z, u) = 0; cov(company size, u) = 0

(3) The 2SLS estimation procedure (Gippel, *et al.,* 2015; Papies *et al.,*2017).

The standard OLS regression model:

$$y_1 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + u \quad (CAAR = \beta_0 + \beta_1 x_1 + \beta_2 WRDS + u)$$

[56] This property, statistically, cannot be proved.

Where y_1 is the dependent variable; x_2 is the main regressor WRDS; x_1 is the set of control variables.

If x_2 (WRDS) is exogenous, not correlated with the error term, covariance (x, u) = 0 and the $\hat{\beta}_2$,estimated with OLS, is unbiased and consistent. On the other hand, if x_2 (WRDS) is endogenous, the coefficient $\hat{\beta}_2$ will be biased and inconsistent. Therefore, we need to apply the 2SLS estimation, with an instrument *'z'*, to correct for this issue.

In a two-stage process of the 2SLS, the endogenous variable is replaced with its predicted values after being regressed on instrument '*z'.*

- <u>First stage</u>, the reduced form equation: $y_2 = \gamma_1 x_1 + \gamma_2 x_2 + e$

We regress the endogenous variable y_2 on the exogenous regressors x_1 and x_2 . Any endogeneity is left in the error term *u* term. In our model: y_2 = WRDS; x_1 = the set of control variables; x_2 = company size is the instrument. From the above formula, we are getting a predicted value of $\widehat{y_2}$[57] to substitute it in the structural equation model, in the second stage of the 2SLS.

- <u>Second stage</u> - we regress the dependent variable y_1 on its predicted value of $\widehat{y_2}$;

  $y_1 = \beta_0 + \beta_1 x_1 + \beta_2 \widehat{y_2} + u$

Applying the formula to our model : $CAAR = \beta_0 + \beta_1 x_1 + \beta_2 \widehat{WRDS} + u$

The coefficient $\hat{\beta}_2$, estimated with 2SLS, should be unbiased because $\widehat{y_2}$ is exogenous and uncorrelated with the error term *u.*

[57] It should be noted that the predicted value $\widehat{y_2}$ ($\widehat{WRDS}$) contains only exogeneous information from the instrument z (company size), it is not the original WRDS variable, which maybe endogenous. This is why an instrument z is an exogenous variable.

(4) Testing for presence of endogeneity (Siddik et al., 2017; Brooks, 2019)

The application of the Durbin-Wu- Hausman test checks for endogeneity of y_2 (WRDS). Here, we assess whether the covariance of *x* and *u* is different than zero, cov(*x u*) ≠ 0.

Based on the structural equation, $y_1 = \beta_1 y_2 + \beta_2 x_1 + u$, the following procedure is performed:

1. Estimate the reduced form equation: $y_2 = \gamma_1 x_1 + \gamma_2 x_2 + u$
2. Obtain the residuals *'u'.*
3. Induce the predicted value of $\hat{u}$ to the structural equation: $y_1 = \beta_0 + \beta_1 y_2 + \beta_2 x_1 + \rho\hat{u} + e$

The procedure is very similar to the 2SLS method with the difference that this time, we are interested in the predicted values of the error term $\hat{u}$ rather than the predicted values of the $\widehat{y_2}$. It should be noted that the predicted values of $\hat{u}$ contain endogenous information, while the predicted values of $\widehat{y_2}$ carry only exogenous information. Therefore, y_2, the endogenous variable *WRDS*, is broken down to exogenous part $\widehat{y_2}$ and endogenous part $\hat{u}$: $y_2 = \widehat{y_2} + \widehat{u}$.

Assessing significance of the *ρ:*

- If the coefficient *ρ* on the residual, from the first stage equation, is not significantly different from zero then the regressors are exogenous.

- If the coefficient ρ is significantly different from zero, the regressors are endogenous.

Figure 3.9: Durbin-Wu- Hausmn endogeneity test

	Structural model	Reduced form model	Structural model with residuals
Variables	**CAAR**	**WRDS**	**CAAR**
WRDS	-.008 (.003) **		-.009 (.005) *
BM	-.002 (.001)	.096 (.014)***	-.002 (.001)
ST	.003 (.002)	.000 (.027)	.003 (.003)
IO	-.000 (.000)	-.002 (.000) **	-.000 (.000)
CAR_p1	.199 (.089) **	.395 (1.11)	.199 (.097) **
CAR_p2	-.032 (.019)	-.017 (.243)	-.032 (.023)
company size		.232 (.013)***	
vhat			.001 (.006)
Constant	0.052 (.049)	9.511 (.406) ***	0.058 (.063)
R-squared	0.059 ***	0.541 ***	0.059 ***

Figure 3.9 shows coefficients of independent variables, in brackets, standard errors. Significance levels of p-values, at 1%, 5% and 10% levels, are captured by ***, **, *.

Here, the focus is on the $\hat{u}$ error term, which is displayed in figure 3.9 under *vhat.* The *vhat* residual is estimated in the reduced form model for *WRDS* (second column) and then induced in the structural model for *CAAR.* The coefficient on the residual $\hat{u}$ is not significant, therefore, we conclude that the *WRDS* variable is exogenous. There is no need to correct for endogeneity, no need for the instrumental variable.

The result is double-checked by running the *'estat endogenous'* command in STATA, which reports the chi2 and F values for the 'vhat' under the Durbin – Wu – Hausman test. This confirms the findings obtained from the manual execution of the test.

Figure 3.10: Durbin-Wu- Hausman endogeneity test with STATA.

```
Tests of endogeneity
H0: Variables are exogenous

Durbin (score) chi2(1)          =  .018745  (p = 0.8911)
Wu-Hausman F(1,363)             =  .018342  (p = 0.8923)
```

The p-value is insignificant, which indicates that there is exogeneity in the model. H_0 = variables are exogeneous, thus no need for any corrections.

(5) **<u>Testing instrumental variables</u>** (Gippel, et al., 2015; Papies et al.,2017).

Despite the outcomes of the endogeneity test, a 2SLS regression is run to provide additional evidence for the exogeneity in the model. Prior to this, the strength of the instrumental variable needs to be tested. An instrument is sufficiently strong if it is correlated with the regressor (Papies *et al.,* 2017). A correlation matrix of the exogenous instrument *company size* and the endogenous regressor *WRDS* provides a first indication.

Figure 3.11: Correlation matrix

	SIZE
SIZE	1.0000
WRDS	0.7241*

We see a strong correlation between the company size and the word count of annual reports, 0.72 at the 1% level of statistical significance. This means that the *'company size'* (represented by the *log_size)* is not a weak instrument. If required, it will correct for endogeneity.

Figure 3.12: First stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,364)	Prob > F
WRDS	0.5415	0.5340	0.4473	264.707	0.0000

The second and a more formal method is to check the summary statistics of the first stage regression, specificity, of the coefficient of the instrument. The instrument is considered sufficiently strong if the F-statistics is greater than 10 (Gippel, *et al.,* 2015), as is the case above; a value of 246 is reported in figure 3.12.

The correlation matrix and the F-statistics show that the '*company size'* is sufficiently strong instrumental variable to correct for the potential endogeneity bias in model 1.

(6) The 2 SLS estimation results

Figure 3.13 presents results for the OLS estimation and the 2SLS estimation. The aim is to compare the *WRDS* coefficients of the OLS with the $\widehat{WRDS}$ coefficient of the 2SLS (Katchova, 2013).

The structural equation model:

$CAAR\ (-1,1)_{i,t} = \beta_0 + \beta_1 WRDS_{i,t} + \beta_2 BM_{i,t} + \beta_3 ST_{i,t} + \beta_4 IO_{i,t} + \beta_5 CAR\_p1_{i,t} + \beta_6 CAR\_p2_{i,t} + u_1$

Here, *WRDS* is endogenous, and the other variables (control variables) are exogenous. The employed instrument for *WRDS* is '*company size'*.

- The first stage – estimates the reduced form equation and obtains predicted value of $\widehat{WRDS}$, which contains only exogeneous information.

  $WRDS = \delta_0 + \delta_1 LnBM_{i,t} + \delta_2 LnShareTurnover_{i,t} + \delta_3 IO_{i,t} + \delta_4 CAR\_pre1_{i,t} + \delta_5 CAR\_pre2_{i,t} + \boldsymbol{\delta_6}\ \mathbf{size} + v_2$

- The second stage - estimates the structural equation replacing WRDS with $\widehat{WRDS}$.

  $CAAR\ (-1,1)_{i,t} = \beta_0 + \beta_1 \widehat{WRDS}_{i,t} + \beta_2 BM_{i,t} + \beta_3 ST_{i,t} + \beta_4 IO_{i,t} + \beta_5 CAR\_p1_{i,t} + \beta_6 CAR\_p2_{i,t} + u_1$

Figure 3.13: Results for 2SLS estimation – full model

	OLS estimation	2SLS estimation - first stage	2SLS estimation - second stage
Variables	**CAAR**	**WRDS**	**CAAR**
WRDS	-.008 (.003) **		
$\widehat{\mathrm{WRDS}}$			-.009 (.005) *
BM	-.002 (.001)	.096 (.014)***	-.002 (.001)
ST	.003 (.003)	.000 (.027)	.003 (.003)
IO	-.000 (.000)	-.002 (.000) **	-.000 (.000)
CAR_p1	.199 (.097) **	.395 (1.11)	.199 (.097) **
CAR_p2	-.032 (.023)	-.017 (.243)	-.032 (.023)
company size		.232 (.013)***	
Constant	0.052 (.066)	9.511 (.406) ***	0.058 (.080)
R-squared	0.059	0.541	0.059

Figure 3.13 shows coefficients of independent variables, in brackets, standard errors. Significance levels of p-values, at 1%, 5% and 10% levels, are captured by ***, **, *.

Figure 3.13 shows results of the OLS estimation, which is compared with the 2SLS estimation, both tests have a robust function employed to control for heteroscedasticity.

Under the OLS, CAAR is regressed on the word count of annual reports and five control variables: book to market, share turnover, institutional ownership and two pre- filing CAARs. The 2SLS procedure regresses the endogenous WRDS on the five control variables, which are exogenous, and on the instrument *'company size'*. It also generates precited values for the word count $\widehat{WRDS}$. In the second stage, WRDS is replaced with $\widehat{WRDS}$ and the CAAR is regresses on $\widehat{WRDS}$ and the other six control variables.

Results:

The OLS estimation regresses *CAAR* on the word count and produces a *WRDS* coefficient of - 0.008, at the 5 level of statistical significance. The OLS estimation ignores the fact that the word count can be endogenous. The result indicates that an additional 1% increase in the word count of an annual report reduces the cumulative average abnormal returns (CAAR) by 0.8%. Using the first stage of the 2SLS estimation, *WRDS* becomes a dependent variable and is regressed on the exogenous instrument company size. Here, we have a strongly significant relationship between the word count and the company size, 0.23 at the 1% level of significance. This confirms that the instrument is correlated with the endogenous variable *WRDS* (the second property of an instrument), and it also indicates that *company size* is a sufficiently strong instrument (Siddik *et al.,* 2017). In the first stage, we are also obtaining the $\widehat{WRDS}$ (a predicted value of x), which is then regressed on *CAAR* in the second stage of the 2SLS. The coefficient of $\widehat{WRDS}$ is -0.009. This means that for an additional 1% increase in the word count we see 0.9% decrease in *CAAR*, at the 10% level of statistical significance. The 2SLS produces a stronger result in the magnitude (0.9%) than the OLS estimation (0.8%), however, at a lower significance (10% vs 5% level of statistical significance).

It is also worth noting the R-squares. The R^2 of the 1st stage 2SLS regression of *WRDS* on *company size* is 0.54. This is a high figure; it implies that as much as 54% of the variation in *WRDS* is explained by the *company size*. This confirms a strong relationship between those two variables (the instrument and the main regressor). The remaining two R- squares, OLS (5.2%) and the 2nd stage 2SLS (5.8%), show a weaker variation in *CAAR* caused by the word count. This, however, is not a surprise, we could not expect that the word count of annual reports would influence the initial market reaction more than a magnitude of a few percentages. An annual disclosure characteristic will have a weaker effect than a fundamental or market data.

In conclusion, applying the Two-Stage Least Squares (2SLS) method yields results that are almost the same as those obtained using Ordinary Least Squares (OLS) estimation. The incremental benefit of employing the 2SLS for correcting endogeneity appears minimal, contributing only slightly to the quality, bias and consistency of the coefficient estimates. This finding confirms the lack of endogeneity in the model, as indicated by the Durbin-Wu-Hausman test. Consequently, it appears that the OLS estimation method is an effective approach for analysing Model 1.

Summary of statical issues

In this section, the model was tested for non-stationarity, heteroscedasticity and endogeneity, as these statistical issues, if unaddressed, could compromise the accuracy of the OLS estimator. Various statistical tests were employed, leading to several key findings. Firstly, the time series was confirmed as stationary, indicating no time trend in the dataset. This result suggests that the reported coefficients are both unbiased and consistent. Secondly, evidence of heteroscedasticity was detected, signalling a lack of stability in the variance of standard errors. Despite this, the model's results seemed largely unaffected. The coefficients, standard errors and significance levels showed minimal variation following the application of a robust function to correct for heteroscedasticity. Lastly, the endogeneity test revealed no significant issues, suggesting that the variables in the model are exogenous.

3.4.1.6 Specifications of regression model (1)

In echoing the approach of Arena and Julio (2012), several CAAR regressions are conducted based on different specifications. Seven separate adjustments of the standard errors are applied, with clustering being one of the methods. The clustered standard errors should correct for correlations of the residuals, which in turn should generate more accurate coefficient estimates (Petersen, 2009).

Figure 3.14: Standard error estimation models

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR $_{(FE)}$	(6) CAR $_{(DBL\_C)}$	(7) CAR $_{(2SLS)}$
Year_dummies	✓	✓	✓	✓	✓		
Ind_dummies	✓	✓	✓	✓			
Cluster_t		✓				✓	
Cluster_i			✓			✓	
Cluster_ind				✓			
Ind FE					✓		
2_SLS							✓

Figure 3.14 shows seven standard error estimation methods. Model 1 employs, parametrically, fixed effects with year and company dummies. Models 2-4, the same fixed effects but with additional clusters (time, company, industry). Model 5 adopts the fixed effects estimator with a year dummy. Model 6 includes a double cluster, time and company. Model 7 employees the 2SLS estimation procedure.

<u>Overview</u>

Models 1- 4 are controlled for two main types of unobservable differences: (1) cross-sectional (within) and (2) time-variant (between). This is done parametrically by employing industry and year dummies (Loughran and McDonald, 2011; Lawrence, 2013). Those controls help to account for variations in reporting length driven by industry characteristics, secondly, by changes in time. Additionally, three clusters are added to model 2, 3 and 4: time (model 2), company (model 3), industry (model 4). A similar method is applied by Li (2008), You and Zhang (2009) and (Loughran and McDonald, 2014). Model 1 remains without a cluster, for the comparison. Models 5, 6 and 7 account for the panel structure of the data, which are observations from multiple companies in multiple years.

<u>Models description:</u>

- Model 1 is an ordinary least square model without any cluster. However, it includes (*t)* and (*i*) dummy variables, which control for the year and the industry effect. It is likely that those two effects have an influence on the wordcount (Li, 2008; Nazari *et al.,* 2017). Loughran and McDonald (2014) applied only industry dummy to control for the cross-sectional dependence, the industry effect, without taking into consideration the time effect.

- Models 2, 3 and 4 use the same dummy variables, industry and time. In addition, they cluster standard errors to account for possible correlations between stock returns within:

    - Time - model 2 (You and Zhang, 2009, their second regression model)
    - Company - model 3 (Lehavy *et al.,* 2011)
    - Industry - model 4 (Li, 2008)

- Model 5 (FE) is a dummy variable regression with fixed effects. The model has a panel data and it employs a fixed effect method (FE), which pools the cross- sectional and the time-series data, as in You and Zhang's (2009) first regression. The aim of the fixed effect (within) estimator is to absorb all time-constant (time-invariant) unobservable characteristics of an individual company (*i*), such as an industry effect, and other time-invariant effects that may be difficult to measure. Those characteristics and effects may impact the outcome, the abnormal returns (Hausman and Taylor, 1981; Seebeck and Kaya, 2022). The model also includes year dummies that captures time-variant unobservable variation, which changes across time periods but not across individual companies, for example, a macroeconomic condition in a given year (e.g., inflation, interest rate change). This variation would also affect the overall outcome of the return.

- Model 6 (DBL_C) follows Petersen's (2009) recommendation. Sets the data as panel (multiple companies, multiple years) and then applies a double cluster by both dimensions (time and company). Two clusters because we are likely to have company and time effect in the data (Petersen's, 2009).

- Model 8 (2SLS) adopts non- parametric approach to estimating model parameters. The 2SLS is an instrumentation procedure which is robust to endogeneity (Shultz *et al.,* 2010).

Petersen noted that finance researchers often estimate the source of residuals correlation parametrically by applying dummy variables and then cluster standard errors by one of the dimensions (time or company). This approach aligns with the findings of most papers referenced in this study, hence the application of models 2-4. However, Petersen observed that this approach can lead to biased standard errors.

If the time effect were fixed, there would be little issue. However, given that the time effect is likely not fixed and there is a significant amount of time-variant unobservable variation in the sample (e.g., changes in inflation, changes in interest rates), this method may not be entirely appropriate. Time dummies will not fully eliminate the dependence, thus producing biased standard errors.

To address this, Petersen proposes clustering simultaneously on both dimensions. By clustering standard errors by time, we capture unspecified correlations between observations across different companies for a given year. By clustering standard errors by company, we control for unspecified correlations between observations across years for a given company. However, while this method produces less biased standard errors, the estimates are still likely to be slightly biased, although Petersen notes that the magnitude is not significant.

This bias arises because the number of year clusters (11) is much lower than the number of company clusters (100). Petersen suggests clustering by the more frequent dimension (company), but this does not significantly improve the results. In fact, Petersen found that the results were almost identical to double clustering (both dimensions simultaneously). Petersen's conclusion is that only clustered standard errors (model 6) produce the least biased results, as they also account for the residual dependence caused by the company effect.

It is difficult to determine which method (1-7) to use, as almost every paper employs a different method, as if the choice was the one that produces the strongest results. Unfortunately, as Petersen points out, there is no clear guidance in finance literature on that issue. Nevertheless, based on his analysis and recommendations, for the type of dataset we have in this enquiry, model 6 has been constructed.

Results of each method are compared and discussed in Chapter 4: Results.

❖

3.4.2 Length of annual reports and financial performance[58]

The enquiry continues based on the findings from the Pearson correlation matrix (figures 3.4.1 and 3.4.2), which confirm the negative association between the word count of annual reports and the market reaction. In accordance with the managerial obfuscation theory[59] (Li, 2008), the aim is to determine whether the length of annual reports is associated with a company's financial performance and if this relationship is indeed negative. The hypothesis posits that: *'the weaker financial performance the longer annual report'.* To ensure that the predictive power of the '*length'* variable is not caused by its association with company specific characterises, several controls are employed.

3.4.2.1 Determinants of reporting length: financial control variables

In line with Li (2008), variables that capture a company's performance, and are associated with the length of annual reports, are used. These include: (1) return on

[58] Additional analysis
[59] The managerial obfuscation theory – see literature review, section 2.4.3

assets (ROA); (2) income (net income).

After testing the financial variables[60] according to Li's framework, it was found that only 'net income' (represented by 'Profit/Loss' in Li's study) yielded statistically significant results for the sample. Consequently, other financial variables were also examined[61]. For instance, when Tobin's Q and ROE are used together with INCOME, they produced similar results (see appendix 4). However, due to suspected multicollinearity[62] with ROA, these two variables where not included in the model.

Return on assets (ROA): this ratio has been applied as a control for profitability in numerous studies (You and Zhang, 2009; Lawrence, 2013; Nazari *et al.,* 2017; Barkat *et al.,* 2019; Figlioli *et al.,* 2020). Often, the literature supports the obfuscation theory, suggesting that financial performance, as indicated by ROA, influences the length and readability of annual reports. The observed relationship is typically negative, where weaker financials are associated with longer and more complex reports. Various measures and indices are used to analyse disclosure characteristics, all fundamentally based on textual length. For instance, Hassan, Abbas and Garas (2019) employ the 'Flesch' reading score, which is based on the number of words per sentence and syllables per word. Their findings confirm that annual reports are more challenging to read when ROA is low. In contrast, Xu, Pham and Dao (2020) worked with the 'Fog' index, focusing on factors like the number of words per sentence, and documented a strongly negative ROA coefficient of -0.29, which was statistically significant. Similarly, Kalelkar, Nguyen and Chen (2023) reported a significant coefficient of -0.49. However,

[60] Operating earnings; Profit/Loss
[61] All variables were acquired from Bloomberg.
[62] Correlation matrix indicated a very strong association between ROA and ROE 0.9*** and between ROA and Tobin Q 0.92***.

Jia and Li's (2022) findings are contrary to this trend. In their analysis of the readability of risk management disclosures, using principal component analysis (PCA), they reported a strongly positive ROA coefficient of 11.9, implying higher readability with higher profitability. Yet, this association reverses when employing the GMM method, aligning with the obfuscation theory, though the result was not statistically significant. Habib and Hasan (2020), using the 'Bog' index, found a significant coefficient of -3.1. Overall, the literature generally suggests a consistent negative impact of ROA on the readability of annual reports.

Net income (INCOME): the net income dummy is assigned a value of 1 if a company reports a profit and 0 otherwise. This variable was employed by Li (2008) in one of the most influential works on the issue of readability of annual report. Consistent with the obfuscation theory, Li argues that accounting losses are often linked to more extensive reporting (Dyer *et al.,* 2017). Therefore, it is anticipated that a fiscal year ending in a loss will correspond to a lengthier annual report. The profit/loss variable has also been featured in recent studies by Hesarzadeh, Bazrafshan, Rajabalizadeh (2020); Raimo, Vitolla, Minutiello, Marrone and Tettamanzi (2022); Kalelkar, Nguyen and Chen (2023), all investigating the impact of readability of corporate disclosures on company fundamentals. Echoing Li (2008), these studies frequently employ the Fog index, and there appears to be a consensus that weaker financial performance, as reflected in a company's annual income, is associated with poorer readability and more extensive reporting. Consequently, a negative relationship is expected between these two factors.

Table 3.5: Definitions and computations of financial variables

Variable	Definition
Return on Assets (ROA)	The income before extraordinary items divided by the total assts at the end of fiscal year, which is analysed in annual reports (Nazari *et al.,* 2017; Xu *et al.,* 2020).
Net Income (INCOME)	Net income for year *t (analysed in the annual report)*. Dummy applied for 1 if a company reports profit and 0 if a loss (Li, 2008; Hesarzadeh *et al.,* 2020; Kalelkar *et al.,* 2023).

* Variables, or data items required to compute those variables, are download from Bloomberg terminal.

3.4.2.2 Motivation behind the control variables (company characteristics)

Following the methodologies of Li (2008); Lehavy *et al.* (2011); Lawrence (2013) and Dyer *et al.* (2017), four variables, associated with a company's characteristics, have been included to control for their potential impact on reporting length. This control is important for accurately testing the interaction between reporting length and the company's performance, as highlighted in Li’s (2008) study. The determinants of the length of a financial disclosure include company size, market- to- book, research and development and leverage.

- **Size (MC):** echoing Li (2008), it is anticipated that larger companies will produce lengthier reports. Wijayana and Achjari (2020) suggest that bigger companies are more likely to disclose extensive information to the public compared to smaller companies.

Lang and Lundhol (1993), along with Hossain *et al.* (1995), argue that larger companies, being followed by more analysts, are required to provide more comprehensive corporate disclosure. The relationship appears straightforward: the larger the company, the more information it generates. However, there are other nuanced perspectives worth considering. For instance, Zamil, Ramakrishnan, Jamal, Hatif and Khatib (2023) associate company size with increased public exposure and scrutiny, leading to more extensive disclosures, similar to the effect of analyst following. This scrutiny, extending beyond the public and press, includes shareholders as well. According to Boshnak (2021), larger companies, due to their visibility, are exposed to a greater shareholder control. Consequently, the management is expected to be more informative in their communication. This is evidenced by a statistically positive result for the size coefficient in Boshnak's study. Yet, shareholders represent just one segment of a broader stakeholder group, which is more extensive in larger companies. The presence of a larger number of stakeholders requires more comprehensive information regarding the company's operations, thereby resulting in longer annual reports that present more sections dedicated to addressing the interests of these diverse stakeholders (Fahad and Rahman, 2020). Additionally, the complexity of operations and strategies in larger firms, as per agency theory, leads to greater information asymmetry and increased cost. Consequently, to mitigate these agency costs, management of larger firms tends to produce more informative and extensive annual reports (Wardhani, Widianingsih and Karundeng, 2019).

- **Market-to-Book (MB):** also referred to price to book (P/B). The ratio reflects a company's business cycle, a high MB indicates a growth stage. Business structures of growth companies are more complex and more uncertain, thus require a more lengthy annual disclosure (Li, 2008); they also carry more risk. A higher MB is associated with a higher risk, a factor which adds complexity and length to a corporate disclosure (Lim, Chalmers and Hanlon, 2018; Xu, Fernando, Tam and Zhang, 2020). Bai, Dong and Hu (2019) note growth stocks convey more firm-specific information, and this needs to be accommodated in an annual report. Empirically, several recent studies linked the MB ratio with the Fog index, which captures opaque and vague, as well as lengthy disclosures. Often, a statistically positive relationship is observed between these two factors. Gangadharan and Padmakumari (2023) report a high magnitude coefficient for MB at 1.02, while Xu, Fernando, Tam and Zhang (2020) document a coefficient of only 0.02. Xu, Pham and Dao (2020), however, find a positive, but not statically significant, relationship. These studies suggests that companies with a high MB ratio tend to release longer and/ or less readable disclosures, attributable to operational complexity or increased risk. In contrast, Xu, Dao, Wu and Sun (2022) argue that growth companies have an incentive to produce transparent, shorter disclosures with low information asymmetry. Due to their attractiveness in yielding higher returns and being popular among investors, these companies are closely followed by analysts. Consequently, they are likely to produce more succinct and readable annual reports. This perspective suggests a negative relationship between the MB ratio and the word count of annual reports, as observed by Jia and Li (2022). However, Habib and Hasan (2020), while arguing that growth companies should release longer and more complex reports, documented mixed results, with both positive and negative relationships, depending on the readability measure applied. In summary, the relationship between the MB ratio and the word count of annual reports is not straightforward, as both positive and negative directions are possible and are supported by plausible arguments. Nonetheless, based on the prevalence of evidence and the strength of these theoretical arguments, a positive relationship is predicted: companies with higher MB (growth companies) are likely to release lengthier disclosures to manage shareholder expectations.

- **Research and Development (RD**): it is reasonable to expect that companies which engage in R&D, because of a greater complexity in their business operations, are likely to issue lengthier reports to accommodate that extra development activity (Lehavy *et al.,* 2011). This is the most intuitive explanation of the relationship between the RD and the word count of annual reports. There are, however, additional supportive reasons. Firstly, companies often undertake R&D activities to improve enterprise performance, which can increase shareholder value and impact expected returns. Hence, management has a vested interest in informing investors about the company's R&D undertakings (Zhang, Qin and Liu, 2020), which will take additional reporting words. Secondly, R&D typically involves technical and scientific activities, with the language used to describe these schemes and initiatives often being lengthy and complex, thereby potentially reducing the readability of annual reports (Lim, Chalmers and Hanlon, 2018). Another aspect relates to company characteristics. Hoffmann and Kleimeier (2021) found that innovative companies tend to release more complex and less readable reports due to factors such as high leverage use, uncertainty regarding future cash flows and R&D investment payoffs. Consequently, such disclosures often exhibit high informational asymmetry and significant informational risk, particularly concerning the value of innovative activities. Therefore, reporting on financial and operational risks and uncertainties is typically more complex and verbose. A third consideration is that R&D intensive companies may deliberately obfuscate information about their research, development and innovation activities to maintain competitive advantage. Rahman, Kabir, Ali and Oliver (2023) suggest that it is not in a company's interest to be transparent in sharing such information with competitors, leading to less readable and more extensive annual reports to obscure proprietary information.

- **Leverage (LEV):** according to Fahad and Nidheesh (2020), the relationship between leverage and the corporate disclosure is based on the agency cost theory, which links higher level of debt with an increased amount of released information. This is attributed to the fact that higher leverage is associated with additional risk to shareholders, elevating the probability of bankruptcy and the levels of a company's idiosyncratic risk (Vitolla, Raimo, Rubino and Garzoni, 2020). This in turn, increases the level of monitoring (Jensen and Meckling, 1976; Lastiningsih, 2021). Long-term creditors and debt holders require to be well informed about the company's strategy and operations, as this enables them to assess associated risks, which are in addition to those already carried by the company (Fahad and Rahman, 2020). To manage those risks companies often disclose more voluntary information in their annual reports (Boshnak, 2021). The overall aim, as indicated by Lastiningsih (2021) and Vitolla *et al.* (2020), is to reduce information asymmetry, increase creditor's confidence about the company's financial stability and its ability to meet financial obligations. The positive relationship between leverage and the length of annual reports has been confirmed in Bradbury (1992) and Hossain *et al.* (1995), and more recently, in Fahad and Rahman (2020), who found that highly leverage companies disclose more information as a transparency measure to assist shareholders in appraising the financial level of risk.

To conclude, it is expected that reporting length increases with: company's size (MC), market-to-book (MB), research and development (RD) and leverage (LEV). Conversely, a negative association is predicted with return on assets (ROA) and net income (INCOME). This suggests that companies exhibiting weaker financial performance tend to produce lengthier annual reports.

Table 3.6: Definitions and computations of company characteristics variables

Variable	**Definition**
Size (MC)	Natural logarithm of the market capitalisation at the end of the preceding calendar year - the year which is addressed in the annual report (Li, 2008; Bochkay *et al.,* 2020).
Market – to- Book (MB)	Market value of equity divided by book value of total assets in the fiscal year '*t* ' (Li, 2008; Lawrence, 2013; Dyer *et al.,* 2017; Jia and Li, 2022).
Research and Development (RD)	Research and development expense to net sales, as a percentage of operating expense from year *t-1*, which is year one prior the fiscal year (Lehavy *et al.,* 2011; Lim; *et al.,* 2018).
Leverage (LEV)	Ratio of the total debt to total assets at the end of the fiscal year covered by the annual report (Asthana and Balsam, 2001; Yekini *et al.,* 2016; Boshnak, 2021).

* Variables, or data items required to compute those variables, are download from Bloomberg terminal.

3.4.2.2 Pearson correlation

Figure 3.15: Pearson correlation matrix with WRDS and financial & company variables

	WRDS	ROA	INCOME	MC	MB	RD	LEV
WRDS	1.0000						
ROA	-0.2357*	1.0000					
INCOME	-0.1181*	0.2270*	1.0000				
MC	0.7444*	-0.0858*	0.0916*	1.0000			
MB	-0.2461*	0.5656*	0.2051*	-0.0775	1.0000		
RD	0.3087*	-0.0193	0.0892	0.2868*	0.1204*	1.0000	
LEV	0.1222*	-0.0277	-0.0595	0.0856*	0.4062*	0.0089	1.0000

Figure 3.15 presents Pearson's correlations of the length (WRDS) of annual reports with the financial performance. Consistent with the hypothesis, there is a statistically significant negative relationship between the word count and: a) ROA**,** coefficient of -0.24 (higher than 0.063 in Lawrence, 2013); b) net income (dummy variable 1 for profit, 0 for loss), coefficient of -0.12. The results are economically significant. These findings indicate that longer reports are indeed associated with weaker financial performance: lower returns on assets (ROA) and a negative net income. The relationship of the length of annual reports with company characteristics is also statistically and economically significant across all variables: a) company size (MC), coefficient of 0.74; b) market-to-book ratio (MB), coefficient of -0.25; a contrary finding as a positive coefficient was expected; c) research and development (RD), coefficient of 0.31; d) leverage (LEV), coefficient 0.12.

These results imply that: bigger companies are discussed at a greater length in annual reports. Not a surprising result, as the size is likely to be associated with a complexity of business operations (Lehavy *et al.,* 2011). The negative MB coefficient is contrary to the prediction. Growth companies (higher MB), which usually have more complex and more uncertain business operations (Li, 2008), should be releasing longer rather than shorter reports. In terms of the research and development, higher levels of R&D are related to lengthier annual reports, this could be linked to higher complexity of operations, no surprise here. Finally, higher levels of leverage (LEV) are associated with longer annual disclosures. This is consistent with Hossain *et al.* (1995) claim that companies, in order to manage the additional risk coming from leverage, provide shareholders with more information in annual reports.

Overall, except for the MB coefficient, those results are consistent with the literature and prior research. Li (2008) reports the same directions in his findings, even for the MB ratio, which is the opposite of what was expected. His figures, however, are of weaker magnitudes, for example, in his correlation between the '*length'* and the company size, he captures a coefficient of 0.103, which contracts with the 0.74 of this study.

3.4.2.3 Regression model (2)

In the second multivariate model, the prediction is that a relationship exists between the length of an annual report, measured in word count, and a company's financial performance, as captured by ROA and 'net income'. Additionally, controls for company characteristics potentially associated with the length of an annual disclosure are included. Year and industry dummies are again applied to control for cross-sectional (within-industry) and over-time differences (time-variant unobservable variation).

$$\mathbf{WRDS}_{i,t} = \beta_0 + \beta_1 \mathbf{ROA}_{i,t} + \beta_2 \mathbf{INCOME}_{i,t} + \beta_4 \mathbf{MC}_{i,t} + \beta_5 \mathbf{MB}_{i,t} + \beta_6 \mathbf{RD}_{i,t} + \beta_7 \mathbf{LEV}_{i,t} + \boldsymbol{\varepsilon}_{i,t}$$

Similar to the first regression, the model is run with different controls; however, this time, seven models are developed. This approach follows Li's (2008) work, which is the most frequently cited paper for this type of enquiry, examining the same relationship. Model 1 is the Ordinary Least Squares (OLS) method that regresses the length of annual reports on potential financial determinants and other explanatory variables that capture company’s characteristics. Model 2 is the OLS that applies year and industry dummies to control for over – time and cross- sectional (within industry) differences. Model 3 employs year and industry dummies, in addition, to control for a potential correlation with an industry, it clusters standard errors on the industry level. Model 4 is the time fixed effects method, which controls for time- specific variations, such as changes in the market and macroeconomic environment. Models 5, 6, 7 employ the Two-Stage Least Squares (2SLS) estimation method to control for endogeneity. Model 5 includes two independent variables ROA and ‘INCOME’ and two instruments. Model 6 is run for ROA and one instrumental variable. Model 7 has ‘INCOME’ as an independent variable and one instrumental variable.

** Please, see 3.4.2.5 section for the specifications of the regression model 2*

3.4.2.4 Statistical issues checks

Similar to model 1, model 2 requires the application of several statistical checks. Tests for stationarity, heteroscedasticity, multicollinearity and endogeneity are conducted, and corrections are made where issues are identified. This process ensures that coefficient estimates are unbiased and consistent.

(i) Stationary (panel unit root test)

A model which contains a time trend, as well as individual and time specific effects is said to be non- stationary, and this may lead to invalid statistical inference (Kunst, 2011). For the stationarity test, the same as in the first model, the Fisher- type Augment Dickey Fuller (ADF) test is employed. The test uses p-values from unit root tests for each cross- section '*i*' . We want to make sure that the time- series is stationary, in other words, that the mean and variance is the same throughout time without any significant seasonality (DeFusco *et al.,* 2015).

Figure 3.16: Panel unit roots test results for y (WRDS)

	WRDS	Test Statistic	Statistic	P-value
Fisher ADF	Inverse chi - squared	P	281.15 ***	0.000
	Inverse normal	Z	2.04	0.979
	Inverse logit	L*	-1.04	0.149
	Modified inv. chi-squared	Pm	7.91 ***	0.000

*, **, *** rejection of null hypothesis of non-stationarity at 1%, 5% and 10% level.

The first results, figure 3.16, indicated that the panel is not entirely stationary. The p-values of the inverse normal (Z) and the inverse logit (L*) are not statistically significant. This means that the y_t contains at least one unit root, and the H_0 (non-stationarity) cannot be rejected.

$$\Delta y_t = \psi y_{t-1} + u_t$$

H_0: $\psi = 0$ is tested against H_1: $\psi < 0$

To induce stationary, a first differencing is applied to y_t, $(y_t \sim I(d))$ (Brooks, 2019).

If $y_t \sim I(d)$ then $\Delta^d_{y_t} \sim I(0)$.

This means that the difference operator Δ, applied *d* times, creates a process with no unit roots (*I(0)*). Formula for the first order difference:

$$\Delta y_t = \phi \Delta y_{t-1} + u_t$$

The second set of results[63], figure 3.17 shows that the time series is stationary, in first difference, at the 1% level of significance for all four tests.

Figure 3.17: Panel unit roots test results for y (WRDS). First Differences.

	d.WRDS	Test Statistic	Statistic	P-value
Fisher ADF	Inverse chi - squared	P	629.22 ***	0.000
	Inverse normal	Z	-14.02***	0.000
	Inverse logit	L*	-20.36 ***	0.000
	Modified inv. chi-squared	Pm	28.91 ***	0.000

*, **, *** rejection of null hypothesis of non-stationarity at 1%, 5% and 10% level.

[63] I also run another ADF test, but this time, rather than differencing, I applied a drift term. The same significance in results has been recorded for each test. All four p-values are significant at 1% level.

An additional ADF (Augmented Dickey-Fuller) test is conducted, as shown in figure 3.18, this time including a trend [64]. According to Hamilton (1994), once a deterministic trend is removed from the non-stationary [65] process, the panel becomes stationary.

Formula for the trend-stationary process, y_t:

$$y_t = \mu_t + \varepsilon_t$$

where:

- μ_t is a deterministic mean trend.
- ε_t is a stationary stochastic process with mean zero.

The adjustment for a time trend is more applicable to the model when regressing the word count on the financial performance of a company. It is important that the word count is determined by y_t not the y_{t-1}, as it is regressed on a financial performance of the same time frame '*t*'.

Figure 3.18: Panel unit roots test results for y (WRDS). Time trend.

	t.WRDS	Test Statistic	Statistic	P-value
Fisher ADF	Inverse chi - squared	P	293.67 ***	0.000
	Inverse normal	Z	- 7.53***	0.000
	Inverse logit	L*	- 7.71***	0.000
	Modified inv. chi- squared	Pm	8.82 ***	0.000

The same significance in results is recorded for the time trend adjustment. All four p-values are significant at the 1% level. Therefore, based on the first differencing and

[64] The mean trend is deterministic.

[65] the residual series is a stationary stochastic process.

the time trend, we can reject the null hypothesis of a unit root in the model series. The time-series is now stationary.

(ii) Heteroscedasticity

Like with model one, a heteroscedasticity test is conducted for the WRDS variable. The aim is to determine whether the variance of the error term is constant and not dependent on the explanatory variables, as detailed by Brooks (2019) and DeFusco *et al.* (2015).

Figure 3.19: Heteroscedasticity tests for WRDS

WRDS	Observations *n*	R-squared $R^2_{u^2}$	k	F-stat	P-value for F-test	LM-stat	P-value for LM test	Conclusion
Breusch-Pagan test	287	0.056	7	2.36	0.023	16.05	0.025	heteroscedasticity
Alternative White test	287	0.013	2	1.86	0.157	3.72	0.156	homoscedasticity

The Breusch-Pagan test, figure 3.19 indicates heteroskedasticity for WRDS. Based on the F-statistic and the p-value, 0.023, the coefficients are jointly significant at the 5% level. The LM test statistic confirms this finding. The LM value is 16 and the p-value, 0.025, is significant at the 5% level. Overall, those results indicate heteroskedasticity in the model.

The Alternative White test, however, states the opposite. Under the F- test, the p-value of 0.157 is greater than 0.05, which means that we do not find a joint significance. The LM-statistic is small, 3.72, and the p-value is 0.156, which again is greater than 0.05. Given the lack of significant evidence of heteroscedasticity, the null hypothesis is not rejected, leading to the assumption that the variance of residuals in model 2 is constant.

Heteroskedasticity corrections

Since the Breusch Pagan test finds a joint significance of coefficients[66], we cannot firmly confirm homoscedasticity for WRDS without correcting for heteroskedasticity. Similar to model 1, heteroskedasticity- robust variance of the coefficients (OLS with robust se) and Feasible Generalized Least Squares (FGLS) are employed.

Figure 3.20: OLS, OLS with robust standard errors and FGLS

WRDS	OLS	OLS with robust se	FGLS
Variables			
ROA	-.006 (.002) ***	-.006 (.002) ***	-.007 (.002) ***
INCOME	-.144 (.042) ***	-.144 (.041) ***	-.133 (.043) **
MC	.188 (.008) ***	.188 (.008) ***	.186 (.008) ***
MB	-.007 (.013)	-.007 (.013)	-.006 (.013)
RD	.042 (.011) ***	.042 (.009) ***	.038 (.011) ***
LEV	.028 (.010) **	.028 (.009) **	.030 (.009) ***
Constant	9.64 (.080) ***	9.64 (.073) ***	9.75 (.078) ***
Observations	410	410	410
R-squared	0.66	0.66	0.66

Figure 3.20 shows coefficients of independent variables, in brackets, standard errors. Significance levels of p-values, at 1%, 5% and 10% levels, are captured by *, **, ***

Figure 3.20 shows that coefficients of the corrected regressions (robust se and FGLS),

[66] Independent variables are explaining squared residuals.

their standard errors and p-values, largely, remain the same[67]. This is especially evident when we compare the OLS model with the robust function model. The conclusion is, therefore, that after correcting for heteroscedasticity, results are similar across all models. This would indicate that the identified heteroscedasticity in the Breusch- Pagan test is not strong enough to influence the estimates of the model.

(iii) Multicollinearity Test

A further assumption we make when we use the multiple linear regression model is that the explanatory variables are orthogonal to one another. In other words, they are not highly linearly related with one another (DeFusco *et al.,* 2015). A problem arises when explanatory variables are strongly correlated, which is the issue of multicollinearity. Model 2 has two independent variables (ROA and income), which are related with each other, and this could cause multicollinearity between them, as well as between them and the control variables. The presence of multicollinearity in a dataset compromises reliability of coefficient estimates and, potentially, weakens their statistical significance (DeFusco *et al.,* 2015).

Two multicollinearity checks are conducted for the model, following the approach of Siddik, Kabiraj, and Joghee (2017). First, pairwise correlations of the explanatory variables are examined, as presented in figure 3.21 under Pearson correlation. While these provide an initial indication of multicollinearity, they are not sufficient alone to conclude its absence. Therefore, the Variance Inflation Factor (VIF) is also applied as a direct measure of the extent of multicollinearity among all independent variables

[67] This is because we are not correcting coefficients but rather standard errors.

(Seiler, 2004), as shown in figure 3.22.

Figure 3.21: Correlation matrix for the multicollinearity test

	WRDS	ROA	INCOME	MC	MB	RD	LEV
WRDS	1.0000						
ROA	-0.2357*	1.0000					
INCOME	-0.1181*	0.2270*	1.0000				
MC	0.7444*	-0.0858*	0.0916*	1.0000			
MB	-0.2461*	0.5656*	0.2051*	-0.0775	1.0000		
RD	0.3087*	-0.0193	0.0892	0.2868*	0.1204*	1.0000	
LEV	0.1222*	-0.0277	-0.0595	0.0856*	0.4062*	0.0089	1.0000

Significance level of p-values at 1% captured by the *.

The highest correlation coefficient, 0.74, is captured between WRDS and MC (company size). This is a strong collinearity that, potentially, may be an issue. It tells us that larger companies tend to release longer narratives. According to Wooldridge (2015), a correlation higher that 0.7 indicates a multicollinearity. Katchova (2013), on the other hand, extends the boundary to 0.9. The other five associations are too low to cause multicollinearity. It is important to note the correlation coefficient between the performance variables, ROA and income, as those are two independent regressors. A high correlation between them could be a strong indicator of multicollinearity (DeFusco *et al.,* 2015). In this case, we have a relatively low figure of 0.23, which is not high enough to be a cause for concern. Overall, coefficients of the correlation matrix do not provide strong evidence for the presence of multicollinearity in the model. This, however, needs to be confirmed with the VIF method.

The second method, the Variance Inflation Factor (VIF), focuses on cumulative multicollinearity among all independent variables, which contrasts with the correlation coefficient between only two variables. The VI factor indicates the extent of the increase of the variance of a parameter estimate due to collinearity between explanatory variables (Seiler, 2004).

$$VIF = \frac{1}{(1 - R_i^2)}$$

The R_i^2 is the R- squared from a regression of x_i on independent variables. Higher R_i^2 would mean that x_i is well explained by the rest of independent variables. From the formula above, we can deduce that the VIF increases with the increase in R_i^2.

Figure 3.22: Variance Inflation Factor (VIF).

Variable	VIF
ROA	1.54
MB	1.37
INCOME	1.33
LEV	1.14
RD	1.14
MC	1.11
Mean VIF	1.27

The VIF for the model of all six explanatory variables is 1.27, which is very low. The highest factor for an individual variable is 1.54 (ROA). This means that the variance of the parameter estimate is 1.54 times larger than it would be in the case if the parameter was independent from the other explanatory variables. This is not a big increase. According to Brooks (2019), VIF values below 5 are usually negligible, while those greater than 10 should be removed from the model. A variable of a high VI factor would be strongly collinear with the other variables. Its explanatory role would be highly reduced because it would be well explained by the rest of the independent variables (Nachane, 2006). In our case, none of the VIF values are greater than the Brook's threshold of 5. This result is in line with the above pairwise correlations which are not high enough to be a cause of multicollinearity. The multicollinearity between the explanatory variables of the model is of no concern.

(iv) Endogeneity

The OLS estimation method requires that regressors are not correlated with the error term. Otherwise, the model could be exposed to endogeneity, which would lead to bias and inconsistency in parameter estimates. There are several sources of the endogeneity bias[68], but the most likely and the most influential would be the omitted variable bias (figure 3.23). This is where the omitted variable is related to the dependent variable WRDS and the independent (endogenous) variables ROA and '*income'.* It seems impossible to include all possible factors affecting the size of an annual report, which means that the endogeneity problem cannot be corrected by control variables alone (Schultz *et al.,* 2010; Papies*, et al.,* 2017).

The issue of endogeneity in model 2 is addressed in a similar way as in model 1. This time, however, it is a shorter version[69].

[68] Causes of endogeneity are explained under model 1 (Endogeneity test).
[69] I am not repeating the technicality of the 2SLS procedure, this is outlined in model 1,

2SLS (Two-Stage Least Squares) estimate:

Two OLS regressions:

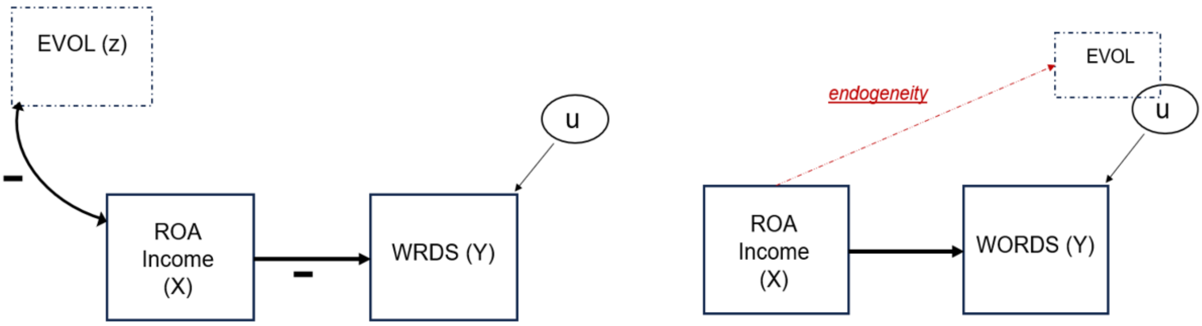
M1: $WRDS_{i,t} = \beta_0 + \beta_1 \mathbf{ROA}_{i,t} + \beta_2 MC_{i,t} + \beta_3 MB_{i,t} + \beta_4 RD_{i,t} + \beta_5 LEV_{i,t} + u_{i,t}$

M2: $WRDS_{i,t} = \beta_0 + \beta_1 \mathbf{INCOME}_{i,t} + \beta_2 MC_{i,t} + \beta_3 MB_{i,t} + \beta_4 RD_{i,t} + \beta_5 LEV_{i,t} + u_{i,t}$

Variables of the model: dependent variable word count (y_1) is influenced by two endogenous regressors: ROA and net income (y_2), and further by exogenous regressors: company size, research and development, leverage and book- to- market ratio (x_1).

In the main OLS model, ROA and INCOME are analysed together. For the endogeneity test, however, these two variables are separated and two different models are created but with the same control variables. Earnings volatility (EVOL)[70] is the instrumental variable (x_2) in both models.

Figure 3.23: Illustration of omitted variable bias



[70] Earnings volatility (EVOL)- standard deviation of earnings before interest and taxes (EBIT) two years prior the filing plus the year of the filing (Li, 2008; Chircop, 2022).

It can be argued that the financial performance of a company, whether captured in ROA or the net income, and the word count of an annual report, jointly depend on earnings volatility (EVOL). A higher volatility in earnings could be caused, for example, by the changing market environment (Broadstock, Shu and Xu, 2011; Ogneva, 2013; Jiang, Habib and Gong, 2015; Chircop, 2022). This makes earnings volatility a proxy for the market conditions, which is likely to influence the financial performance of a company (Harris and Auerbach, 2017). The financial performance, impacted by the market volatility, is then directly reflected in the word count of annual reports. This relationship is presented in figure 3.23, first image. Earnings volatility has a negative correlation with a company's financial performance. In turn, the financial performance impacted by the EVOL, has a negative effect on the word count of an annual report. Based on this intuition, if we do not account for the earnings volatility, the model is likely to exhibit the omitted variable bias. Earnings volatility will be included in the error term, thereby influencing financial performance (second image in figure 3.23). This is the endogeneity problem, which results in biased and inconsistent results (Papies *et al.,* 2017).

Therefore, EVOL is employed as an instrument 'z'[71] [72] which should correct for the endogeneity by removing correlation of *u* with the financial performance (ROA and income).

Requirement for the instrument '*z'* (EVOL) (Gippel, *et al.,* 2015)

- EVOL is correlated with regressors X (ROA and *Income*), E[73] [*z x*] ≠ 0.

[71] The EVOL, as an instrumental variable, is put to test further down this section: 'Testing instrumental variables'.
[72] EVOL when included in the regression model, as a control variable, reduced the R-square, moreover, its coefficient was statically insignificant. Therefore, it was not added to the set of independent variables.
[73] E - stands for expectation

- EVOL is uncorrelated with the error term *u,* E [z u] = 0 (z is not endogenous)
- EVOL is not a direct cause[74] of dependent variable *y* (*WRDS), cov* [y, z|x] = 0

(1) 2SLS estimation for ROA and INCOME (separate models)

a) Testing for presence of endogeneity [75]

Before implementing the 2SLS procedure, a test for endogeneity is conducted for both models. Specifically, the Durbin-Wu-Hausman test is applied to determine whether the ROA and INCOME regressors are exogenous or endogenous, as detailed by Brooks (2019). The procedure closely resembles that used for the 2SLS estimate, but at this stage, it focuses on the residual *u* rather than the endogenous *x*.

- The first stage: estimation of the reduced models

  $y_2 = x_1 y_1 + x_2 y_2 + u$ (model 1: $y_2 = ROA$; model 2: $y_2 = income$)

- The second stage: the residual predicted value $\hat{u}$ is included in the structural equation regression.

  $y_1 = y_2\beta_1 + x_1\beta_2 + \hat{u}\rho + \mathrm{e}$ (y_1 = *WRDS*)

Insignificant (significant) coefficient *ρ* on the residual indicates exogeneity (endogeneity) of the regressors ROA and INCOME.

[74] Instrument z is only indirectly related to *y* via its direct link with *x*.
[75] The procedure is explained in detail in model 1.

Figure 3.24: Durbin-Wu- Hausman endogeneity test, model 1 (ROA)

	Structural model	Reduced form model	Structural model with residuals
Variables	**WRDS**	**ROA**	**WRDS**
ROA	-.009 (.002) ***		-.038 (.006) ***
MC	.186 (.008) ***	2.002 (.396) ***	.196 (.008) ***
RD	.043 (.011) ***	.510 (.345)	.061 (.011) ***
LEV	.030 (.011) ***	- 1.130 (.311) ***	-.002 (.012)
MB	-.008 (.013)	2.870 (.392) ***	.090 (.023) ***
EVOL		-1.767 (0.329) ***	
vhat			.031 (.006) ***
Constant	9.536 (.072) ***	-2.609 (2.477)	9.611 (.071) ***
R-squared	0.65 ***	0.24 ***	0.68 ***

Figure 3.24 shows coefficients of independent variables. Standard errors are presented in brackets. Significance levels of p-values, at 1%, 5% and 10% levels, are captured by ***, **, *.

Figure 3.25: Durbin-Wu- Hausman endogeneity test, model 2 (Income)

	Structural model	Reduced form model	Structural model with residuals
Variables	**WRDS**	**Income**	**WRDS**
INCOME	-.211 (.038) ***		-.654 (.099) ***
MC	.187 (.008) ***	.113 (.015)***	.194 (.008) ***
RD	.039 (.011) ***	.001 (.013)	.042 (.011) ***
LEV	.033 (.011) ***	-.033 (.013) **	.019 (.011) **
MB	-.023 (.012) **	.037 (.015) **	.007 (.014)
EVOL		-.102 (.013) **	
vhat			.510 (.107) ***
Constant	9.671 ***	0.465 (.094) ***	10.014 (.104)***
R-squared	0.64 ***	0.18 ***	0.66 ***

Figure 3.25 shows coefficients of independent variables. Standard errors are presented in brackets. Significance levels of p-values, at 1%, 5% and 10% levels, are captured by ***, **, *.

The *ρ* coefficient on the residual (vhat), in both models, is significant. This indicates endogeneity, which is likely to result in biased OLS coefficients estimated for ROA and INCOME. The same as in the first model (figure 3.9), the above results are confirmed with STATA with the application of a command for the Durbin-Wu-Hausman test.

Figure 3.26: Durbin-Wu- Hausman endogeneity test with STATA, model 1.

```
Tests of endogeneity
H0: Variables are exogenous

Durbin (score) chi2(1)          =  27.4042  (p = 0.0000)
Wu-Hausman F(1,390)             =  28.9171  (p = 0.0000)
```

Figure 3.27: Durbin-Wu- Hausman endogeneity test with STATA, model 2.

```
Tests of endogeneity
H0: Variables are exogenous

Durbin (score) chi2(1)          =  17.9688  (p = 0.0000)
Wu-Hausman F(1,390)             =  18.4888  (p = 0.0000)
```

The only statistic that STATA reports is the Durbin chi2 score. The null hypothesis is that the model is exogenous[76] (Katchova, 2013). The p-value is significant in both cases. This indicates that both models are exposed to endogeneity, which is consistent with the above result, obtained manually via the Durbin test. Therefore, to correct for the endogeneity issue, the 2SLS procedure is applied.

---

[76] The alternative hypothesis - the model is endogenous.

b) <u>Testing instrumental variables</u>

For the instrument to have the power to correct for endogeneity it has to be sufficiently strong, otherwise it will undermine precision of the estimator (Stock, Wright and Yogo, 2002). We need the instrument to be strongly correlated with the endogenous regressor. The effectiveness of the EVOL instrumental variable can be captured by correlating it with ROA and INCOME. Figure 3.28 shows a strong correlation of – 0.24 between EVOL and ROA, and a slightly weaker – 0.20 between EVOL and INCOME, both at the 1% level of statistical significance. Those associations indicate that the EVOL is a good instrument.

Figure 3.28: Correlation matrix

	EVOL
EVOL	1.0000
ROA	-0.2441*
INCOME	-0.1993*

The strength of the instrumental variable can also be identified in the first stage of the 2SLS regression, under the summary statistics. Figures 3.29 and 3.30 report 25 for the partial F-statistics on the ROA, and 28 for INCOME. Both values are greater than 10, which implies that EVOL is not a weak instrument (Stock *et al.,* 2002).

Figure 3.29: First-stage regression summary statistics for ROA

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,404)	Prob > F
ROA	0.2451	0.2358	0.0665	25.3716	0.0000

Figure 3.30: First stage regression summary statistics for Income

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,404)	Prob > F
INCOME	0.1942	0.1842	0.1395	28.8311	0.0000

The correlation matrix and the F-statistics (larger than 10) indicate that EVOL is a sufficiently strong instrumental variable, therefore, is likely to correct endogeneity bias in the model (Reardon, Unlu, Zhu and Bloom, 2014).

c) Estimation results

A brief summary of the 2SLS procedure:

- The 2SLS first stage estimates the reduced form equation. Further, it obtains the predicted values of $\widehat{ROA}$ (M1) and $\widehat{income}$ (M2).

M1[77] : **ROA** = $\delta_0 + \delta_1 EVOL_{i,t} + \delta_2 MC_{i,t} + \delta_3 MB_{i,t} + \delta_4 RD_{i,t} + \delta_5 LEV_{i,t} + u_2$

M2: **INCOME** = $\delta_0 + \delta_1 EVOL_{i,t} + \delta_2 MC_{i,t} + \delta_3 MB_{i,t} + \delta_4 RD_{i,t} + \delta_5 LEV_{i,t} + u_2$

[77] The M1 and M2 equation contains exogenous information, any endogenous information is left in the residual u_2.

- The 2SLS second stage estimates the structural equation replacing ROA and *net income* with $\widehat{ROA}$ and $net\ \widehat{income}$.

M1: $WRDS_{i,t} = \beta_0 + \beta_1 \boldsymbol{\widehat{ROA}}_{i,t} + \beta_2 MC_{i,t} + \beta_3 MB_{i,t} + \beta_4 RD_{i,t} + \beta_5 LEV_{i,t} + u_{i,t}$

M2: $WRDS_{i,t} = \beta_0 + \beta_1 \boldsymbol{\widehat{INCOME}}_{i,t} + \beta_2 MC_{i,t} + \beta_3 MB_{i,t} + \beta_4 RD_{i,t} + \beta_5 LEV_{i,t} + u_{i,t}$

Control for non-stationarity[78] in the time series is also applied through the inclusion of the time trend.

Table 3.31: Results for 2SLS estimation, model 1.

	OLS estimation	2SLS estimation - first stage	2SLS estimation - second stage
Variables	**WRDS**	**ROA**	**WRDS**
ROA	-.009 (.002) ***		-.038 (.006) ***
MC	.186 (.008) ***	2.002 (.396) ***	.196 (.011) ***
RD	.043 (.011) ***	.510 (.345)	.061 (.016) ***
LEV	.030 (.011) ***	- 1.129 (.311) ***	-.002 (.017)
MB	-.008 (.013)	2.870 (.392) ***	.090 (.032) ***
EVOL		-.176 (.032) ***	
trend	-000 (.000)	-000 (.002)	-000 (.000)
Constant	9.536 (.072) ***	-2.610 (2.477)	9.611 (.101) ***
R-squared	0.65 ***	0.24 ***	0.34 ***

* time trend included based on the stationarity test
* robust function applied to correct for a potential heteroscedasticity

The interpretation of the coefficient of the endogenous variable ROA in the OLS model:

➢ For every additional 1 percent increase in ROA, a company produces a shorter annual report by 0.9%, at the 1% statistical significance.

[78] Non- stationary has been found in figure 3.16

The interpretation of the coefficient of the exogenous variable $\widehat{ROA}$ in the 2SLS model:

- After instrumentation, for every additional 1 percent increase in ROA, a company produces a shorter annual report by 3.8%, at the 1% statistical significance.

Those two results are different, the 2SLS coefficient is of a greater magnitude than the OLS coefficient. This indicates that ROA is likely to be endogenous. We have a much greater reduction in the word count when we correct for the endogeneity. The rest of the regressors are similar in both models except for the *leverage* and the *book- to-market* ratio (BM). Here , the control for endogeneity leads to reversal in the direction and significance of the estimated relationship between those two variables and the word count. Under the 2SLS, *leverage* changes the sign and becomes negative, but since it is not statistically significant (in comparison to the OLS), it loses its influence on the dependent variable[79]. The book-to-market ratio also exhibits different behavior under the 2SLS. It gains a strong economic influence, with a coefficient of -30% (2SLS) compared to 3.5% (OLS). However, it loses its statistical significance under the 2SLS. These results highlight the significant effect of endogeneity correction.

[79] The loss of statistical significance is due to application of the robust function, without that, *leverage* keeps its 10% significance, the same as under the OLS.

Table 3.22: Results for 2SLS estimation, model 2

	OLS estimation	2SLS estimation - first stage	2SLS estimation - second stage	2SLS Probit estimation - second stage
Variables	**WRDS**	**Income**	**WRDS**	**WRDS**
INCOME	-.211 (.038) ***		-.654 (.118) ***	-.447 (.055) ***
MC	.187 (.008) ***	.113 (.015)***	.194 (.009) ***	.189 (.008) ***
RD	.039 (.011) ***	.001 (.013)	.042(.013) ***	.041 (.011) ***
LEV	.039 (.010) ***	-.033 (.013) **	.019 (.013)	.029 (.011) **
MB	-.024 (.013) **	-.037 (.015) **	.007 (.016)	-.012 (.014) *
EVOL		-.106 (.014) ***		
trend	-.000 (.000)	.000 (.000)	.000 (.000)	.000 (.000)
Constant	9.671 (.077) ***	0.465 (.094) ***	10.014 (.123)***	9.867 (.086) ***
R-squared	0.65 ***	0.18 ***	0.53 ***	- ***

* time trend included based on the stationarity test
* robust function applied to correct for a potential heteroscedasticity

INCOME appears to be a stronger regressor than ROA, as it has a higher effect on the word count. Similar to the previous ROA model, the 2SLS coefficient on the endogenous INCOME is greater in magnitude than the OLS coefficient. The results after instrumentation reveal that profitable companies produce annual reports that are 63% shorter compared to companies reporting a loss. This contrasts with the OLS estimate of -19%. These findings provide strong evidence for the effectiveness of endogeneity correction.

Since the main regressor is a binary variable[80], a treatment probit regression (fourth column) have been included, which in STATA is estimated in a very similar way as the 2SLS. Here, the magnitude of the INCOME coefficient is lower than of the normal 2SLS estimate, - 42% vs. -63%.

The choice of the EVOL instrument is confirmed in the first stage of the 2SLS for both

[80] Net income is a binary variable; 0, 1 (loss / profit) endogenous variable.

models. The coefficient on the EVOL is high and significant. In Model 1 (table 3.31), that is – 18%, statistically significant. Model 2 (table 3.22) records – 11%, also statistically significant. This satisfies the property of a good instrument, which assumes a strong relationship with a regressor (ROA and INCOME).

It is also worth noting the high values of the R-squared. Both estimations (OLS and 2SLS) indicate a strong relationship between the word count and INCOME. Under the OLS model, 67% of variation in the length of annual reports is explained by the company's net income. A similar OLS figure is reported for the ROA, 65%. The 2SLS is slightly more conservative, the INCOME explains 55% variation. Stata did not provide the R-squared figure for the ROA.

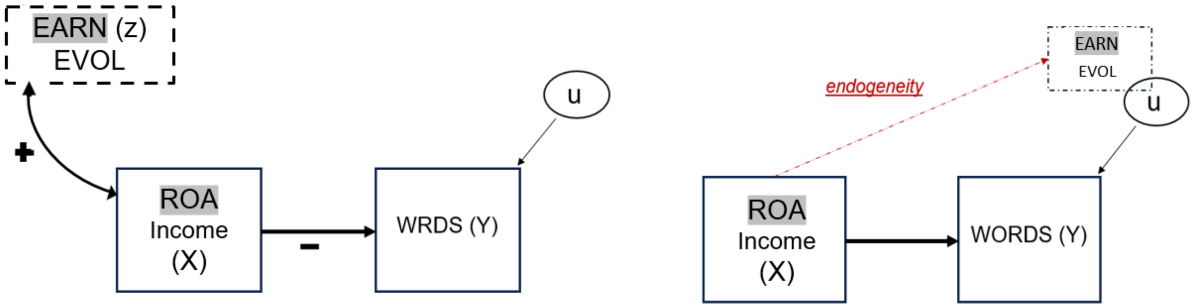
(2) 2SLS estimation for ROA and INCOME (one model)

The 2SLS process is repeated, but this time both endogenous regressors, ROA and INCOME, are treated under one equation[81]. However, this iteration requires two instruments to handle the two independent variables within the 2SLS framework. The number of instruments should not be fewer than the number of regressors (Roberts and Whited, 2013; Papies, *et al.,* 2017). Therefore, earnings yield[82] variable (EARN) is employed as the second instrument for the ROA, while the EVOL is assigned as the instrument to INCOME. The pairing of the variables is based on their correlations (figure 3.35, below). EARN is more strongly correlated with the ROA than with the INCOME. In terms of EVOL, its correlation with INCOME and ROA is of a similar

[81] The full 2SLS model (with two independent regressors) is needed for the comparison of the specification models, see section 4.4.2.6.
[82] Earnings yield - ratio of net income to stock price (Wilcox, 2007).

strength.

Figure 3.33: Illustration of omitted variable bias



I argue that ROA depends on earnings (EARN), therefore, earnings are indirectly associated with the word count of annual reports. The indirect relationship between EARN and WRDS is negative, which is shown in figure 3.33. Numerous studies report a strongly positive association between earnings performance and operational efficiency, measured by return on assets (Lama, 2012; Mostafa and Ibrahim, 2019; Wenfang and Ayisi, 2020). The consensus is that a company's ability to generate strong earnings is a result of its assets being turned into cash productively and efficiently. According to Abraham, Harris and Auerbach (2017), earnings yield, in particular, can predict the ROA. This is because higher earnings yield reflects a stronger increase in cash flows compared to an increase in stock price. The relationship, as it is further argued, is associated with factors other than market related, for example, operational efficiency (ROA). Figure 3.35 shows evidence of a strong correlation between EARN and ROA, which is significant and of a high 0.65 value. It should be noted that when EARN is added to the model 2 with the WRDS dependent variable, as a control variable, its coefficient is not statistically significant, moreover, it reduces the R-square[83]. Assuming, however, that the length of annual reports is independent of earnings is implausible, thus, including EARN, as an instrumental variable, should prevent or reduce the omitted variable bias. Otherwise, we would have an omitted common cause 'earnings' and the endogeneity problem. This would mean that the earnings variable was likely to be absorbed by the error term, causing biased and inconsistent estimates (Guide and Ketokivi, 2015).

Requirement for the instrument *z* (EARN) (Gippel, *et al.,* 2015)

- EARN is correlated with the regressor X (ROA), E [$z\ x$] ≠ 0.
- EARN is uncorrelated with the error term *u,* E [z u] = 0 (z is not endogenous)
- EARN is not a direct cause of dependent variable y (*WRDS), cov* [y, z|x] = 0

a) Testing for the presence of endogeneity

In the same way as in previous models, the Durbin-Wu- Hausman test is employed to check whether the model, with two independent regressors, is endogenous.

Figure 3.34: Durbin-Wu- Hausman endogeneity test with STATA

```
Tests of endogeneity
H0: Variables are exogenous

Durbin (score) chi2(2)          =  22.8579  (p = 0.0000)
Wu-Hausman F(2,400)             =  11.8391  (p = 0.0000)
```

The Durbin chi2 reports a significant p-value, which indicates endogeneity in the

[83] EVOL was tested in the same way as the EARN. The variable when included in the model reduced the R-square, moreover, its coefficient was statically insignificant.

model. This is not a surprise since the two separate models above (ROA and INCOME), have been identified as endogenous. Therefore, the 2SLS estimation procedure needs to be employed to correct for the endogeneity.

b) Testing instrumental variables

Similar to EVOL, EARN is tested for its instrumental strength. The correlation matrix and the summary statistics of the first-stage regression are employed. It is important to ensure that the instrument used is strong enough to effectively correct for endogeneity, as a weak instrument may not produce reliable results (Roberts and Whited, 2013)

Figure 3.35: Correlation Matrix

	EVOL	EARN	ROA	INCOME
EVOL	1.0000			
EARN	-0.2759*	1.0000		
ROA	-0.2441*	0.6542*	1.0000	
INCOME	-0.1679*	0.2074*	0.2270*	1.0000

Strong correlation between EARN and both regressors (ROA and INCOME) is captured in figure 3.35. This is a good sign of the EARN instrumental strength.

Figure 3.36: First-stage regression summary statistics for ROA & EARN

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,404)	Prob > F
ROA	0.2796	0.2707	0.1091	11.6927	0.0007

Figure 3.37: First-stage regression summary statistics for INCOME

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,405)	Prob > F
INCOME	0.0947	0.0835	0.0300	16.13683	0.0027

The F- statistics, in both instances, are larger than 10, which indicates that the EARN variable has enough of instrumental value to correct endogeneity in the model (Reardon *et al.,* 2014).

c) <u>Estimation results</u>

The structural equation model:

$\mathbf{WRDS}_{i,t} = \beta_0 + \beta_1 \mathbf{ROA}_{i,t} + \beta_2 \mathbf{INCOME}_{i,t} + \beta_3 MC_{i,t} + \beta_4 MB_{i,t} + \beta_5 RD_{i,t} + \beta_6 LEV_{i,t} + u_{i,t}$

The 2SLS estimation procedure takes two stages:

<u>In the first stage</u> of the 2SLS, two instruments are added , EARN and EVOL, based on which predicted values of the $\widehat{ROA}$ and $\widehat{INCOME}$ are derived.

ROA, INCOME = $\delta_0 + \delta_1 EARN_{i,t} + \delta_2 EVOL_{i,t} + \delta_3 MC_{i,t} + \delta_4 MB_{i,t} + \delta_5 RD_{i,t} + \delta_6 LEV_{i,t} + u_2$

In the second stage of the 2SLS, the $\widehat{ROA}$ and $\widehat{INCOME}$ replaces the ROA and *INCOME*

$$WRDS_{i,t} = \beta_0 + \beta_1 \widehat{ROA}_{i,t} + \beta_2 \widehat{INCOME}_{i,t} + \beta_3 MC_{i,t} + \beta_4 MB_{i,t} + \beta_5 RD_{i,t} + \beta_6 LEV_{i,t} + u_{i,t}$$

Figure 3.38 presents the results of the OLS and the 2SLS. The focus is on the coefficient estimates of ROA and INCOME, as well as the disparity in magnitude between both methods.

Figure 3.38: Results for 2SLS estimation, full model

	OLS estimation	2SLS estimation - first stage	2SLS estimation - first stage	2SLS estimation - second stage
Variables	**WRDS**	**ROA**	**INCOME**	**WRDS**
ROA	-.006 (.002) ***			-.011 (.008)
INCOME	-.144 (.042) ***			-.455 (0.197) **
MC	.188 (.008) ***	1.711 (.382) ***	.109 (.015) ***	.195 (.008) ***
MB	-.007 (.013)	2.184 (.392) ***	.0278 (.016) *	.032 (.022)
RD	.042 (.011) ***	.265 (.332)	-.002 (.013)	.047 (.013) ***
LEV	.028 (.010) **	- 1.079 (.317) ***	-.032 (.013) **	-.012 (.013)
(z) EVOL			-.096 (.013) ***	
(z) EARN		.179 (.029) ***		
trend	-.000 (.000)	-.000 (.002)	-.000 (.002)	- .000 (.000)
Constant	9.640 (.077) ***	-3.226 (2.477)	.457 (.094) ***	9.892 (.156) ***
R-squared	0.66 ***	0.31 ***	0.30 ***	0.57 ***

* time trend included based on the stationarity test
* robust function applied to correct for a potential heteroscedasticity

Figure 3.38 reports differences in coefficients between the OLS and the 2SLS model, for the ROA and INCOME. Based on the OLS, the reduction in the word count of annual reports is 0.6% for every 1% increase in ROA, statistically significant at 1% level. On the other hand, after the instrumentation, that reduction is higher, up to 1%, but the coefficient loses its statistical significance. In terms of the INCOME variable, the difference in coefficients is even greater. Under the OLS, companies which report financial losses produce shorter annual reports by 14%. The result is significant at the 1% level. That number is higher for the 2SLS, where we see a 46% reduction in annual reports, at the 5% level of statistical significance. The differences in results, in those two estimation methods, confirm identified above endogeneity bias. The 2SLS corrects endogeneity in the model; the coefficients are of higher magnitude; however, their statistical significance is weakened.

In terms of the control variables, there is no big difference between those two methods. Except for the market- to- book ratio (MB), which under the 2SLS changes sign, coefficient values are similar across the set. The change in the MB sigh, from negative to positive, is in fact in accordance with the theoretical prediction, as growth companies are expected to release longer annual reports. However, the variable is not statistically significant, indicating that it has no influence on the word count of annual reports.

Both models record high R-squared values, 66% under the OLS and 57% (slightly more conservative) for the 2SLS. This implies that a company's financial performance (ROA and INCOME) has an influence on the length of annual reports.

In terms of the instrumental variables, their strength is captured in the first stage of the 2SLS. EVOL exhibits a particularly strong relationship with the ROA and INCOME, with coefficients of - 1.35 and – .096, respectively, both statistically significant at the 1% level. On the other hand, EARN is a weaker instrument, with a coefficient of 0.18 for ROA, significant at the 1% level, and 0.002 for INCOME, significant at the 5% level. Therefore, both instruments have the power to correct the endogeneity bias, but EVOL is more effective.

On a final note, one of the drawbacks of the 2SLS method is that the standard errors and variances are likely to be higher compared to the OLS method, leading to weaker significance of the estimates (Katchova, A., 2013). This is reflected in ROA, where the coefficient is not significant under the 2SLS, contrasting with the 1% level of statistical significance in the OLS.

Overall, the higher value of coefficient estimates for ROA and INCOME, under the 2SLS, suggest that instrumentation has reduced the endogeneity in the model. These two regressors are now less, or to a smaller extent, correlated with the error term.

The central finding of this section tells us that the magnitude of the relationship of the word count and the financial performance is stronger once accounted for endogeneity using the IV approach. Across all three models - (1) ROA; (2) INCOME and (3) the full model incorporating both ROA and INCOME - the coefficients estimated by 2SLS are larger than those estimated by OLS, suggesting the presence of endogeneity bias. This bias is addressed through the use of instrumental variables, EVOL (earnings volatility) and EARN (earnings yield), resulting in more precise coefficient estimates (Schultz, 2010).

In concluding this analysis, it is important to recognise that the differences in estimates between the OLS and the IV methods can be caused by various factors (Card, 1999, 2001). Firstly, the presence of an omitted variable that is negatively correlated with the length of annual reports may result in a downward bias in the OLS estimates of the word count coefficient, while the IV estimates are not directly affected. Secondly, the possibility that INCOME and ROA are imprecise (noisy) measures of financial performance could bias the OLS estimates towards zero due to errors in these regressors. Such bias does not impact the instrumental (2SLS) estimates, thereby making them larger than the OLS estimates (Siddik *et al.,* 2017; Brooks, 2019). Other potential reasons for the larger estimates in the Instrumental Variables (IV) approach may relate to statistical issues within the model, such as weak instruments, multicollinearity among instruments, heteroscedasticity in the Two-Stage Least Squares (2SLS) model and outliers (Roberts and Whited, 2013; Papies *et al.,* 2017). Each of these issues has been examined and addressed as necessary. The F-statistics confirm that the instrumental variables employed are robust and not weak. The model has been checked for multicollinearity, revealing low Variance Inflation Factor (VIF) values[84] for both the overall model and each instrument individually. To account for potential heteroscedasticity, a heteroscedasticity-robust standard errors function has been applied to the regression analysis. Furthermore, the dataset was scrutinised for outliers, ensuring that the panel data is free of influential observations that could skew results.

Summary of statiscal isues

Following the approach used for Model 1, several statistical tests were conducted to ensure that Model 2 is free from biases and inefficiency [85]. These tests check for: (1) the presence of a trend or seasonality; (2) non-constant variance in the residuals (heteroscedasticity); (3) multicollinearity among predictors; and (4) correlation between the regressors and the error term, indicative of endogeneity. The analysis revealed partial non-stationarity in the panel data, which was corrected by applying a time trend

[84] Results of the multicollinearity check for both instruments: the overall VIF figure was low 1.87, while the individual VIF for EVOL was 3.39 and for EARN was 1.36.

[85] Biasness and inefficiency: coefficient estimates are less precise while standard errors and significance levels are overestimated.

adjustment to the regression. While heteroskedasticity was detected as an issue, it did not significantly impact the model's results, as the coefficients and standard errors remained largely consistent post-correction. The tests for multicollinearity showed no concerns, as no high correlations were found among the independent variables. Lastly, the model required adjustments for endogeneity bias. This was addressed through the application of the Two-Stage Least Squares (2SLS) method and the employment of two instrumental variables, increasing the precision of the coefficient estimates.

3.4.2.5 Specifications of regression model (2)

Like with regression 1, seven model specifications [86] are run, providing the opportunity to compare the magnitude and signs of the coefficient estimates across different estimation strategies (Gormley and Matsa, 2014). A time trend is applied to all seven approaches to control for the non-stationarity in the time-series, which was identified in figure 3.39.

- The first specification is estimated based on the standard ordinary least squares without industry and time effects.

- The second specification, in order to control for over-time (time-variant unobservable variation) and cross- sectional (within- industry) difference, adds year and industry dummies. This is to account for potential differences in the word count of annual reports caused by the market environment and industry characteristics

[86] Explanation of adjustments and controls of each model is presented in section 4.4.1.6, regression model 1.

rather than by the investigated financial performance of a company (Li, 2008; Loughran and McDonald, 2011; Lawrence, 2013; Gormley and Matsa, 2014).

- The third specification is an industry factors adjustment. The model, in addition to the year and industry dummies, clusters standard errors to control for a potential correlation of dependent variables within an industry (Li, 2008; Gormley and Matsa, 2014).

- The fourth approach applies time fixed effects to control for changes in the market and economic environment. Specifically, this method controls for the underling observable and unobservable systemic differences between time units caused by macroeconomic or global shocks (Coakley, Fuertes and Smith, 2006; Gosser and Moshgbar, 2020).

- The fifth specification is the second stage of the 2SLS estimation, from the above section. Model 2 has two independent variables, ROA and INCOME, therefore, two instrumental variables are employed to control for endogeneity (Shultz *et al.,* 2010).

- The sixth specification adopts the 2SLS estimation for ROA (INCOME is excluded) and uses one instrumental variable.
- The seventh specification is the 2SLS estimation for INCOME (ROA is excluded) with one instrumental variable.

Figure 3.39: Standard error estimation models for regression 2

	(1) WRDS	(2) WRDS	(3) WRDS	(4) WRDS	(5) WRDS	(6) WRDS	(7) WRDS
Year_dummies		✓	✓	✓			
Ind_dummies		✓	✓				
Cluster_ind			✓				
FE				✓			
RI_SLS					✓		
ROA_SLS						✓	
INCOME_SLS							✓

Figure 3.39 shows seven estimation methods. (1) OLS; (2) year and industry dummies; (3) year and industry dummies with additional industry cluster; (4) FE, time fixed effects; (5) 2SLS estimation procedure for ROA and INCOME with two instrumental variables; (5) 2SLS for ROA with one instrumental variable; (6) 2SLS for INCOME with one instrumental variable.

Results of each specification are compared and discussed in the next chapter.

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3.5 Summary of the Methodology

Chapter 3 provides a detailed explanation of the research design. It begins with a description of the sample, which is employed to test each of the five hypotheses. Here, a couple of findings are identified.

Firstly, we learn that filing dates cluster in March, coinciding with the regulatory due date. Around 40% of all submissions occurred between the end of February and the end of April, with the highest concentration in March. This clustering indicates a calendar time effect, which may impact the study's results. The increased investor activity during this period might lead to a stronger market reaction, not solely due to the event of filing itself and its information content. This issue is discussed further in chapter 4, where the results of the abnormal price change for this time period are reported.

Secondly, over the timeframe of this study (from 2006 to 2016), we observed an upward trend in the length of annual reports, indicated by an 83% increase in the mean word count. This trend suggests that market participants are dealing with a larger volume of information, potentially leading to a greater cognitive overload. The concept of 'information overload' is discussed in section 2.2.2. Longer reports require more extensive analysis, thereby incurring higher processing costs. Unless the market employs suitable technology or software capable of effectively processing this information overload, the increase in report length could lead to reduced market efficiency.

In the same 'sample' section, it was also found that the abnormal returns, a factor reflecting market reaction, exhibit a negative correlation with the word count of annual reports. However, the association is not as strong as might be expected. Two event windows (0,1) and (-1, 1) were employed to assess the significance of this correlation. More significant results were obtained in the (0, 1) window.

The discussion and analysis of the sample were followed by the introduction to the 'event study,' a method employed to address the enquiry regarding market reaction to annual reports, as well as the other two sub-enquiries on dissemination method and reporting complexity. The application of this methodology and its associated formulas were explained. Subsequently, two regression models derived from the third enquiry on the negative market reaction to lengthy annual reports were presented. The first model, which serves as a further test and confirmation of the event study, received the most attention. A second regression model, testing the relationship between reporting length and company financials, was introduced as a supplement to the third enquiry.

Both models were tested for potential statistical issues, including non-stationarity, heteroscedasticity, multicollinearity and endogeneity. The aim was to ensure that coefficient estimates were unbiased and consistent. In model 1, tests confirmed the time series as stationary. While heteroscedasticity was detected, its impact on the results was minimal, and applying a robust correction function resulted in only minor changes. The endogeneity test indicated that the variables were exogenous. In model 2, partial non-stationarity was addressed with a time trend adjustment, and although heteroscedasticity was presented, it did not significantly affect the results. Multicollinearity tests revealed no high correlations among variables. Endogeneity bias was mitigated using the 2SLS method and instrumental variables, improving the precision of coefficient estimates.

Chapter 4 presents the results of the event study and the regression analysis. It addresses all five hypotheses and discusses their respective findings.

❖

CHAPTER 4: RESULTS

4.1 Introduction

Chapter 4 presents results of the three enquires of this study and addresses each of the five hypotheses.

Market reaction to annual reports

H1: *The market underreacts to filings of annual reports.*

H2: *The market reacts to preliminary statements of annual reports.*

H3: *There is a market reaction to annual reports in the absence of preliminary statements of annual reports.*

Dissemination method

H4: *The market reaction to filings of annual reports is faster after the adoption of the NSM.*

Reporting complexity

H5: *The market reaction to filings of lengthy annual reports is delayed or negative*.

To examine the market reaction: (1) to annual reports, (2) to the change in the dissemination method of a corporate discourse and (3) to the length of reporting, a series of event studies were employed. Through this analysis, the abnormal price change around filings of annual reports, for each of the three enquiries, was determined. Under this method, the average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) were computed. Both panels, the AAR and CAAR, are included for every test.

The derived results indicate whether a significant response to each type of annual report release has been captured. Based on those results, the posed hypotheses have either been accepted or rejected. In addition to the event study, a further multivariate analysis for the third enquiry was conducted. Two regression models were developed: the first examined the relationship between market reaction and reporting length, and the second investigated the association between the length of annual reports and a company's financial performance.

This chapter is organised as follows:

Section 4.2 includes three sub-sections. The first results of the market reaction to annual reports are presented in section 4.2.1. This is followed by section 4.2.2, where two more tests are conducted: (1) the market reaction to preliminary statements of annual reports; (2) the market reaction to annual reports when preliminary statements are not released. In addition, the calendar time cluster effect is investigated under 4.2.3. Results of each of the analysis are presented in two panels: 1) average abnormal returns (AAR) and 2) cumulative average abnormal returns (CAAR).

Section 4.3 presents results for the dissemination method enquiry. This section comprises two sub-sections. In section 4.3.1, the price response to the Morningstar filers is compared with the price response to the filers of the traditional method. In section 4.3.2, a similar comparison is conducted but this time between filers of the first year of Morningstar with filers of the last year of the old paper system. Results of these two analyses are recorded in two panels: 1) average abnormal returns (AAR) and 2) cumulative average abnormal returns (CAAR).

Section 4.4 documents results of the study on the reporting complexity. As in the above, those are shown in the AAR and the CAAR panels. Two sub-sections are part of this last enquiry. In 4.4.1, the examination of the market sensitivity to length of annual reports is presented. To further investigate the strength of the relationship, additional multivariate analysis is conducted in 4.4.2. In the same section, a complementary regression model is introduced to test the 'managerial obfuscation' theory. This model analyses the relationship between reporting length and a company's performance.

Section 4.5 summarises the results.

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4.2 Market Reaction

Even though it is well established that the information content of annual reports is of value to investors, the price-responsiveness around their releases remains an open question.

Stice (1991), Cready and Mynatt (1991), Easton and Zmijewski (1993), Chircop *et al.* (2022) and Alduais *et al.* (2022), found no statistically significant evidence, or if any then weak and conditioned to lack of preliminary statements, for the abnormal price change around releases of annual reports. Therefore, my first enquiry looks at the issue again and examines the market reaction to filings of annual reports.

The second enquiry revolves around the preliminary statements of annual reports. As early as 1968, Beaver claimed that by the time annual reports are released, the market is already familiar with the information and the price has already incorporated it. While companies voluntarily publish preliminary statements of annual results (Li and Ramesh, 2009), a question arises whether a preliminary report, which is only a fraction of the full and final annual report, can adequately substitute for the wealth of information contained in the complete report. Annual reports convey far more data and information than what is documented in preliminary announcements, statements and results (Cready and Mynatt, 1991; Bharati, *et al.,* 2019; Roychowdhury, *et al.,* 2019; Chircop *et al.,* 2022). The enquiry seeks to determine if preliminary reports dominate the market's attention to the extent that there is no price response to annual reports.

In short, section 4.2. answers the following questions:

1. Is there a market reaction to annual reports?
2. Does the market respond to preliminary statements of annual reports?
3. Is the market more responsive to annual reports when preliminary reports are not available ?

4.2.1 Annual Reports

The first enquiry is an opening one. It examines the market response to filings of annual reports. The posed hypothesis is:

Hypothesis 1: *The market underreacts to filings of annual reports*

The below analysis of the average abnormal returns (AAR) are based on the **'**market adjusted returns model' (MAR) (first column). For the comparison, and to show that results do not change much when a different model is applied, this is the Brown and Warner's (1985) argument, results of the 'constant mean return model'[87] are also presented (second column).

[87] In the calculation of the second model, I applied an estimation window of (-20, -270).

Table 4.1: Abnormal returns for the full sample

	Market Adjusted Returns Model		Constant Mean Return Model	
	Full Sample		Full Sample	
Event Day	AAR	PAAREt_test	AAR	PAAREt_test
-20	0.21%***	0.00	0.11%	0.15
-19	0.09%	0.19	0.01%	0.91
-18	0.17%***	0.01	0.13%*	0.09
-17	0.15%**	0.02	0.15%**	0.04
-16	0.15%**	0.02	0.12%	0.12
-15	-0.01%	0.92	-0.12%*	0.10
-14	0.08%	0.21	0.11%	0.16
-13	0.09%	0.15	0.05%	0.54
-12	0.19%***	0.00	0.23%***	0.00
-11	0.01%	0.83	0.00%	0.96
-10	0.13%**	0.04	0.25%***	0.00
-9	0.12%*	0.07	0.00%	0.96
-8	0.02%	0.78	-0.03%	0.73
-7	0.11%**	0.08	0.02%	0.77
-6	0.00%	0.96	-0.03%	0.70
-5	0.09%	0.19	0.11%	0.13
-4	0.02%	0.76	0.01%	0.93
-3	-0.02%	0.72	-0.02%	0.83
-2	-0.04%	0.55	-0.12%	0.11
-1	0.07%	0.29	0.07%	0.36
0	0.04%	0.57	0.05%	0.49
1	0.05%	0.43	-0.02%	0.74
2	0.05%	0.48	0.09%	0.26
3	0.01%	0.84	-0.01%	0.95
4	-0.04%	0.52	-0.08%	0.27
5	0.03%	0.69	-0.02%	0.84
6	0.06%	0.34	0.18%**	0.02
7	0.01%	0.84	0.00%	0.99
8	-0.09%	0.19	-0.11%	0.16
9	0.01%	0.88	-0.01%	0.86
10	0.08%	0.24	0.06%	0.43
11	-0.06%	0.36	0.04%	0.57
12	-0.04%	0.53	-0.01%	0.90
13	0.03%	0.65	0.03%	0.70
14	-0.02%	0.77	0.02%	0.76
15	-0.12%	0.07	-0.14%*	0.06
16	0.02%	0.78	0.07%	0.39
17	0.00%	0.98	-0.14%*	0.06
18	-0.01%	0.88	-0.02%	0.78
19	0.07%	0.31	0.17%**	0.02
20	-0.01%	0.86	0.04%	0.62

Average abnormal returns (AAR) – abnormal returns of all securities in the sample averaged for each day of the event window. Normal returns are calculated based on the market adjusted return model using the FTSE100 index, the constant mean return model is used for the comparison. The full sample consists of 884 observation for the FTSE100 companies, for the ten year period 2007-2017. P values are reported under the PAAREt_test.

4.2.1.1 Average abnormal returns (AAR)

Table 4.1 shows average abnormal returns (AAR) computed for the 41-day period (-20 to 20) around filing dates of annual reports. P-values (PAARt-test) are reported next to each return.

The AAR for the event day is 0.04%, the value, however, is statistically insignificant. This indicates that there is no evidence for the price reaction to annual returns on the day of the filing.

It is worth noting the pre-event returns from – 20 to – 7. Most of the time, they are statistically significant. They are also higher[88] than the return on day 0; a range from 0.21% to 0.11%. The 'constant mean return model' documents a similar pattern. This pre-event abnormal activity indicates that the market, systematically, responded to the same source of information, or the same type of event. In the literature review, section 2.2.3, attention is drawn to the preliminary statement of annual reports. The content of annual reports was available to the market prior to their filings, so it is probable that we captured the period of releases of the preliminary statement of annual reports. This would explain the lack of market reaction to filings of annual reports. The market incorporated the preliminary information and the key summaries of annual results into the price, but then ignored the content of full and final annual reports (You and Zhang, 2009). If this is true then it could be argued that preliminary statements of annual reports are price relevant, while the content of annual reports is not.

[88] Only those returns are higher that are statistically significant

4.2.1.2 Cumulative average abnormal returns (CAAR)

To evaluate the aggregate effect of filings of annual reports on the market, cumulative average abnormal returns (CAAR) are determined over a series of different time windows. The 41- day time frame has been divided into four main windows: (i) 5 pre-event windows; (ii) event day, day 0; (iii) 5 post-event windows; (iv) 2 full event windows (pre-event days and post-event days).

The pre-event windows show whether there is any market anticipation of the information content of annual reports, or leakage of information. The event day (day 0) captures the actual market reaction to filings of annual reports. The post-event period tells us how efficient the market is in adjusting to new information. Finally, the symmetrical window (+ and –) captures the full picture, market anticipation and a possible delay in the market response (Kliger and Gurevich, 2015). Following Barakat *et al.* (2017), the test of statistical significance is based on the usual t-test, at the 10% (*), 5% (**) and 1% (***) levels.

Table 4.2 reports the estimated CAAR for each event window, based on the 'market-adjusted return' (MAR) model.

Table 4.2: Cumulative average abnormal returns for the full sample for different event windows

Market Model CAAR	Pre- Annoι ement Window					Event Day 0	Post- Announcement Window					Full Window	
	4 weeks before	3 weeks before	2 weeks before	1 week before			1 week delay		2 weeks delay	3 weeks delay	4 weeks delay		
	(-20,-15)	(-15,-10)	(-10,-5)	(-5,-1)	(-3,-1)	(0,0)	(1,3)	(1,5)	(5,10)	(10, 15)	(15, 20)	(-3,3)	(-5, 5)
Full Sample	0.76%***+++	0.51%***+++	0.47%***+++	0.11%	0.01%	0.04%	0.11%	0.09%	0.10%	-0.13%	-0.05%	0.15%	0.24%

This panel reports the cumulative average abnormal returns (CAARs) for the full sample of 884 observations. For the robustness checks, several pre and post event windows are presented: (i) 5 pre-event windows; (ii) event day (0); (iii) 5 post event windows; (iv) 2 full windows. The t-tests (*) is used to test the statistical significance of the CAARs.

(i) Pre-event window

A statistically significant market reaction in cumulative average abnormal returns, at the 99% confidence level, is captured for the pre-event period, from day – 20 to – 5. The highest mean excess return over the entire event window (-20, 20) was observed during that time. In week 4, before the filing day, the CAAR was 0.76%; in week 3, it was 0.51%; and in week 2, it was 0.47%. This finding is in line with the observed significant abnormal returns, presented in table 4.1.

Under the efficient market theory, two main explanations emerge, both concerning 'information arrival'. The first explanation suggests that the observed anomaly in mean returns during the pre-event window is attributable to unexpected information affecting market sentiment (Jarrow *et al.,* 1995; Stoian & Iorgulescu, 2020). This reaction is likely related to the gradual dissemination of annual financial results.

Preliminary statements of annual reports, released in the 16-day pre-event window, between weeks 4 and 2 prior to the filing day, provide a summary of key financial metrics. Although earlier information release is plausible, the analysis commenced 20 days before filing, thereby preventing confirmation of earlier announcements. During the pre -event window, the market incrementally integrates preliminary information into security prices. Given its novelty and unexpected content, the information is both price-sensitive and of high value relevance to investors, as reflected in the statistical significance of the results (Machmuddah *et al.,* 2020).

The unexpected news element changes investors' expectations regarding future cash flows, consequently affecting the probability distribution of expected returns and, thus, stock prices (Holthausen & Verrecchia, 1988; Dargenidou *et al.,* 2018; Opong, 1996; Fender, 2020). From a theoretical standpoint, market efficiency is upheld as the unanticipated components of the preliminary statements are swiftly integrated into stock prices (Stoian & Iorgulescu, 2020).

Alternatively, the observed significance may reflect market anticipation of the event (Eckbo *et al.,* 1990; Jarrow *et al.,* 1995; Choi *et al.,* 2017; Fender, 2020), which in this instance is the filing of annual reports. This anticipation, often aligned with historical filing dates, prompts investors to trade based on this expectation, potentially as early as 20 days prior to the filing. While it is possible that market anticipation precedes the four-week pre-event period, this study's scope does not confirm such. Therefore, the abnormality in price movement from -20 to -5 day could, under the second reasoning, indicate market anticipation of the information content of annual reports.

It is worth noting that the rate of return decreases from 0.76 (week 4) to 0.47 (week 2), which could reflect the amount of preliminary statements released each week. In other words, in week 4, a greater amount of preliminary information entered the market compared to week 3 and 2. For the other two pre-event windows, 1 week before the filing day, we still see some abnormality in price change, especially for the (- 5, -1) window, with a return of 0.11%0, but the figures are no longer statistically significant.

In addition to losing significance, a decrease in cumulative returns is also observed. The closer to the filing, the smaller the cumulative abnormal returns (CAARs) become. The 5- days window (- 5, -1) captured 0.11% in returns, while the 3- days window (-3, -1) only captured 0.01%. This could indicate the end of releases of the preliminary reports.

(ii) Event day (day 0)

On the filing day, we observe a lack of economic and statistical significance, with almost zero abnormality in returns. The average abnormal return (AAR) is only 0.04%. It is reasonable to say that by this time, the market has processed all the information content of the preliminary reports, resulting in no abnormality in price change. Even if the market acknowledges the filing of annual reports, it may not react significantly to them. This could be because it obtained the annual information from other, more timely sources, such as the preliminary statements of annual reports discussed earlier.

(iii) Post-event window

The post-event returns are not statistically significant. There is some abnormal movement in the price, possibly related to annual reports, but not significant. This finding indicates that the market does not act on the information content of annual reports after their release day, which is a surprising result.

The notion that the market responds to annual reports with a delay, possibly due to their length and narrative complexity, is a plausible one (see section 2.2.2, 'limitations of information processing', for the discussion), and it has been documented in various studies (Cready and Mynatt, 1991; Chapman *et al.,* 2019). However, no evidence of this occurring has been found in this enquiry.

A possible explanation for this finding is that the market assimilates information from annual reports with a notable delay, indicative of a prolonged post-announcement underreaction. The content of an annual disclosure is vast, therefore, according to Stice (1991), processing that information takes more than a few weeks. This pattern of initial underreaction to 10-K reports, followed by an extended 12-month price adjustment, has been captured in You and Zhang (2009). Similarly, Dargenidou *et al.* (2018) noted an underreaction to earnings announcements[89] lasting up to five months.

Such extensively delayed responses to the filings of annual reports challenge the principles of the efficient market hypothesis (Kliger & Gurevich, 2014; Zhang & Gregoriou, 2020). The efficient market hypothesis posits that new information should be promptly reflected in security prices upon public release (Dargenidou *et al.,* 2018; Stoian & Iorgulescu, 2020). However, the absence of significant price abnormalities post-filing does not necessarily affirm efficient market reaction to the release of annual reports, as no statistically significant response on the day of filing has been captured.

A second explanation is that the information content of annual reports is not price relevant to the market, most likely because is not new or unexpected (Fender, 2020). This information, likely disclosed in preceding reports, would have been assimilated by market participants earlier, thereby being reflected in security prices before the filing

[89] Post-earnings announcement drift (PEAD)

(Beaver, 1968; De George *et al.,* 2019; Stoian & Iorgulescu, 2020). As a result, neither an immediate nor a delayed reaction to the release of annual reports is observed, indicating a lack of post-event market attention.

It should be noted that abnormal returns are slowly reverting to pre-filing levels, reaching that of week 1 before the event day. By week 4, they are almost zero, which indicates that the filing effect, however small, disappears by this point.

The overall picture of the first enquiry is that investors do not respond to filings of annual reports. There is neither initial nor a delayed significant response, confirming the first hypothesis of market underreaction to the information content of annual reports. The finding is consistent with the literature.

This weak abnormality in the price movement, 0.11%, immediately after the event day (1, 3), is comparable with Cready and Mynatt's (1991) 0.75% one-day market response[90]. The lack of statistical significance aligns with Stice's (1991) findings, who recorded neither significant abnormality in returns nor in trading volumes around 10-K filings. In a more recent work, Chircop *et al.* (2022), reported no abnormality at all; the market does not move above the normal price level. He argues that the content of annual reports loses its price sensitivity because is communicated through earlier, timelier, channels.

[90] A predicted response based on a simulation.

Summary

In conclusion, the first results indicate that the market underreacts to the information content of annual reports. It seems that there is too much of information presented in annual disclosures, moreover, the processing costs are too high to act immediately upon their release. Some investors may experience information overload (Li *et al.,* 2019; Pernagallo and Torrisi, 2020), while others may refrain from participation due to associated costs (Dargenidou *et al.,* 2018). Consequently, market participants exhibit inattention and underreaction in the initial weeks following the filing (Zhang & Gregoriou, 2020). Although, the availability of preliminary annual information may enable investors to form opinions about the expected value of a security, leading to price adjustments prior to the report's release, however, completely disregarding annual reports could prove disadvantageous. These reports contain valuable information that may influence security prices over the long term (Stoian & Iorgulescu, 2020; Chircop *et al.,* 2022).

❖

4.2.2 Preliminary statements of annual reports (preliminary reports)

The results of the first enquiry reveal a significant amount of abnormal activity during the pre-event period. This suggests that the market systematically reacted to a specific source of information or to a particular event. Based on the literature review (Easton and Zmijewski, 1993; Li and Ramesh, 2009), the suspicion arises that this response is triggered by releases of preliminary statements of annual results (also known as preliminary reports). Li and Ramesh note that before annual reports become available to the market, investors have access to companies' preliminary results, which are voluntary disclosures. Therefore, this two-part system of information release provides us with the opportunity to test and compare the reaction to preliminary reports with the reaction to annual reports.

This enquiry is addressed with two hypotheses:

***Hypothesis 2**:* *The market reacts to preliminary statements of annual reports.*

Hypothesis 3: *There is a market reaction to annual reports in the absence of preliminary statements of annual reports*

Hypothesis 2 is supported by Easton and Zmijewski (1993) and Chircop *et al.* (2022) claims that most of information content of annual reports is revealed in preliminary announcements and accounts, therefore, it is expected that filings of preliminary statements of annual reports will evoke investor reaction.

Hypothesis 3 removes the issue of preliminary reports and applies a scenario when they are not released. Then, it tests the market response to annual reports.

Referring back to the sample composition for this enquiry [91], the main sample has been divided into four groups based on the availability of preliminary reports and the dates of their release.

[91] The method chapter, section 3.2.1

Annual samples

1) Annual reports when preliminary reports are unknown *(AR when PR unknown)*

2) Annual reports and preliminary reports the same dates *(AR & PR the same dates)*

3) Annual reports following preliminary reports *(AR following PR)*

Preliminary sample (only)

4) Preliminary reports *(PR)*

Table 4.3: Price response for the ‘preliminary reports’ enquiry

Panel A: Average abnormal returns (AAR)

Market Adjusted Returns Model

	AR when PR unknown (N= 133)		AR & PR the same dates (N= 56)		AR following PR (N=661)		PR (Prelimianry Results) (N= 666)	
Event Day	AAR	PAAREt_test	AAR	PAAREt_test	ARE	PAAREt_test	AAR	PAAREt_test
-20	0,15%	0,31	0,19%	0,47	0,20%	0.00 ***	0,09%	0,27
-19	0,16%	0,28	-0,19%	0,47	0,09%	0,27	0,05%	0,54
-18	-0,10%	0,48	0,15%	0,57	0,27%	0.00 ***	-0,06%	0,43
-17	0,05%	0,74	-0,03%	0,90	0,17%	0.03 **	0,04%	0,65
-16	0,11%	0,45	0,19%	0,48	0,18%	0.02 **	-0,04%	0,60
-15	-0,02%	0,90	-0,23%	0,38	0,03%	0,69	0,05%	0,49
-14	0,12%	0,41	-0,11%	0,69	0,08%	0,29	-0,11%	0,17
-13	0,14%	0,34	-0,10%	0,71	0,07%	0,39	0.21%***	0,01
-12	0,19%	0,19	0,20%	0,44	0,20%	0.01 **	0,12%	0,12
-11	0,14%	0,32	0,12%	0,66	0,00%	1,00	0.16%**	0,04
-10	0,17%	0,25	-0,05%	0,86	0,13%	0,10	0,08%	0,27
-9	0,03%	0,83	0.5%*	0,06	0,10%	0,18	0,10%	0,19
-8	0,09%	0,55	-0,08%	0,78	0,01%	0,87	0.14%*	0,07
-7	0,16%	0,27	0.44%*	0,10	0,05%	0,51	0.15%*	0,06
-6	-0,14%	0,32	0,36%	0,17	0,03%	0,74	0.25%***	0,00
-5	0,05%	0,72	-0,30%	0,26	0,12%	0,14	0.16%**	0,04
-4	-0,16%	0,26	-0,19%	0,48	0,06%	0,41	0,11%	0,14
-3	0,13%	0,37	-0,01%	0,97	-0,06%	0,43	0,11%	0,16
-2	-0,20%	0,17	0,17%	0,53	-0,03%	0,72	0,13%	0,11
-1	-0,08%	0,58	0.60%**	0,02	0,06%	0,41	0.31%***	0,00
0	0,02%	0,90	0,00%	1,00	0,01%	0,89	0.49%***	0,00
1	0,01%	0,93	-0,05%	0,84	0,04%	0,61	0,04%	0,57
2	0,16%	0,27	-0,22%	0,41	0,03%	0,75	0.17%**	0,03
3	-0,18%	0,21	0,36%	0,17	0,02%	0,80	0.18%**	0,02
4	0,03%	0,85	0,12%	0,64	-0,07%	0,39	0,04%	0,60
5	-0,02%	0,90	0,07%	0,81	0,05%	0,49	.-0.2%**	0,01
6	-0,03%	0,83	-0,04%	0,87	0,07%	0,36	-0,02%	0,80
7	-0,13%	0,38	0,08%	0,75	0,03%	0,71	0,04%	0,62
8	-0,05%	0,76	0,08%	0,76	-0,12%	0,12	0.14%*	0,08
9	-0,11%	0,47	0,08%	0,77	0,02%	0,78	0,04%	0,65
10	-0,12%	0,41	0,31%	0,25	0,10%	0,22	0,00%	0,98
11	0,01%	0,94	0,23%	0,38	-0,10%	0,22	-0,04%	0,57
12	-0,12%	0,41	-0,30%	0,26	0,02%	0,75	-0,02%	0,80
13	0,04%	0,77	-0,22%	0,41	0,03%	0,68	0,06%	0,47
14	0,04%	0,76	-0,05%	0,84	-0,01%	0,87	0,01%	0,94
15	.-0.43%***	0,00	-0,05%	0,84	-0,09%	0,27	-0,03%	0,71
16	-0,13%	0,38	0,00%	0,99	0,07%	0,34	0,07%	0,40
17	.-0.27% *	0,06	0,26%	0,32	0,02%	0,75	.-0.13%*	0,09
18	0,12%	0,39	0,41%	0,12	-0,05%	0,54	-0,01%	0,85
19	0,10%	0,50	0,18%	0,49	0,05%	0,51	0,07%	0,36
20	-0,13%	0,36	0,24%	0,37	-0,02%	0,83	0,01%	0,94

Panel B: Cumulative average abnormal returns (CAAR)

CAAR	PR unknown		AR & PR the same dates		AR follow PR		PR		(a) Group PR	(b) Group PR unknown AR & PR the same AR follow PR	Sig.
[-5;-1]	-0,26%	0,43	0,27%	0,66	0,15%	0,38	0.82% ***	0,00	PA	1.08% **	0,02
										0,56%	0,75
										0.67% **	0,01
[-3;-1]	-0,15%	0,56	0,75%	0,11	-0,03%	0,85	0.55% ***	0,00	PA	0,69%	0,09
										-0,21%	0,97
										0.57% ***	0,00
[0; 0]	0,02%	0,90	0,00%	1,00	0,01%	0,89	0.49% ***	0,00	PA	0,47%	0,35
										0,49%	0,99
										0.48% *	0,09
[1; 3]	-0,01%	0,97	0,09%	0,84	0,08%	0,53	0.39% ***	0,00	PA	0,40%	0,61
										0,30%	1,00
										0,31%	0,50
[1; 5]	0,00%	1,00	0,28%	0,64	0,07%	0,69	0,24%	0,18	PA	0,23%	0,98
										-0,05%	1,00
										0,16%	0,97
[-3,3]	-0,14%	0,72	0,85%	0,23	0,07%	0,74	1.43% ***	0,00	PA	1.6% ***	0,00
										0,58%	1,00
										1.36% ***	0,00
[-5,5]	-0,24%	0,62	0,55%	0,54	0,23%	0,37	1.55% ***	0,00	PA	1.8% ***	0,00
										1,00%	0,94
										1.31% ***	0,00

Table 4.3, panel A, reports average abnormal returns (AAR) for four samples; panel B displays cumulative average abnormal returns (CAAR). Both panels are based on the market- adjusted returns model. Statistically significant market reactions are highlighted in grey.

(i) *AR when PR unknown*

Panel A: the first column reports the abnormal price change around filings of annual reports where the dates of preliminary statements are unknown[92]. Contrary to the hypothesised premise (hypothesis three), no statistically or economically significant reaction is captured for these observations, expect for a much delayed response on day 15, after the event, - 0.43%, and on day 17, - 0.27%. This finding is difficult to explain.

Panel B: based on CAAR (-3,3) and (-5,5), the cumulative price change, most of the time, is economically lower than for the other three samples, moreover, with no statistical significance. The returns are often negative, a reaction not observed in any other sample (except for the one instance of *AR follow PR* (-3, -1)).

The lack of abnormality in the price movement when preliminary statements of annual reports are absent is a surprising finding, as the opposite was expected. One of the main points discussed in the section on market reaction (2.2 section) is the gradual, multi -day release of annual reports information to the market, leading up to the filing day. During the pre-announcement period, preliminary information about the company's financials is communicated to the market. This two-stage informational release process can potentially 'silence' the impact of the final annual reports (De George *et al.,* 2019). This is a reasonable notion, as investors may process most of the annual information by the time of the filing. However, when preliminary data is not shared, abnormal price movements could be anticipated around the release of annual reports, given their significant amount of value relevant information (Bharati *et al.,* 2019; Roychowdhury *et al.,* 2019; Chircop *et al.,* 2022). Surprisingly, contrary to the findings of Easton and Zmijewski's (1993) and Li and Ramesh (2009), the results of this enquiry show a lack of reaction.

[92] I found no dates for those reports.

Two explanations are proposed. First, annual report content might reach the market through channels other than preliminary reports, such as earnings announcements (Li and Ramesh, 2009; Choi *et al.,* 2017; Dargenidou *et al.,* 2018; Zhang and Gregoriou, 2020; Beaver, McNichols, and Wang, 2020), conference calls, or interim statements (Lennox *et al.,* 2021). This diversified information dissemination could diminish the price relevance of annual reports, leading to initial market unresponsiveness (Holthausen and Verrecchia, 1988; Fender, 2020). The key point of this argument is the initial reaction. It is implausible to assume that annual reports are devoid of price relevance, that they do not convey any new information, or that everything of value can be communicated in preceding disclosures and announcements. This institution leads to a second explanation.

It could be argued that complexity and length of annual reports contribute to informational overload, thereby delaying the market's response (You and Zhang, 2009; Dargenidou *et al.,* 2018; Zhang and Gregoriou, 2020). It is plausible that the market takes several months post-filing to fully integrate the report's content into stock prices (Stice, 1991).

(ii) *AR & PR the same dates*

Panel A: second column shows the abnormal price change to annual filings that are released together with preliminary statements of annual reports (PR). This time, there is some evidence of a significant price reaction closer to the event day. On day 9, 7 and 1, prior to the filing date, abnormal returns are higher than usual, 0.50%, 0.44% and 0.60%, respectively.

Panel B: CAARs (-3, 3) and (-5, 5) are also much higher than for the two neighbouring samples, at 0.85% and 0.55%, respectively, although without statistical significance. It is important to note that the reaction is captured around releases of the concurrent preliminary reports, suggesting that the market may respond to the information content of both sources. However, it is more likely that the response is associated with the preliminary reports rather than the annual reports. This is because the information content of preliminary statements of annual reports is shorter, and the narrative is less complex. As a result, the processing costs of preliminary reports are lower compared to annual reports (Li and Ramesh, 2009). Therefore, it is more plausible that the market reviews the preliminary content swiftly, while analysis of the annual reports is delayed (Chapman, *et al.,* 2019; Truong, 2023).

It is worth noting that the first two groups (*AR when PR unknown; AR & PR the same dates*) experienced no significant reactions during the pre-event window (-20, -10), as indicated by the square bracelet. During this period, there is no pre-emptive activity because preliminary reports were either not released (sample one) or they were concurrently published with the annual reports (sample two). This observation supports the notion that while the market is responsive to preliminary statements of annual reports, it does not exhibit the same responsiveness to annual reports themselves.

(iii) *AR following PR*

The third column presents returns of annual reports that follow preliminary results. No abnormal or cumulative price change is reported for this group, except for the usual pre-event period from - 20 to -12. This early response was expected, as this is the time when the preliminary reports are published. The lack of price movement around the filings dates confirms the results of the first enquiry, which documented no market reaction to annual reports.

The *'AR following PR'* group has a similar composition as the original sample of the first enquiry (661 vs 884), and therefore, the results are consistent with those presented in tables 4.1 and 4.2. Consequently, the explanation of the findings aligns with that of the first group. This sample captures the two-stage release of annual information, where annual reports follow preliminary reports (Li and Ramesh, 2009).

It could be expected that the releases of annual reports would prompt some market reaction. Given the vast information content in these reports, it is unlikely that all value-relevant details are conveyed in preliminary disclosures (De George *et al.,* 2019; Chircop *et al.,* 2022). It is reasonable to expect that annual reports contain unexpected elements that could shift investor beliefs about a stock's value, therefore, altering their investment decision, which aligns with Beaver's classic argument (1968). However, the results suggest otherwise. The market seems to absorb the information content of preliminary reports to satisfactory levels. At the time of the annual report release, stock prices have already reflected this preliminary information, leading to negligible market attention towards the annual reports (De George *et al.,* 2019).

If we accept this point of view, than we also acknowledge that the information content of annual reports does not change investors' beliefs about the stock's expected returns (Roychowdhury *et al.,* 2019; Rahman and Oliver, 2022), which is unlikely for a year-end disclosure. Alternatively, we could argue that the market reaction takes place but is much delayed[93] (Stice, 1991; You and Zhang, 2009; Dargenidou *et al.,* 2018), and, due to the study's event window ending 20 days post-filing, not captured in this analysis.

(iv) *PR (preliminary reports)*

Finally, the fourth column shows a significant price reaction around release dates of preliminary reports (preliminary statements of annual reports). This is the only sample in this study where results consistently demonstrate significant statistical and economic significance throughout the entire examined period.

In panel A, we observe some early abnormality in returns around the release dates, indicating that the market begins responding to those reports as early as thirteen days before day 0, which implies a significant anticipation of the preliminary content of information. The early abnormal returns (statistically significant) range between 0.25% and 0.14%. On the day before the release (day - 1), the return increases to 0.31%, at a significant level of 1%. On the event day, the market drives the price up to 0.49%, once again, an abnormal change is captured at the 1% significance level. This represents the strongest reaction observed in the entire 41- day examination period, and is also the strongest within all four groups. The response extends to day 8 after the filing day, with an abnormal price movement of 0.14% observed at the 5% significance level.

In panel B, during the eleven-day period (-5, 5), the sample achieved 1.55% in cumulative abnormal returns, at the 1% significance level. This represents the

[93] The argument was made when explaining the results of the post-event window, under 4.2.1.2.

strongest gain across all seven examined event windows. Furthermore, the difference in mean returns between the *PR sample* and the other two samples, *AR when PR unknown* and the *AR following PR,* is also significant at the 1% level. However, there is no statistical difference between the *PR* and the *AR & PR the same dates*. This lack of difference is not surprising, as the preliminary reports are part of the second sample.

None of the other groups have achieved results as strong, both statistically and economically, as the PR sample. The *AR & PR same dates* group achieved the second highest cumulative abnormal returns: 0.85% for the (-3, 3) window and 0.55% for the (-5, 5) window; however, those results are statically insignificant. Once again, this higher change in price is not surprising, as the preliminary statements of annual reports are part of that group.

These results provide strong evidence of the informational supremacy of preliminary statements of annual results. It seems that market participants, possibly institutional investors (Cready and Mynatt, 1991), rely on preliminary information to form expectations about the value of a security. Preliminary reports are more timely disclosures than the subsequent, albeit final, annual reports (Li and Ramesh, 2009; Lennox *et al.,* 2021). Therefore, the information presented there is often new and unexpected, making these reports price- sensitive (Stice,1991; Truong, 2023). Additionally, preliminary reports typically have a simpler format and of a lower narrative content than annual reports, making them the optimal source of information (Simon, 1991; Chapman *et al.,* 2019; Figlioli *et al.,* 2020).

Given the bounded rationality (limited cognitive capacity), investors tend to apply heuristics and favour simplified information sources for investment decisions (Simon, 1991; Hirshleifer and Teoh, 2003). This preference for preliminary statements, and the consequent inattention to the more detailed annual reports, is a strategic choice where the benefits outweigh the costs of not analysing the latter in depth. These two parameters, timeliness and simplicity, allow market participants to process preliminary disclosures at a lower cost and respond to them promptly (Jones, 1999; De George *et al.,* 2019).

Summary

Overall, this enquiry provides two important findings. Firstly, it demonstrates a statistically significant market response to preliminary statements[94] of annual reports, as evidenced by the PR group. This result has been hinted since the first enquiry, where abnormal activity during the pre-event window was noted. It is an important finding as it confirms the price sensitivity of preliminary reports (Beaver, 1968; Stoian & Iorgulescu, 2020; Banerjee *et al.,* 2020), thereby supporting the second hypothesis of the study: *the market reacts to preliminary statements of annual reports.*

It seems that preliminary reports attract significant attention from market participants who trade based on their informational content, resulting in a prompt adjustment of security prices to new information (De George *et al.,* 2019; Truong, 2023), thus confirming the notion of market efficiency. Beaver *et al.* (2020), in their study of earnings announcements, argue that concurrent, value-relevant releases can be an important source of information for investors. They found that financial statements[95] published alongside earnings announcements had a strong explanatory power of the

[94] Preliminary reports
[95] Concurrent releases to earnings announcements

market response.

Secondly, surprisingly, there was no evidence found of abnormal price change around the filings of annual reports when released in solitude[96], meaning they are not preceded by preliminary statements of annual reports (the *AR when PR unknown* sample). This result is contrary to what was expected and weakens our argument for the price relevance of annual reports. Moreover, it does not support findings reported by Li and Ramesh (2009) and Easton and Zmijewski's (1993). Both studies documented abnormal change around filings of 10K-reports, although weak in the case of Easton and Zmijewski, where no preliminary earnings announcements were made prior to releases of the annual reports. There are two possible explanations: investors find price- relevant information in other preceding releases and announcements (Dargenidou *et al.,* 2018; Zhang and Gregoriou, 2020; Lennox *et al.,* 2021). Alternatively, market participants are initially inattentive due to information overload caused by the volume and complexity of the narrative of annual reports (Li *et al.,* 2019; Pernagallo and Torrisi, 2020). Consequently, the third hypothesis, '*there is a market reaction to annual reports in the absence of preliminary statement of annual reports',* is rejected.

The other two groups, (1) annual reports and preliminary reports released concurrently (*AR & PR the same dates*) and (2) annual reports follow preliminary reports (*AR follow PR*) present different patterns of market reactions. The first sample captured some statistically significant abnormal activity before the event day. This, however, could be attributed to the preliminary reports. Regarding the second group, *AR follow PR,* no statistical significance has been captured closely around the filing day. This is not

[96] The filings dates of preliminary statements of annual reports could not be identified.

surprising given that the sample composition is very similar to the original sample from first enquiry. Nonetheless, there is some abnormal movement in early days returns before the event day, which once again could be related to the preliminary reports.

In conclusion, preliminary statements of annual reports seem to attract the majority of investors' attention, while subsequent annual reports are often overlooked by the market. The lack of attention could be attributed to the absence of unexpected information. Alternatively, another perspective suggests that while annual reports do contain new information, their extensive and complex narrative may result in informational overload, thereby hindering a timely market response. Consequently, preliminary statements serve as an initial substitute for the full, comprehensive annual reports.

In short, results in table 4.3 show a significant market reaction to the *PR* sample (preliminary statements of annual reports). For the other three samples: *PR unknown; AR & PR the same dates; AR follow PR,* the abnormal prince change is statistically insignificant.

4.2.3 Calendar time cluster effect (additional analysis)

Regulatory due-date cluster of annual reports filings

Examining calendar-time clustering is important because it can potentially impact the abnormal returns. In this study, the highest intensity of filings was observed in March (40% of all submissions), which is the mandatory submission deadline in the U.K. for companies with fiscal years ending in December of the previous calendar year. Another popular month for filings was June (17% of all submissions). Together, these two months accounted for 57% of the sample.

Calendar-time clustering can introduce biases into the analysis by concentrating events within specific time periods. For instance, if abnormal returns coincide with the clustered filing dates, it may artificially inflate or deflate the observed market reaction. Therefore, it is important to investigate and account for any clustering effects to ensure the robustness and validity of the study findings.

Table 4.4: Market reaction to clusters of filings: March & June cluster

Panel A: Average abnormal returns (AAR)

Market Adjusted Returns Model

	March Cluster (N= 356)		vs	June Cluster (N=149)		M & J Clusters (N=505)		vs	Everyone Else (N=376)	
Event Day	ARE	PAAREt_test		ARE	PAAREt_test	ARE	PAAREt_test		ARE	PAAREt_test
-20	0,16%	0,11		0,39%	0.00 ***	0,23%	0.00 ***		0,18%	0.09 *
-19	0,02%	0,84		0,03%	0,81	0,02%	0,77		0,17%	0,11
-18	0,27%	0.01 ***		0,32%	0.01 **	0,29%	0.00 ***		0,03%	0,75
-17	0,13%	0,19		0,10%	0,44	0,12%	0,13		0,18%	0.09 *
-16	0,15%	0,13		0,11%	0,42	0,14%	0.09 *		0,20%	0.07 *
-15	-0,14%	0,16		0,09%	0,51	-0,07%	0,36		0,08%	0,44
-14	0,15%	0,13		-0,13%	0,34	0,07%	0,39		0,10%	0,33
-13	-0,10%	0,32		0,21%	0,12	-0,01%	0,91		0,20%	0.06 *
-12	0,31%	0.00 ***		0,01%	0,94	0,22%	0.001 ***		0,13%	0,22
-11	0,17%	0.09 *		0,00%	0,97	0,12%	0,15		-0,07%	0,52
-10	0,15%	0,14		0,23%	0.08 *	0,17%	0.03 **		0,05%	0,66
-9	0,08%	0,44		0,19%	0,16	0,11%	0,18		0,11%	0,32
-8	0,13%	0,19		-0,03%	0,81	0,08%	0,30		-0,07%	0,53
-7	0,03%	0,76		0,02%	0,89	0,03%	0,74		0,21%	0.05 *
-6	0,14%	0,17		0,03%	0,83	0,10%	0,20		-0,11%	0,29
-5	0,15%	0,14		0,15%	0,26	0,15%	0.06 *		0,00%	0,98
-4	0,06%	0,54		-0,09%	0,51	0,02%	0,82		0,02%	0,87
-3	-0,01%	0,91		-0,14%	0,29	-0,05%	0,54		0,02%	0,82
-2	0,02%	0,81		-0,01%	0,92	0,01%	0,87		-0,13%	0,24
-1	0,06%	0,55		-0,03%	0,81	0,03%	0,68		0,11%	0,31
0	0,05%	0,63		0,18%	0,17	0,09%	0,28		-0,04%	0,68
1	0,05%	0,61		-0,20%	0,13	-0,02%	0,78		0,14%	0,20
2	0,00%	0,97		-0,05%	0,72	-0,01%	0,89		0,12%	0,28
3	0,12%	0,24		-0,05%	0,69	0,07%	0,40		-0,07%	0,50
4	0,08%	0,41		-0,13%	0,32	0,02%	0,81		-0,11%	0,32
5	0,09%	0,39		-0,13%	0,31	0,02%	0,79		0,06%	0,58
6	0,09%	0,37		0,18%	0,18	0,11%	0,16		-0,02%	0,84
7	-0,11%	0,27		0,01%	0,96	-0,08%	0,35		0,15%	0,16
8	-0,09%	0,35		-0,21%	0,10	-0,13%	0,11		-0,02%	0,83
9	-0,05%	0,64		-0,18%	0,18	-0,09%	0,29		0,16%	0,14
10	0,07%	0,46		0,02%	0,89	0,06%	0,48		0,10%	0,34
11	-0,03%	0,76		-0,06%	0,65	-0,04%	0,63		-0,09%	0,41
12	-0,03%	0,73		-0,21%	0,11	-0,09%	0,29		0,03%	0,80
13	-0,05%	0,62		-0,05%	0,73	-0,05%	0,55		0,14%	0,21
14	-0,03%	0,74		0,08%	0,56	0,00%	0,99		-0,01%	0,92
15	-0,23%	0.02 **		-0,22%	0,10	-0,23%	0.00 ***		0,01%	0,95
16	-0,02%	0,84		0,14%	0,29	0,03%	0,73		0,01%	0,93
17	0,08%	0,43		-0,07%	0,57	0,03%	0,68		-0,02%	0,85
18	0,00%	0,97		-0,03%	0,83	-0,01%	0,95		0,01%	0,93
19	0,09%	0,37		-0,10%	0,47	0,04%	0,66		0,09%	0,38
20	-0,05%	0,59		0,10%	0,45	-0,01%	0,91		-0,05%	0,62

Panel B: Cumulative average abnormal returns (CAAR)

CAAR	March		June		M & J Clusters (a)		Everyone Else (EE) (b)		EE	(a) Group: EE / EE / EE / March Spike	(b) Group: March Spike / June Spike / June Spike / June Spike	Sig. (1) difference between groups	(a) -(b) Mean Difference	Sig. (2) difference between groups
[-5;-1]	0,28%	0,21	-0,12%	0,68	0,16%	0,37	0,02%	0,93		EE	-0,26%	0,61	0,14%	0,58
											0,14%	0,92		
										March	0,41%	0,51		
[-3;-1]	0,07%	0,68	-0,19%	0,42	0,00%	0,98	0,01%	0,97		EE	-0,07%	0,95	-0,01%	0,96
											0,19%	0,79		
										March	0,26%	0,66		
[0;0]	0,05%	0,63	0,18%	0,18	0,09%	0,28	-0,04%	0,68		EE	-0,09%	0,86	0,13%	0,42
											-0,22%	0,60		
										March	-0,13%	0,84		
[1;3]	0,17%	0,33	-0,30%	0,20	0,03%	0,24	0,18%	0,33		EE	0,01%	1,00	-0,15%	0,52
											0,48%	0,31		
										March	0,47%	0,33		
[1;5]	0,34%	0,13	-0.56% *	0,06	0,07%	0,68	0,13%	0,58		EE	-0,21%	0,74	-0,06%	0,82
											0,69%	0,14		
										March	0.90% **	0,04		
[-3,3]	0,29%	0,28	-0,30%	0,39	0,11%	0,59	0,14%	0,61		EE	-0,14%	0,98	-0,03%	0,93
											0,45%	0,59		
										March	0,59%	0,36		
[-5,5]	0.67% *	0,05	-0,50%	0,25	0,33%	0,23	0,11%	0,76		EE	-0,56%	0,52	0,21%	0,60
											0,61%	0,51		
										March	1.18% **	0,04		

Table 4.4 shows the market reaction to filings made in March and June. The *Everyone Else* (EE) partition is our control group[97].

The analysis reveals evidence of the price change around filing dates for the March group. A significant cumulative reaction of 0.67% is reported for the 11 day-event window (-5, 5). Additionally, there is a statistically significant difference in the mean returns between the March and June samples, with a reported result of 1.18% at the 0.05 significance level. Moreover, a delayed response of -0.23% in abnormal returns is observed on day 15 after the filing, although it appears to be a singular event. This finding underscores the importance of considering calendar-time clustering effects

[97] The usual pre-event (-20, -10) abnormal reaction is observed in all four samples.

when analysing market reactions to annual report filings.

The analysis of the June group reveals a significant cumulative change of -0.56% for the 6-day event window (1, 5). Similarly to the previous observation, there exists a statistically significant difference between the March and June groups during this period, with a reported discrepancy of 0.90% at the 0.05 significance level.

These findings highlight distinct market reactions around filing dates for companies filing annual reports in June compared to those filing in March.

Furthermore, as a control test, an additional group labeled ‘EE’ (*Everyone Else*) was created and compared with the March and June clusters. The results indicate no statistically significant differences between these groups, as shown in the Sig.(1) column. This suggests that the calendar-time clustering around regulatory filing deadlines does not significantly impact the market reaction to the filings of annual reports.

To further ensure the robustness of the findings, another test was conducted, merging the March and June clusters into the ‘*M&J Clusters’* group and comparing their returns with those of the ‘*Everyone Else’* group, the control partition. Once again, the results indicate no statistical difference between the means of abnormal returns for these two groups, as indicated in the second 'Sig (2)' column. Therefore, the analysis suggests that the calendar-time clustering effect does not have a significant impact on market reactions to annual report filings.

The presence of event-date clustering, particularly around regulatory submission deadlines in March and June, poses potential challenges due to cross-sectional correlation among abnormal returns (MacKinlay, 1997; Monaco, 2023). This could lead to dependence in returns across companies, as highlighted in previous studies (Sharda, 2022; Kolari, Pape and Pynnonen, 2018). The overlapping of filings during these periods may contribute to statistical abnormality in returns (Kliger and Gurevich, 2015; Monaco, 2023), which could potentially lead to an over-rejection of the null hypothesis of zero abnormal returns (Kolari et al., 2018; Sharda, 2022). However, while event-date clustering was observed, similar to the findings in Griffin (2003)[98], the difference in mean returns between the March and June groups and the rest of the sample was statistically insignificant. Additionally, there was no immediate abnormality in the price movement around the event day for both March and June, as illustrated in figure 4.4. Therefore, while the clustering of the event window may pose some challenges, it is unlikely to significantly impact the results of this study.

From the statistical point of view, the potential clustering of event windows is offset by averaging. According to El Ghoul, *et al.* (2023), working with the cumulative average returns reduces the correlation of returns across event windows. It is also worth noting that in the multivariate analysis (section 3.4.2.5), robust standard errors are clustered on the company level, and this should control for the cross- sectional dependence[99] (Kolari *et al.,* 2018).

[98] Asthana and Balsam (2001) report event- clustering only in March.

[99] Therefore, should produce results robust to event- induced cross- sectional correlations (Kolari *et al.,* 2018).

Summary

The objective of this additional analysis was to investigate whether the clustering of filings in March and June influenced abnormal price changes during the period examined in this study. This was important to explore, as such clustering could potentially introduce bias to the study results (Kolari *et al.,* 2018; Sharda, 2022; Monaco, 2023). As outlined in the methodology chapter (3.2.3), the sample was concentrated in March and June, which correspond to regulatory due dates for annual reports submissions. The question was whether this clustering had any impact on our sample, on the market reaction to the filings of annual reports. The results revealed that despite the clustering in March and June, no abnormality in price change was observed around the event day of a filing. Thus, calendar- time clustering had no effect on abnormal returns within the sample. This finding contrasts with the results reported by Li and Ramesh (2009) and Griffin (2003), who observed increased market reactions around the last few days of the regulatory due dates.

❖

4.3 Dissemination Method

Qi *et al.* (2000), Ashana and Balsam (2001), Griffin (2003) and You and Zhong (2009) have documented a significant market reaction to 10-K reports submitted on EDGAR (the US market), then a new submission platform for corporate disclosures. It was argued that EDGAR brought efficiency to the market. The access to annual reports (10-Ks) was now almost instant, moreover, freely available.

The fourth hypothesis predicts that the British market responds more strongly to annual reports filed after 2011. This is when the National Storage Mechanism (NSM) was introduced, and 'Morningstar' was appointed as an electronic provider of the service.

Hypothesis 4: *The market reaction to filings of annual reports is faster after the adoption of the NSM*

Under this enquiry, abnormal and cumulative abnormal stock returns prior and post the adoption of the NSM / Morningstar system are investigated.

The impact of the electronic system is evaluated over five event windows: (-5, -1), (-3, -1), day 0, (1, 3), (1,5) and then accumulated to the 11- day period, beginning 5 days before and ending 5 days after the filing day (-5, 5). This relatively long time window (-5, 5) allows for the possibility of information anticipation or a leakage of information. It also accounts for a possible delay in the reaction of the market (Qi *et al.,* 2000; Ashana and Balsam, 2001).

4.3.1 Traditional method versus electronic system

Table 4.5: Price response: traditional system vs electronic platform

Market Adjusted Returns Model

	Traditional (pre Morningstar) group / 2006-2010 (N=325)		**Morningstar group/ 2011-2017 (N=559)**	
Event Day	AAR	'AARt_test	AARE	AAREt_te
-20	0,30%	0.02 **	0,15%	0.03 **
-19	0,02%	0,90	0,12%	0.08 *
-18	0,28%	0.03 **	0,12%	0.09 *
-17	0,15%	0,25	0,15%	0.03 **
-16	0,32%	0.01 **	0,07%	0,31
-15	-0,12%	0,37	0,06%	0,35
-14	0,07%	0,62	0,10%	0,16
-13	0,03%	0,82	0,11%	0,12
-12	0,27%	0.04 **	0,14%	0.04 **
-11	-0,04%	0,78	0,07%	0,32
-10	0,22%	0.09 *	0,06%	0,35
-9	0,16%	0,24	0,08%	0,22
-8	-0,10%	0,45	0,08%	0,23
-7	0,19%	0,15	0,06%	0,42
-6	-0,16%	0,23	0,11%	0,11
-5	0,28%	0,04	-0,03%	0,68
-4	-0,02%	0,88	0,04%	0,56
-3	0,04%	0,76	-0,06%	0,39
-2	-0,15%	0,26	0,02%	0,81
-1	0,15%	0,27	0,02%	0,77
0	0,03%	0,83	0,04%	0,59
1	0,10%	0,44	0,02%	0,82
2	0,03%	0,81	0,04%	0,51
3	-0,01%	0,94	0,02%	0,75
4	0,01%	0,97	-0,05%	0,42
5	0,06%	0,66	0,02%	0,81
6	0,10%	0,46	0,04%	0,56
7	-0,02%	0,91	0,04%	0,57
8	0,04%	0,75	-0,16%	0.02 **
9	-0,07%	0,60	0,07%	0,33
10	0,12%	0,37	0,05%	0,43
11	-0,05%	0,70	-0,06%	0,40
12	0,05%	0,72	-0,08%	0,22
13	0,10%	0,46	-0,01%	0,88
14	0,16%	0,23	-0,10%	0,14
15	-0,15%	0,26	-0,11%	0,10
16	0,12%	0,35	-0,04%	0,57
17	-0,18%	0,17	0,11%	0,12
18	-0,05%	0,68	0,04%	0,55
19	0,12%	0,38	0,03%	0,66
20	-0,15%	0,25	0,04%	0,59

CAAR	Pre Morningstar (a)		Morningstar (b)		Mean Difference (a-b)	
[-5;-1]	0,29%	0,33	-0,01%	0,94	0,30%	0,30
	(0.984)		(-0.072)		(1.046) *t* value	
[-3;-1]	0,04%	0,88	-0,02%	0,85	0,06%	0,80
	(0.1566)		(-0.192)		(0.251)	
[0; 0]	0,03%	0,83	0,04%	0,59	-0,01%	0,96
	(0.219)		(0.541)		(-0.048)	
[1; 3]	0,12%	0,59	0,08%	0,49	0,04%	0,87
	(0.541)		(0.684)		(0.161)	
[1; 5]	0,19%	0,53	0,04%	0,78	0,15%	0,62
	(0.636)		(0.277)		(0.496)	
[-3,3]	0,19%	0,60	0,10%	0,60	0,09%	0,82
	(.528)		(.526)		(-0.227)	
[- 5,5]	0,51%	0,25	0,07%	0,76	0,44%	0,34
	(1.153)		(0.301)		(0.966)	

Table 4.5, the first panel, presents average abnormal returns for the (-20 to 20) event window, around two types of filings, the traditional paper filing system (pre Morningstar) and the electronic system (Morningstar). P-values (AARt-test) are reported next to each return.

The second panel CAAR, the second column, also shows the p-values of the differences in the mean return between both filling systems, for each cumulative event widow. The t-values are reported in parenthesis under returns.

Consistent with earlier results, (enquiry 1, table 4.2), there is no evidence of the market reaction on the filing day, as neither of the two samples show any statistical significance in the AAR or CAAR results. Abnormal returns on the event day are very similar in both cases: 0.03% for the traditional filers, and 0.04% for the Morningstar filers, both are statically insignificant.

In terms of the CAAR panel, the second column 'Mean Difference' documents no evidence of a statistical disparity in cumulative returns (across all seven event windows) between those two samples. This means that there is no reliable difference in the response of the market to either of the filing system.

Despite the lack of statistical variation, it is difficult not to observe consistently higher returns for the traditional group. The strongest response is recorded on the 11-day window (-5, 5) at 0.51%. Here, the traditional group achieved returns 0.44% higher than the Morningstar group. This is a surprising finding[100], as it indicates that filers of the paper system gained a stronger market response than filers of the electronic platform. This outcome does not agree with the earlier research on EDGAR, where the market responded strongly positively to the new electronic submission system (Qi *et al.,* 2000; Asthana and Balsam, 2001).

In terms of the pre-event period, significantly positive abnormal returns are observed for days from -20 to -10, in both samples. These findings are likely to be consistent with the results of previous inquiries, as this is where the market most likely reacts to the information content of preliminary statements.

[100] The number of Morningstar filers is greater, 559 vs 325, could have distorted the result.

4.3.2 Comparing the first year Morningstar filers with the last year traditional filers

Asthana and Balsam (2001), in their study, compare the market response to the first year filings on EDGAR with the last year filings on the traditional paper system. They found abnormal price change around EDGAR filings but not around non-EDGAR filings. Both samples, according to researchers, were statistically different. Following the same approach, table 4.6 presents a similar comparison between the first year Morningstar filers (2011) and the last year traditional paper filers (2010).

Table 4.6: Price response: first year Morningstar filers vs the last year paper filers

Marekt Adjusted Returns Model

	First year Morningstar (2011) (N= 74)		Last year of Traditional filing (2010) (N=78)	
Event Day	AAR	AARt_test	AAR	AARt_test
-20	-0,08%	0,63	0,22%	0,37
-19	0.28% *	0,10	-0,06%	0,80
-18	0,22%	0,20	0,25%	0,32
-17	0,22%	0,20	0,26%	0,29
-16	0,11%	0,53	0,36%	0,15
-15	0,07%	0,66	0,12%	0,63
-14	0,08%	0,64	-0,40%	0,10
-13	0,01%	0,93	-0,11%	0,67
-12	0,04%	0,80	0,23%	0,36
-11	-0,11%	0,53	0,07%	0,78
-10	-0,02%	0,91	0,24%	0,32
-9	0,09%	0,60	0,23%	0,35
-8	0,13%	0,44	-0,26%	0,28
-7	0,03%	0,85	0,28%	0,26
-6	0,25%	0,15	-0,04%	0,86
-5	0.41% **	0,02	0,17%	0,50
-4	-0,06%	0,72	0,25%	0,31
-3	0,04%	0,82	-0,14%	0,56
-2	0,17%	0,31	-0,02%	0,92
-1	-0,16%	0,36	0,00%	0,99
0	0,23%	0,19	-0,01%	0,98
1	-0,02%	0,89	0,07%	0,77
2	0.29% *	0,09	-0,06%	0,80
3	0,20%	0,23	0,15%	0,55
4	-0.35% **	0,04	0,30%	0,22
5	0,10%	0,57	0,06%	0,80
6	0,07%	0,67	-0,11%	0,65
7	0,02%	0,92	0,26%	0,30
8	-0,14%	0,42	0,12%	0,62
9	-0,06%	0,71	0,17%	0,49
10	0,07%	0,69	0,32%	0,20
11	0,13%	0,44	-0,01%	0,95
12	-0,19%	0,27	0,01%	0,95
13	-0,16%	0,36	-0,09%	0,72
14	-0,24%	0,16	0,18%	0,46
15	-0,01%	0,96	0,21%	0,39
16	-0,06%	0,74	0,24%	0,33
17	-0,19%	0,26	-0,03%	0,89
18	-0,08%	0,65	0,38%	0,12
19	-0,23%	0,18	0.49% **	0,05
20	-0,14%	0,40	0,09%	0,71

CAAR	Morningstar (2011) (a)		Traditional (2010) (b)		Mean Difference (a-b)	
[-5;-1]	0,41%	0,30	0,25%	0,65	0,17%	0,75
	(1.048)		(.456)		(0.326) *t* value	
[-3;-1]	0,06%	0,85	-0,17%	0,69	0,23%	0,58
	(0.188)		(-.399)		(0.560)	
[0; 0]	0,23%	0,19	-0,01%	0,98	0,24%	0,49
	(1.310)		(-.021)		(0.696)	
[1; 3]	0,47%	0,12	0,15%	0,72	0,32%	0,45
	(1.578)		(0.358)		(0.750)	
[1; 5]	0,22%	0,57	0,52%	0,35	-0,33%	0,46
	(0.589)		(.935)		(-0.748)	
[- 3, 3]	**0.76% ***	**0,10**	-0,04%	0,95	0,79%	0.20
	(1.651)		(-.058)		(1.299)	
[- 5,5]	0,85%	0,14	0,77%	0,35	0,08%	0,91
	(1.485)		(.927)		(0.117)	

From table 4.6, we learn that the Morningstar group achieved significant abnormal returns (AAR) on: day -5 (0.41%), day 2 (0.29%) and day 4 (-0.35%). During those three days, returns of the sample are the highest. More importantly, results are statistically significant. In respect of the second sample, the traditional paper group, no evidence is found of a significant change in price.

When comparing returns on event day 0, the Morningstar filers captured 0.23% in abnormal returns, while the traditional filers recorded nearly zero (-0.01%). This suggests that there was some abnormal activity in the electronic group, although statistically insignificant, while there was nothing abnormal in the paper group.

On the cumulative basis: as predicted in the hypothesis, the Morningstar sample achieved higher abnormal returns across six event windows, with the exception of the (1, 5) window, but only the (-3, 3) window had statistically significant results. On the contrary, there is no significance in CAARs for the traditional sample. The difference in response between those two groups is the most evident in the 7-day event window

(-3, 3): 0.76% Morningstar (statistically significant) vs. -0.04% traditional (not significant).

Those findings indicate that the market responded to the first year Morningstar filers but not to the last year traditional filers. More trades took place after the NSM implementation (Gao and Huang, 2020), probably because of the reduction in the disclosure dissemination costs and improvement in accessibility and acquisition of information (Goldstein *et al.,* 2023). The informational environment for all market participants has advanced, for investors, traders and sell-side analysts (Bharati *et al.,* 2019; Gibbons, Illiev and Kalodimos, 2021).

At this point, it is worth recalling Griffin (2003) results. He documents an efficient response of the market to the EDGAR filers, stating that *"it is precisely when it should be"*. In his sample, there is no pre-event or delayed abnormal activity, but rather the market reaction is short and immediate, on day 0, 1 and 2. Griffin has a problem with the pre-filing reaction (recorded in this study, on day 5, before the filing day). The pre-emptive abnormal returns, as he argues, are not consistent with the underlying premise of the market response to periodic filings. In principle, he claims, unless there is a leakage of information, investors should only respond on the day of the filing, or shortly after. And yet, this pre-emptive abnormal response, a few days prior to the filing day, has been found in Easton and Zmijewski (1993), Asthana and Balsam (2001) and in this study. In my view, Qi *et al.* (2000) are right, those earlier reactions are probably a sign of a market anticipation rather than Griffin's information leakage. On the other hand, the delayed reaction, which in this study extends to day 2 and 4 after the filing, according to Griffin (2003), is consistent with the expectation. As he further says, investors need time to analyse and respond to complex disclosures such as the annual reports. A few days delay in response has also been reported in Qi *et al.* (2000) and Asthana and Balsam (2001).

Returning to our results, we can say, with a reasonable amount of confidence, that the market responded positively in the first year of the new electronic filing system, while it was indifferent in the last year of the traditional filing method. Similar findings were recorded by Asthana and Balsam (2000) and Qi *et al.,* (2000) for their respective samples. However, it should be noted that the difference in mean returns between our two groups is insignificant, as indicated by the second CAAR column, 'Mean Difference'. This implies that from a statistical point of view, we cannot definitely say that the market reaction to the Morningstar filers is significantly different from the reaction to the traditional paper filers. Results from Asthana and Balsam (2001) are stronger in this aspect, as they identified a significant difference between the first - time EDGAR filers and the last year non- EDGAR filers.

Summary

For the second enquiry, two examinations were conducted. Firstly, the full sample covering 10 years of observations was investigated, comparing filings submitted via the traditional paper system with those made on the electronic NSM (Morningstar platform). Secondly, following Asthana and Balsam (2001), the price change for the last year filers of the old method was contrasted with that of the first-year filers of the new electronic system.

The first test did not produce any strong results. The market did not respond significantly to either of the samples. Moreover, the difference in means between those two groups was not significant enough to suggest that investors differentiated between those two filing methods.

In terms of the second test, more pronounced results were obtained. An abnormal, statistically significant, price change for the first-time filers of on the electronic platform was observed. There was no abnormal movement in price for the last year filers of the paper system. This result indicates that the NSM adoption led to a greater price efficiency (Gao and Huang, 2020; Goldstein *et al.,* 2023) and is consistent with the literature (Qi *et al.,* 2000; Asthana and Balsam, 2001; Griffin, 2003[101]; Gao and Huang, 2020). It should be noted, however, that although the mean difference in the market reaction between those two groups was substantial, with the highest point being 0.79% for the (-3, 3) window, statistically, the difference was insignificant. Therefore, we cannot accept our fourth hypothesis of *the faster market reaction to filings of annual reports after the NSM adoption.*

Despite this result, there is still evidence suggesting that investors are sensitive to technological solutions that alter the way market participants access information. The implementation of the NSM has indeed changed how corporate disclosures are disseminated (Gao and Huang, 2020; Gibbons *et al.,* 2021) and this, in turn, had an impact on incorporation of new information into security prices.

* <u>Testing for the financial crises effect</u>

It is possible that the above results ('traditional method versus electronic system' enquiry) are influenced by a time-dependent factor, unrelated to the filing method, such

[101] Griffin (2003) analysed only post EDGAR filers.

as the 2007- 2008 Financial Crisis (FC). This issue was examined in a separate enquiry, and it was reported that this was not the case. The enquiry, along with its results, is presented in appendix 2. Therefore, the interpretation of the results from section 4.3.1 remains unchanged.

❖

4.4 Reporting complexity

In the final enquiry, the focus is on the issue of reporting complexity, with a particular examination of the effect of lengthy annual reports on the market.

Verbose company reports are costly to process (Miller, 2010; Blankespoor, 2019). This is because it takes time to extract and analyse relevant information from a 100,000-page long disclosure[102]. Investors, therefore, are likely to respond to it with a delay, which impairs efficient incorporation of information into a stock price (Cready and Mynatt, 1991; You and Zang, 2009; Bhattacharya *et al.,* 2021).

There is also the second element. The managerial obfuscation theory (Li, 2008; Bloomfield's, 2008) suggests that managers facing weaker financial performance, may try to obfuscate this information and bury it in a lengthy disclosure. Thereby, hoping that the bad news either will be missed by investors or will be revealed gradually and with a delay. This would lessen the impact of the disappointing news on the market, thus potentially preventing a sharp drop in the company's stock price. But then, it is possible that the market outsmarts the managers and discounts the 'bad fruit in hand' (Miller, 2010).

The third hypothesis predicts that investors' reaction is dependent on the length of an annual report.

Hypothesis 5: *The market reaction to filings of lengthy annual reports is delayed or negative*

[102] the mean WRDS in 2016 was 109,626; see table 4.2 in 4.2.4.2

4.4.1 Univariate analysis

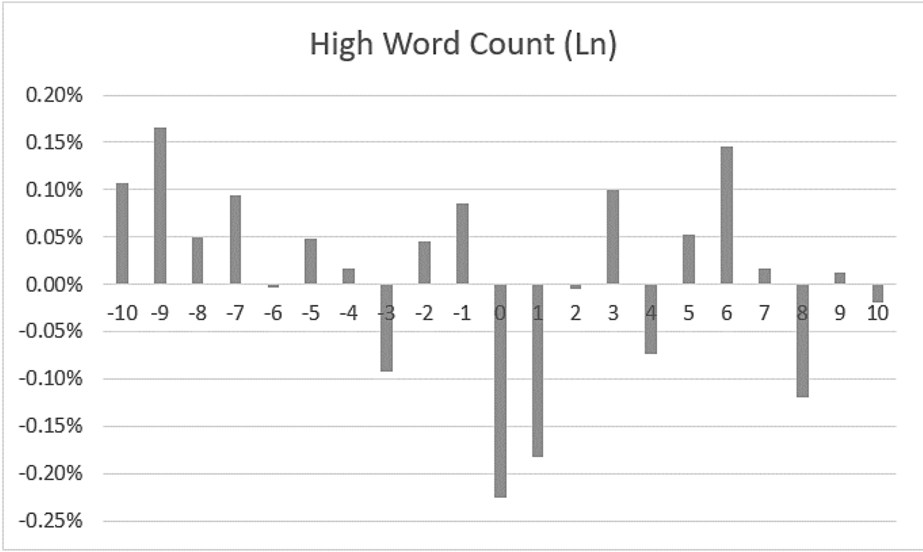
In the final enquiry, the test is conducted to find out whether the market reaction to lengthy annual reports is delayed, as the literature suggests (Cready and Mynatt, 1991; You and Zhang, 2009). The direction of the response, if any, to lengthy annual reports is also examined.

The average abnormal returns of the two samples, high word count and low word count, are determined over a 21-day event window, CAAR (-10, 10). This 21-day period is the chosen duration for this enquiry, representing a reduction of the examined window from 41 days to 21 days.

From the findings of the previous four enquiries, it was learned that there is a pre-event reaction from week – 2 to week – 4. As the same test is applied and the same data is used, the result is consistent: the market reacts to a preliminary source of information. A shorter event window in this enquiry is employed to provide clarity in the presentation of results.

Figure 4.1. AAR for high and low word count (annual reports)

Panel A: AAR of annual reports with high word count



Panel B: AAR of annual reports with low word count

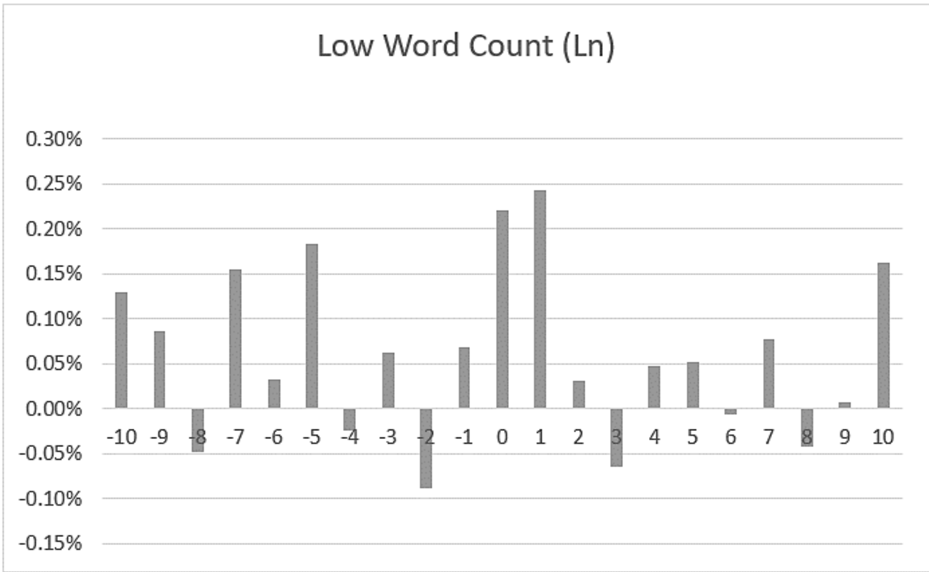


Figure 4.1 (panel A and B) presents, graphically, market reactions to both samples: *H_WC* (high word count) and *L_WC* (low word count).

Panel A: *H_WC*: captures negative abnormal returns on day 0, – 0.22 %, and day 1 (after the event) – 0.18%

Panel B: *L_WC:* reveals a different trend, on the day of the filing (day 0), the abnormal return for the sample is positive, 0.22%, and it continues to rise. On day 1, the bar chart records an abnormal return of 0.24%.

Results of these four days[103] are statistically significant, see table 4.7 for the p-values results.

[103] H_WC: day 0 and day 1; L_ WC: day 0 and day 1

Table 4.7. AAR and CAAR for high and low word count samples

Marekt Adjusted Returns Model

Event Day	LN_High Word Count (N=356) AAR	LN_High Word Count (N=356) PAARt_test	LN_ Low Word Count (N=407) AAR	LN_ Low Word Count (N=407) PAARt_test
-10	0,11%	0,29	0,13%	0,19
-9	0,17%	0.10 *	0,09%	0,39
-8	0,05%	0,63	-0,05%	0,63
-7	0,09%	0,35	0,16%	0,12
-6	0,00%	0,97	0,03%	0,74
-5	0,05%	0,64	0,18%	0.07 *
-4	0,02%	0,87	-0,02%	0,81
-3	-0,09%	0,36	0,06%	0,54
-2	0,05%	0,65	-0,09%	0,38
-1	0,09%	0,40	0,07%	0,50
0	-0,22%	0.03 **	0,22%	0.03 **
1	-0,18%	0.07 *	0,24%	0.02 **
2	-0,01%	0,96	0,03%	0,75
3	0,10%	0,32	-0,06%	0,52
4	-0,07%	0,46	0,05%	0,64
5	0,05%	0,61	0,05%	0,61
6	0,15%	0,15	-0,01%	0,95
7	0,02%	0,87	0,08%	0,44
8	-0,12%	0,24	-0,04%	0,68
9	0,01%	0,90	0,01%	0,95
10	-0,02%	0,85	0,16%	0,11

CAAR	ln_High Word Count (a)	t_test	ln_Low Word Count (b)	t_test	Mean Difference (a-b)	Sig (2-tailed)
[-5;-1]	0,10%	0,65	0,20%	0,38	-0,10%	0,73
[-3;-1]	0,04%	0,83	0,04%	0,81	0,00%	0,99
[0; 0]	-0,22%	0.03 **	0,22%	0.03 **	-0,44%	0.01 ***
[0; 1]	-0,41%	0.01 ***	0,46%	0.00 ***	-0,87%	0.00 ***
[1; 3]	-0,09%	0,62	0,21%	0,23	-0,30%	0,24
[1; 5]	-0,11%	0,63	0,31%	0,17	-0,42%	0,14
[-1,3]	-0,23%	0,32	0,50%	0.03 **	-0,72%	0.03**
[-3,3]	-0,28%	0,30	0,47%	0.08 *	-0,75%	0.05 **
[- 5,5]	-0,23%	0,49	0,73%	0.03 **	-0,96%	0.03 **
[-1, 1]	-0,32%	0.07 *	0,53%	0.00 ***	-0,85%	0.00***

Table 4.7 depicts the average abnormal returns (AAR) and the cumulative average abnormal returns (panel CAAR) for the two sub-samples, *H_WC* and *L_WC*. It is evident that returns surrounding the filing dates are impacted by the length of a

disclosure. In both cases, there is a statistically significant market reaction on the day of the filing (day 0) and on the next day (day 1). These reactions are significant in the predictive direction: a negative response to the high word count and a positive response to the low word count.

Both samples reactions are efficient, strong and of a similar magnitude. An important distinction, however, is that the *H_WC* response is negative, which contrasts with the positive reaction of the *L_WC.*

During those two days (day 0 and 1), the reaction of the market is the strongest:

- *H_WC*: - 0.22% (day 0) and -0.18% (day 1)
- *L_WC*: 0.22% (day 0) and 0.24% (day 1)

Beyond those days, the price change is of a lower economic and statistical significance. This indicates that the impact of the reporting length is primarily noticeable in a short and immediate time frame surrounding the filing, specifically over the 2-day event window. This finding is inconsistent with the hypothesised premise of a delayed market reaction to longer reports.

Furthermore, the CAAR panel confirms the robustness of the AAR results. It shows that the difference in reactions between the two groups is statistically significant not only on the day of the event (day 0), the day after (0,1), but also across other event windows: the 4-day (-1,3), the 7-day (-3,3) and the 11-day (-5,5).

The fact that the market reacted strongly and efficiently in both cases was a surprise, considering You and Zhang (2009), Miller's (2010) and Bhattacharya *et al.* (2021) findings. Just to remind us: You and Zhang (2009) documented a significant underreaction of the market to more complex 10-K reports, using word count as a proxy for complexity. This underreaction was also expected in this study. Miller (2010) records a significantly negative relationship between the number of words in 10-K filings and abnormal trading (the same result as in this study, although we measure returns). It is worth noting that in Miller's footnote, he mentions an additional test in which he found a "muted market reaction", not immediate, to more complex financial reports."

Alduais *et al.* (2022), on the other hand, investigated the market reaction to concise annual reports over a 21-day event window (-10, +10). While they observed abnormal returns, these were statistically insignificant according to two measures: the Fog index and the length factor. Statistical significance was achieved only by inducing an interaction term between the Fog index, length and earnings. Ultimately, they found abnormality in trading volume, but this was only significant for the Fog index and at the 10% level of statistical significance.

Proving a significant association between the length of annual reports and the price change around their filings is not always achievable. Loughran and McDonald (2010), for example, show lack of significance in their results, and commented that the use of word count is not a good determinant of a discourse’s complexity or readability. Interestingly, 4 years later, in their next paper (Loughran and McDonald, 2014), they recommend application of the ‘file size’ as the measure of a disclosure readability, in association with post filing returns volatility and analysts’ dispersion and forecasts errors.

On a final note, the pre-emptive response, not surprisingly, has also been captured in this enquiry. Results are documented in the appendix 3. Similar to previous enquiries, the reaction beings on day – 20 and continues until day – 12. Additionally, there is some abnormal movement on days 15 and 17, after the filing. However, why this abnormality occurs with such a delay and only on those two days cannot be explained at this stage of the research, perhaps, it is just random price behaviour.

Summary

The above results indicate that investors are sensitive to the length of financial reporting. The market reacts to the annual report filings of both groups, but the reaction differs according to the length of a disclosure. As expected, investors discounted longer reports, while responding positively to shorter ones. This suggests a negative relationship between the market reaction and the length of annual reports. Interestingly, the economic magnitude of the abnormal returns for both samples on day 0 is the same, at 0.22% in absolute terms. Surprisingly, lengthy annual reports had the opposite effect on the market response time than predicted. The abnormal price movement occurred during a short event window surrounding the filing day, CAAR (0,1), indicating efficient investor reactions to lengthy reports.

In the light of this evidence, the first part of the hypothesis that '*the market reaction to filings of lengthy annual reports is delayed'* is rejected. Conversely, the second part of the premise, asserting that *'the reaction is negative'*, is confirmed.

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4.4.2 Multivariate analysis

4.4.2.1 Market reaction and length of annual report

The univariate results indicate a negative association between the length of annual reports and the market reaction. To further examine this relationship, a multivariate analysis is conducted as an additional test. The event study method does not account for different effects that can impact abnormal returns. Therefore, a multivariate regression model is employed where the cumulative average abnormal return (CAAR), for the 3-day event window (-1, 1), is regressed on the word count (WRDS) and control variables documented in the literature to have influence on returns.

To control for cross-sectional (within-industry) and over-time differences, year and industry dummies are applied, as outlined in models 1-4 (Lawrence, 2013). Additionally, other control variables included in the regression model are: book-to-market ratio (BM), share turnover (ST), institutional ownership (IO) and two measures of recent stock returns, AAR (-2) represented under CAR_p1 and CAAR (-20, -3) showed in the model as CAR_p2. For the explanation of these variables, please refer to section 3.4.1.2. Similar control variables were used by Tetlock *et al.* (2008) and Loughran and McDonald (2011) in their studies. Figure 3.4.1, in the method chapter, presents the correlation coefficients for each pair of variables.

(i) Regression model 1

$$\text{CAAR }(-1,1)_{i,t} = \beta_0 + \beta_1 \textbf{WRDS}_{i,t} + \beta_2 \textbf{BM}_{i,t} + \beta_3 \textbf{ST}_{i,t} + \beta_4 \textbf{IO}_{i,t} + \beta_6 \textbf{CAR\_p1}_{i,t} + \beta_7 \textbf{CAR\_p2}_{i,t} + \varepsilon_{i,t}$$

Table 4.8: Regression model 1: CAAR and WRDS (seven different adjustments of standard errors)

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
WRDS	-0.00818**	-0.00818**	-0.00818*	-0.00818	-0.00818**	-0.00830**	-0.00877*
	(-2.10)	(-2.61)	(-1.98)	(-1.39)	(-2.10)	(-2.28)	(-1.86)
BM	-0.00303**	-0.00303**	-0.00303***	-0.00303**	-0.00303**	-0.00179	-0.00175
	(-2.15)	(-2.71)	(-3.00)	(-2.98)	(-2.15)	(-1.63)	(-1.42)
ST	0.00605**	0.00605	0.00605*	0.00605**	0.00605**	0.00330	0.00328
	(2.40)	(1.52)	(1.90)	(2.87)	(2.40)	(1.13)	(1.48)
IO	-0.0000256	-0.0000256	-0.0000256	-0.0000256	-0.0000256	-0.0000511	-0.0000545
	(-0.33)	(-0.39)	(-0.37)	(-0.41)	(-0.33)	(-0.89)	(-0.73)
CAR_p1	0.184**	0.184**	0.184*	0.184***	0.184**	0.199**	0.199**
	(2.02)	(3.06)	(1.88)	(4.77)	(2.02)	(2.05)	(2.21)
CAR_p2	-0.0308	-0.0308	-0.0308	-0.0308	-0.0308	-0.0317	-0.0320
	(-1.55)	(-1.65)	(-1.23)	(-1.00)	(-1.55)	(-1.39)	(-1.63)
N	371	371	371	371	371	371	371
R-sq	0.109	0.109	0.109	0.109	0.093	0.059	0.059
adj. R-sq	0.050	0.050	0.050	0.050	0.033	0.044	0.043
F	1.851	.	2.766	.	2.739	3.391	3.226
Year_dummies	✓	✓	✓	✓	✓		
Ind_dummies	✓	✓	✓	✓			
Cluster_t		✓					
Cluster_i			✓				
Cluster_ind				✓			
Ind_FE					✓		
Cluster_dbl						✓	
IV_SLS							✓

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Figure 4.8 shows seven standard error estimation methods. Model 1 employs, parametrically, fixed effects with year and industry dummies. Models 2-4, the same fixed effects but with additional clusters (time, company, industry). Model 5 adopts the fixed effects estimator with year dummy. Model 6 includes a double cluster (time and company). Model 7 employees the 2SLS estimation procedure. For models specifications see chapter 3, section 3.4.2.5.

Table 4.8 shows the results of the multivariate analysis. The model is run seven times based on different adjustments of the standard errors to account for the potential dependence in residuals. These adjustments aim to provide more accurate coefficient estimates (Petersen, 2008). The coefficient values are reported with significance levels indicated by asterisks. The t–statistics, shown in parentheses, are clustered at three different dimensions: time (model two), company (model three) and industry (model four). A similar method has been applied by Li (2008) and You and Zhang (2009).

In the analysis, the *length* variable is regressed against the cumulative average abnormal returns, CAAR (-1, 1), along with five control variables: book-to-market ratio (BM), share turnover (ST), institutional ownership (IO) and two measures of recent stock returns (CAR_p1 and CAR_p2).

(ii) Length variable (WRDS)

The coefficient estimates of the explanatory WRDS variable and the five control variables remain consistent across all seven models. The word count coefficient is negative at 0.008 and statistically significant in six out of seven models, except for model 4, the industry cluster (Cluster_ind), where it loses significance[104].

The negative signs of the WRDS coefficient confirms the result of the event study (univariate analysis). The cumulative average abnormal returns around filing days are higher for companies with shorter annual reports, indicating that abnormal returns decrease with increasing report length. While the economically modest coefficient of 0.8% may not be high, this is not unexpected, as the length variable is not anticipated to strongly determine market reaction to annual report filings (Tetlock et al., 2008).

[104] This is probably due to the excessive clustering, which is explained in the following sub-section (control variables), when the BM ratio is discussed.

These results align with previous research on the negative effect of complex and lengthy annual disclosures on the market. In related works: You and Zhang (2009) observe a delayed reaction to longer filings, while Miller (2010) and Lawrence (2013) find that retail investors are more likely to invest in companies that release shorter annual reports. Loughran and McDonald (2014) document greater short-term abnormal return volatility, as well as errors and dispersion in analysts' earnings forecasts when longer 10-K reports were released.

Despite the relatively low coefficient (-0.008), this is an important finding, indicating that even a crude disclosure marker like word count has some explanatory power of abnormal returns beyond traditional fundamental factors.

(iii) Control variables[105]

Three control variables exhibit a strong explanatory power for the abnormal returns around the filing day: the Book- to -Market ratio (BM), the Share Turnover (ST) and the CAR_pre1 (2-day return before the event). The coefficients of these three variables are mostly significant, suggesting that they are potentially good contributors to modelling the market reaction. It is not surprising that not all control variables are significant. As noted by Tetlock *et al.* (2008), it can be challenging to capture strong results for controls which are supposed to predict a market reaction, particularly next-day returns (a point already made in the previous paragraph). Surprisingly, the effect of the control variables on the market reaction is not always consistent with the expected direction found in the literature.

[105] Control variables explained in greater detail under 3.4.1.2.

- Contrary to expectation, a negative relationship between the Book-to- Market ratio (BM) and returns is found. The coefficients ranging from -0.3% to 0.01% are significant in models 1- 5. This negative association is also confirmed in the Pearson's correlation matrix (refer to figure 3.4.1, section 3.4.1.3). This finding is surprising as a positive relationship was initially predicted.

Higher BM ratios are typically indicative of poorer earnings and higher return uncertainty (Fama and French, 1992; Auret and Sinclaire, 2015). Therefore, higher returns are expected as compensation for the risk factor (Fama and French, 1992). However, the table above shows a significantly negative relationship. Moreover, models 6 and 7 display statistically insignificant results.

The statistical significance is lost when the double-clustered standard errors (model 6) are applied. This suggests an excessive amount of clustering in the model. Clustered standard errors adjust p-values to account for the correlation of observations within the same cluster, resulting in more conservative estimates with larger standard errors compared to non-clustered standard errors. In our case, double clustering exacerbates this effect, leading to smaller and less significant t-statistics (Petersen, 2009; Abadie, Athey, Imbens, and Wooldridge, 2023).

Regarding model 7 (2SLS), the instrumentation appears to affect the significance of BM. This is illustrated in figure 3.13[106]. A comparison of the result of the first, instrumented, stage of the model with the second stage (which replaces the endogenous WRDS variable with its predicted value generated in stage one) reveals

[106] Results of the 2SLS estimation, section 3.4.1.5.

the loss of statistical significance for BM in the second stage. According to Young (2022), such occurrences are not uncommon.

The change in the coefficient and the p-value is a product of the reduced-form equation used in the predicted estimation stage. It should be noted that the relationship between BM and '*company size'* (the instrumental variable) is relatively weak in terms of strength and significance[107]. This could explain the weaker significance in the BM estimate.

- According to the prediction, a positive relationship between the share turnover (ST) (trading volume) and the abnormal return is observed. The relationship is statistically significant in models 1, 2, 3, 5 and 6. According to Chen (2012) *"it takes volume to move prices".* A positive return-volume relation has been found in: Gallant, Rossi and Tauchen (1992), Griffin, Nardari and Stulz (2007), Gebka and Wohar (2013), Chordia Huh and Subrahmanyam (2007). The lack of statistical significance in Models 6 and 7 can be attributed to the same reasons discussed earlier regarding the BM ratio. Two controls, the double cluster standard errors (indicating excessive clustering) and the instrumentation, have reduced the significance of the ST estimated coefficient (Petersen, 2009).

- The negative relationship between institutional ownership (IO) and the market reaction is surprising, as the opposite was expected; see section 3.4.1.2 for detailed explanation. However, the result is both economically and statistically insignificant, indicating a lack of any predictive power over the CAAR.

[107] The Pearson correlation coefficient *r* for BM and *size* is -.0117 with the p-value of 0.7765.

- Based on Tetlock *et al.* (2008), a recent stock return is applied as a control. Average abnormal returns (CAR_p1) from day 2 before the filing (-2) and the cumulative average abnormal returns (CAR_p2) from 20 days before the filing (-20, -3) are considered. According to Tetlock *et al.,* this variable potentially captures relevant information about companies' fundamentals. The purpose of this control is to make sure that we captured the full price effect of the event. In our study, CAR_p1 (-2) is shown to be a strong predictor of the market reaction to the filings, with coefficients of 0.18 and 0.19, which are statistically significant across the models. On the other hand, the coefficients on the longer pre-filing returns (-20, -3), CAR_p2, are negative at -0.03, but statistically insignificant.

Overall, the explanatory power of the control variables is not very strong, as indicated by the relatively low R^2 values. In models 1-4, the R^2 value is 11%, while in the FE model it is 9%, and in the DBL_C and IV models it is 5.9%. The adjusted R^2 values are even lower: 5% for models 1-4; 3% for model 5 and 4% for models 6 and 7. This suggest that only a fraction of the variation in the market reaction can be attributed to the independent variables of these models, possibly due to the short event window analysed (initial market reaction).

These weak results are not surprising, according to Tetlock *et al.* (2008), as it is challenging to control and predict next- day returns in efficient markets, resulting in low explanatory power of the model (R^2). Comparable results are documented in other studies: You and Zhang (2009) reported an R^2 of 8.44%; Miller (2010) reported an R^2 of 18.47% (slightly higher); Loughran and McDonald (2011) reported R^2 of 2.44% (a smaller value); and Tetlock *et al.* (2008) only documented the adj. R^2 of 0.18%. Similar results are reported in more recent studies: D'Augusta *et al.* (2023)[108] documented R^2 of 2% for the model of earnings announcement. Even though their event window is longer (+2, +25), the model does not manage to generate a higher explanatory power. Xu, Yao and Chen (2019)[109] reported similar results, with an adjusted R^2 of 1.6% for the market reaction to earnings announcements across four event windows (from a 3-day to a 11-day). In Seeback and Kaya (2022)[110], the R^2 of 8.1% for the 2-day abnormal returns around filings of auditor reports is comparable to the R^2 of this study.

Summary

In summary, the results of the multivariate analysis confirm our earlier findings of the event study and support the notion of the negative market reaction to lengthier annual reports.

Across models 1-7 (excluding model 4), the evidence shows a strong relationship between higher word count and lower returns around the filings of annual reports, even after controlling for book-to-market, shareholder turnover, institutional ownership and for the two pre-filing abnormal returns. However, the results are not conclusive due to the relatively modest level of explanatory power exhibited by the control variables, which is represented by the low R^2 value.

Nevertheless, the regression outcome, together with the event study results, make a compelling case against lengthy disclosures. This raises the question: why is *'more not better'* ? What type of information does the length marker carry? Is it due to greater

[108] D'Augusta *et al. (*2023) does not report adj. R^2.
[109] Xu, *et al. (*2019) does not report R^2.
[110] Seeback and Kaya (2022) does not report adj. R^2.

processing costs, according to Miller (2010) difficult to examine. Or is it because longer reports are associated with poorer financial performance, as indicated by Li (2008) and DeHaan *et al.,* (2021)? If the latter is true, then the length of reporting, represented by the WRDS variable, has the ability to capture company-specific fundamental information.

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4.4.2.2 Financial performance and length of annual report

The above findings indicate a negative relationship between the length of annual reports (WRDS) and abnormal returns around their filings. This enquiry is followed by an investigation into whether the reporting length can provide insights into the company's recent financial performance. Drawing from the Managerial Obfuscation Theory (Bloomfield's, 2008; Li, 2008; Hassan *et al.,* 2021), it is hypothesised that: *the weaker financial performance, the longer annual report.*

The literature on the obfuscation theory predicts a negative relationship between a company's financial performance and the length of annual reports (Li, 2008; DeHaan *et al.,* 2021). Refer to section 2.4.3 for a detailed discussion on the theory. The rationale behind this prediction is that when a company's performance is unsatisfactory, there is an incentive for management to obscure or hide that information within a verbose disclosure. Managers hope that the market will not react immediately to the adverse information, mainly due to the high processing costs associated with a lengthy, vague and complex disclosure. However, when the market does react, the reaction is often delayed (Bloomfield, 2002).

Contrary to this perspective, my argument is that the market is actually smart, it recognises a bad fruit, a 'lemon', and it discounts a verbose report accordingly. For that reason, we observe the negative market reaction to filings of lengthy annual reports, reported in section 4.4.1.

(i) <u>Regression model 2</u>

$$\mathbf{WRDS}_{i,t} = \beta_0 + \beta_1 \mathbf{ROA}_{i,t} + \beta_2 \mathbf{INCOME}_{i,t} + \beta_3 \mathbf{MC}_{i,t} + \beta_4 \mathbf{MB}_{i,t} + \beta_5 \mathbf{RD}_{i,t} + \beta_6 \mathbf{LEV}_{i,t} + \varepsilon_{i,t}$$

Table 4.9: Regression model 2: WRDS and financial performance

	(1) WRDS	(2) WRDS	(3) WRDS	(4) WRDS	(5) WRDS	(6) WRDS	(7) WRDS
ROA	-0.00642***	-0.00515***	-0.00515*	-0.00120*	-0.0112*	-0.0376***	
	(-3.86)	(-3.25)	(-2.04)	(-1.66)	(-1.42)	(-4.67)	
INCOME	-0.144***	-0.127***	-0.127***	-0.0448*	-0.455**		-0.654***
	(-3.43)	(-3.32)	(-3.27)	(-1.80)	(-2.31)		(-5.55)
MC	0.188***	0.171***	0.171***	0.0815***	0.195***	0.196***	0.194***
	(24.77)	(17.51)	(12.61)	(5.04)	(22.44)	(18.03)	(21.43)
MB	-0.00686	-0.00974	-0.00974	-0.0255*	0.0316	0.0904***	0.00658
	(-0.54)	(-0.77)	(-0.56)	(-1.70)	(1.44)	(2.81)	(0.41)
RD	0.0425***	0.0149	0.0149	0.0256	0.0466***	0.0605***	0.0423***
	(3.96)	(0.96)	(0.69)	(0.70)	(3.60)	(3.86)	(3.37)
LEV	0.0285***	0.0160	0.0160	-0.0170*	0.0124	-0.00238	0.0186
	(2.73)	(1.41)	(1.00)	(-1.84)	(0.98)	(-0.14)	(1.46)
N	410	410	410	410	409	410	410
R-sq	0.664	0.750	0.750	0.588	0.574	0.346	0.537
adj. R-sq	0.659	0.734	0.734	0.497	0.567	0.338	0.532
F	132.5	48.06	.	31.87	104.4	81.39	115.1
Year_dummies		✓	✓	✓			
Ind_dummies		✓	✓				
Cluster_ind			✓				
FE				✓			
RI_SLS					✓		
ROA_SLS						✓	
INCOME_SLS							✓

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Income (dummy) takes the value of 1 if the net income is positive, and 0 if it is negative. Models specifications forthe dependent variable WRDS: (1) OLS; (2) OLS with time and industry dummy; (3) OLS with time and industry dummy, plus additional industry cluster; (4) Time fixed effects; (5) 2SLS for ROA and INCOME together; (6) 2SLS for ROA; (7) 2SLS for INCOME.

Table 4.9 displays the results of regressing the word count (WRDS) of annual reports on its potential determinants, a company's financial performance: Return on Assets (ROA) and Net Income (INCOME). To ensure that the WRDS variable captures financial performance beyond the known sources of predictability, four control variables are employed: size (MC), Market-to-Book ratio (MB), Research and Development (RD) and Leverage (LEV). The rationale for selecting these variables is detailed in section 3.4.2.2. The models presented in the table vary in terms of the level of control. Further explanation of each specification is provided in section 3.4.2.5. T-statistics are enclosed in parenthesis. Additionally, a time trend is incorporated into each model to control for the non-stationarity in the time-series, as identified in figure 3.18.

(ii) <u>Financial regressors (ROA and INCOME)</u>

As predicted, the analysis reveals that the length of annual reports increases with lower financial performance, as captured by ROA and INCOME. This suggests that longer disclosures tend to be written for companies with weaker current financials. Both explanatory variables, ROA and INCOME, demonstrate statistical and economic significance. Moreover, they exhibit the predicted negative direction, confirming the results of the Pearson correlation analysis which indicated a negative association between the WRDS factor and companies' financial performance (as shown in figure 3.15)

There are two potential explanations of this inverse relationship. Firstly, management intentionally obfuscates negative or lower than expected financial performance by adding textual volume to the narrative of the annual disclosure. In doing so, important but negative information is buried within a verbose discourse (Hassan *et al.,* 2019; Nadeem, 2022). There is also an alternative explanation that excludes the intention of obfuscation. It is possible that companies, faced with weaker financial performance, provide additional information to mitigate associated risks and reassure stakeholders. This additional information may include explanations and justifications of the financial underperformance, details on remedial actions, and strategies for improvement (Bloomfield, 2008; Dyer *et al.,* 2016).

- *Models comparison: <u>ROA and INCOME</u>*

The results of models 1 through 3 exhibit similarity, with consistent statistical significance and magnitude of coefficients. Both financial regressors, ROA and

INCOME, are found to be significant and in the predictive negative direction across these models.

The OLS model (1) emerges as the strongest, which is not surprising given it is the least conservative. It produces a coefficient of - 0.006 for ROA (with a t- statistics of - 3.86) and - 0.14 INCOME (with a t-statistics of -3.43). These results suggest that companies with higher ROA and positive net income tend to release shorter annual reports compared to companies with lower ROA and negative net income.

Models 2 and 3 control for time-variant unobservable variation and within-industry differences by applying time and industry dummies. In addition, model 3 clusters standard errors on the industry level to account for within-cluster correlations or heteroscedasticity, as previous studies have identified this as the source of the strongest variation (Li, 2008; Gormley and Matsa, 2014). The coefficient estimates for these two models are slightly weaker compared to model 1, with a coefficient of 0.005 for ROA and -0.12 for INCOME.

The time fixed effect, model 4, records the lowest coefficients for ROA and INCOME: - 0.001 and -0.04, respectively, although they remain significant. This weaker explanatory power of regressors is expected, as the model is the most conservative. It controls for the time-specific variations (time factors), such macroeconomic conditions, policy changes or global events, which affect all observations during the time period of this study (Coakley, *et al.,* 2006; Gosser and Moshgbar, 2020).

Model 5, the 2SLS, reports much stronger results for both financial regressors: -0.01 for ROA and – 0.45 for INCOME. When we separate these two independent variables in models 6 and 7, they exhibit the highest explanatory power, with a coefficient of –

0.03 for ROA and – 0.65 for INCOME, both statistically significant at the 1% level. A comparable analysis of both methods, 2SLS and OLS, and their results, is presented in section 3.4.2.4 (iv. Endogeneity).

(iii) Control variables

- As expected, larger companies (MC) tend to release longer annual reports. This is supported by positive coefficients ranging from 0.17 to 0.19, all statistically significant at the 1% level, across all six models. The time fixed effects (model 4) reports a more conservative figure of 0.08. Compared to Li's (2008) coefficient of 0.01, these results for the size factor are surprisingly strong.

- The market-to-book ratio (MB) captured mixed results. Largely, negative coefficients ranging between 0.009 and 0.02 (models 1- 4) are observed, contrary to expectations. A higher MB ratio, characteristic of growth companies, would typically be associated with more complex and longer annual reports (Li, 2008), suggesting a positive association. However, under the 2SLS methods (models 5-7), the coefficients changed sign from negative to positive. Results across the models were statistically insignificant, except for model 4 (time fixed effects) and model 6 (2SLS for the ROA), indicating a weak predictive contribution of the MB variable to the regression model.

Similar inconsistencies in the direction of the MB coefficient have been documented in other studies. Li (2008) and Miller (2010) reported coefficients of -0.026 and -0.027, respectively, comparable in magnitude to our results. Conversely, Dyer *et al.* (2017) documented a positive coefficient of 0.005

- The relationship between the length of annual reports and Research and Development (RD) is as expected, positive, across all models. It is reasonable to assume that research and development adds complexity to a company's operations (Lehavy *et al.,* 2011; Zhang *et al.,* 2020; Hoffmann and Kleimeier, 2021), which is reflected in a higher word count as more annual information is disclosed. The coefficient estimates range between 0.01 and 0.06. Statistical significance is observed in four out of seven models (1, 5, 6, and 7), while in models 2, 3, and 4, significance is not captured.

The application of three controls - dummy variables (model 2), clustering (model 3), and time fixed effects (model 4) - results in a reduction in the precision of the RD coefficient estimate, making it less significant. As shown in Table 4.9, in all three models, the t-statistics are much lower compared to the other models. This suggests that the use of these controls has inflated the standard errors.

It is possible that the variability within the year and industry category (model 2) was reduced, leading to lower t-statistics[111] and larger p-values, making statistical significance harder to capture (Mummolo and Peterson, 2018). Clustering (model 3), on the other hand, tends to enlarge standard errors, thereby broadening confidence intervals, which are inversely related to statistical significance (Petersen, 2009; Abadie *et al.,* 2023).

Finally, with the use of time fixed effects (model 4), the model becomes more rigid due to the absorption of time-specific variation[112]. Consequently, it becomes more challenging for a variable to have a significant effect on the model (Gösser and

[111] There is an inverse relationship between t-statistics and p-value.
[112] Within, time invariant unobservable characteristics of individual company.

Moshgbar, 2020).

- As expected, the leverage variable (LEV), at large, is positively related to WRDS, suggesting that companies with higher debt levels tend to release longer annual reports. Although, models 4 and 6 captured the opposite, negative coefficients. The assumed positive relationship stems from the association of leverage with risk, which is typically managed by providing extensive information in annual reports. The main purpose is to reassure shareholders, creditors and other stakeholders about the company's ability to effectively manage its debt (Bradbury, 1992; Hossain *et al.,* 1995; Ezejiofor and Emeneka, 2022).

On average, the coefficient is recorded as 0.02, except for model 6, which reports 0.002. However, from a statistical standpoint, this is one of the weakest variables, as only models 1 and 4 show significant levels in their p-values. Under more conservative regressions, with additional controls, the statistical significance is lost. This suggests that the relationship between the leverage factor and the length of an annual report is relatively weak.

The cumulative explanatory power of the variables is significant, as evidenced by the high adjusted R-squared values of the models, ranging between 0.34 and 0.75. Among the variables, MB and LEV appear to be relatively weak contributors, whereas ROA, INCOME, and MC demonstrate stronger associations, which are well-reflected in the word count factor. Statistically significant coefficients for these three variables are consistently observed across all seven models.

Summary

After controlling for the company size, market-to-book, research and development and leverage, a negative relation is found between the length of annual reports and a company's recent financial performance. Specifically, the word count increases with weaker returns on assets and is higher for companies reporting a financial loss (negative net income). This indicates that annual reports of companies with poorer financial performance tend to be longer.

The effect is both statistically and economically significant and remains unchanged after controlling for company characteristics, time and industry fixed effects. However, it's important to note that causality between the financial performance and the word count of annual reports cannot be conclusively established.

The obfuscation theory is equally possible as the ontology or the attribution theory, see 2.4.5 section. Therefore, it is reasonable to suspect that more words are required to explain adverse information, mainly because of the justification and rationalisation element (Bloomfield, 2008; Dyer *et al.,* 2016; 2017). On the other hand, we cannot exclude the intentional obfuscation of bad news. It is not unusual to see arguments in the literature that lengthy corporate disclosures may be a deliberate attempt by management to overload investors with complex information in order to obfuscate company's financial performance (Nazari *et al.,* 2017; Hassan *et al.,* 2019; Demaline, 2020; DeHaan, *et al.,* 2021; Nadeem, 2022).

Accordingly, the question of whether weaker financial results are concealed within extensive text of annual reports to delay the market reaction to bad news, or whether they simply require a greater deal of explanation and justification, remains unanswered in this study. Regardless of the motive, the evidence from the enquiry suggests that managers tend to write longer reports when their company's financials are weaker.

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4.5 Summary of Results

Chapter 4 presents results and analysis of the three main enquiries of this study. The results address five hypotheses, along with an additional hypothesis (Ha), which were introduced in chapter 3.

1. Market reaction to annual reports

   H1: *The market underreacts to filings of annual reports*

   H2: *The market reacts to preliminary statements of annual reports*

   H3: *There is a market reaction to annual reports in the absence of preliminary statements of annual reports.*

2. Dissemination method

   H4: *The market reaction to filings of annual reports is faster after the adoption of the NSM*

3. Reporting complexity

   H5: *The market reaction to filings of lengthy annual reports is delayed or negative*

   H(a):[113] *The weaker financial performance the longer annual report*

Enquiry 1: Market reaction to annual reports

The findings reveal a lack of price reaction to the filings of annual reports. However, upon closer examination, systematic abnormal price movements are observed

[113] H(a) - additional hypothesis tested in section 4.4.2.2

between the second and fourth weeks before the event. Further analysis links this pre-event abnormal activity to the release of preliminary statements of annual results. This suggests that the market reacts to this preliminary information but shows no interest in the subsequent annual reports, despite their richer content. Surprisingly, even when preliminary reports are not published, there is still no reaction to annual reports. These results challenge the Efficient Market Hypothesis, as new information is not promptly reflected in security prices (Fama, 1970)

Enquiry 2: Dissemination method

Despite making a compelling case for increased market efficiency following a technological change in the dissemination method of corporate filings, from paper to electronic, it was found that the market remained indifferent to the submission method. Abnormal price reactions around releases of annual reports were still absent. However, evidence suggests that investors were more sensitive and reactive during the short transition period from one system to the other. Statistically significant abnormal returns were observed for the sample of first-year Morningstar filers, indicating a stronger market reaction during this period of change, although the mean difference in abnormal returns between the two groups was not significant.

Enquiry 3: Market reaction to annual reports

In the final enquiry, it was found that investors responded differently to 'lengthy' and 'succinct' annual reports. Verbose reporting was heavily discounted to -0.22% in abnormal average returns on the filing day. Conversely, shorter reports achieved an additional 0.22% in returns above the market on the filing day.

Contrary to the hypothesised premise of a delayed reaction to lengthy reports, the market response was efficient. A two-day cumulative average abnormal activity (0,1) in the price change was recorded, after which the significance disappeared. This finding is novel and significant, representing one of the main contributions of this study to the literature. Moreover, it is consistent with the Efficient Market Hypothesis (Fama, 1970) which suggests that new information is immediately incorporated into security prices.

Following this result, consideration was given to whether the negative reaction was driven by more than just the length factor. Therefore, additional analysis was conducted in line with the Managerial Obfuscation Theory (Li, 2008), which hypothesised that managers might use excessive reporting to obscure weaker financial performance. The regression model confirmed this hypothesis by revealing an inverse relationship between the word count of annual reports and companies' financial performance.

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CHAPTER 5: DISCUSSION WITH CONCLUDING REMARKS

5.1 Introduction

In Chapter 5, the findings from Chapter 4 are consolidated. Key points and associated analyses are discussed and emphasised. Finally, the case for a single completed enquiry on the market reaction to annual reports is presented.

The focus of the chapter is on interpreting the study results, hence there is limited use of figures, as these are recorded and explained in the previous chapter.

This chapter is organised as follows: section 5.2 interprets and discusses the results; section 5.3 closes the study with 'concluding remarks'. A conclusion is presented, followed by recommendations for future research. Several limitations are also considered. Contributions[114] of the study and policy and practical implications are identified at the end of the chapter.

[114] Contributions are also discussed in the first chapter, under section 1.6.

5.2. Interpretation of Results

Annual reports are one of the most important corporate disclosures for investors, analysts and traders (Nadeem, 2022; Chircop *et al.,* 2022; Rahman and Oliver, 2022). Their importance comes from the value of the information content they carry, which, in turn, impacts the company's market value (Roychowdhury *et al.,* 2019). Figures from financial statements serve as inputs in risk and valuation models (Barker, 1999). Sentiment factors, used in technical analysis, are derived from textual characteristics and managerial tone found in these disclosures (Loughran and McDonald, 2011). The informational wealth embedded in annual reports plays a crucial role in reducing information asymmetry between management and market participants (Roychowdhury *et al.,* 2019). Despite the well-established usefulness of these reports for investment decisions, there is a surprising observation that their releases are not met with an efficient market reaction. Studies dating back to the early 1990s initially drew researchers' attention to this issue, and it persists in more recent works. Consequently, it is hypothesised that the *market underreacts to the filing of annual reports*. To gather new evidence and further investigate this phenomenon, additional tests are conducted, prompting a new inquiry into the market's reaction to annual reports.

As anticipated, this study found no evidence of abnormal price changes around the filing days of annual reports. These findings align with the outcomes of the classic papers by Cready and Mynatt (1991) and Stice (1991), as well as more recent research by Chapman *et al.* (2019), Chircop *et al.* (2022), and Alduais *et al.* (2022). Our Cumulative Average Abnormal Return (CAAR) figures closely matched Cready and Mynatt's predicted values from their simulation. In their study, they tested a 1-day price change around the releases of annual reports and found that the change was never greater than 0.75%. This observation holds true in our study, with the highest movement in CAAR (-5, -1) and (1, 3) being 0.11%, which is statistically insignificant. This represents a small magnitude of price reaction, indicating little economic value. According to Cready and Mynatt, such low figures suggest that the market is price-invariant with respect to the information content of annual reports. This argument echoes what Lev and Ohlson observed in 1982:

“Security prices are the same whether or not the informational item is known by all individuals in the economy”.

Similarly, in Chircop *et al.* (2022), there is an expectation of a significant response to high-quality annual reporting; however, this is not observed. The cumulative abnormal returns on the publication date amount to zero, suggesting that annual reports do not convey information relevant to stock prices. According to Chircop *et al.,* those reports lack timeliness, moreover, rather than communicating new information, they confirm information from earlier releases and announcements. It seems, therefore, that releases of annual reports have no impact on prices. This finding contradicts the theory of market efficiency.

Stice’s (1991) study provided a different perspective. The lack of market reaction at filing dates was attributed to the high cost of obtaining, in a timely fashion, information content of annual reports. The argument posited that the distribution method of corporate disclosures determines whether the information is promptly reflected in security prices. This point will be further explored when discussing the results of the next enquiry on 'dissemination methods.' Stice's argument is extended by emphasising that the cognitive effort required to process a disclosure, particularly one with the characteristics of an annual report, significantly affects reaction time. This relates to the concept of ‘information overload’, which says that analysing a complex and lengthy piece of information is likely to be inefficient (Simon 1996; Simnett, 1996; Lee, 2012).

An excessive amount of information is going to overwhelm investors' cognitive capacity, leading to delays in processing and decision-making (Li *et al.,* 2019; Pernagollo and Torrisi, 2020). Unless an investor, or a trader, employs sophisticated technology, for example, a machine learning program, or a deep learning model, which processes, analyses and makes investment or trading decisions in a fraction of time, we will not be able to capture the immediate market response.

Another plausible explanation is that the examined price effect has a longer time frame than our specified event window. As highlighted by Cready and Mynatt, it is possible that the market reaction to filings of annual reports can only be captured several weeks, or even months, after the event of a filing. Therefore, it is likely that investors, instead of reacting immediately to the information content of annual reports, process it over time and then respond. However, that response is significantly delayed. This perspective aligns with the findings of You and Zhang (2009), who noted a similar pattern in their study. They observed an initial underreaction of the market to the information presented in 10-K reports. Subsequently, however, the information was gradually incorporated into the stock price over the ensuing 12 months. They attributed this to the complexity and poor readability of annual reports. This echoes the previous argument on cognitive effort and 'information overload' (Lee, 2012; Chapman, *et al.,* 2019). Both factors contribute to a deceleration in the price discovery process (De George *et al.,* 2019), thereby compromising market efficiency (Pernagallo and Torrisi, 2020). The third enquiry (fifth hypothesis) of this study tested the impact of the complexity of annual reports on the market.

Simultaneously with the absence of an immediate reaction to annual reports, a significant abnormality in returns is observed during the pre-event period, spanning from day -20 to day -5. At this stage of the research, guided by the literature review (section 2.2.2), it could only be presumed that this abnormality was linked to the releases of preliminary statements of annual reports. The answer was provided in the subsequent analysis, where the market reaction to these preliminary reports was examined. The hypothesis was that: *the market reacts to preliminary statements of annual reports.* And indeed, this is where a match for the pre-event abnormal price movement, attributed to the filings of the preliminary statements, was identified. Consequently, a situation was found where the market responded to the information content of preliminary statements but remained unresponsive to the information content of annual reports. As noted by De George *et al.* (2019), disclosures that are more timely and cognitively less costly, albeit less informationally loaded, tend to receive market attention and are more likely to be immediately priced in, aligning with their observations in their study. They captured higher trading volumes around quarterly announcements than around semi-annual announcements.

The argument is, however, that we should be seeing some response to the latter because it conveys more information than what is communicated in the former. This result suggests that pre-disclosure information can serve as a substitute for the full annual information. Such a phenomenon could be explained by the concept of bounded rationality, where opting for a discourse that carries less cognitive weight and constraints becomes a more satisfying choice than delving into the comprehensive but heavier discourse of the annual report (Chapman *et al.,* 2019). It also confirms what Cready and Mynatt (1991) found in their study. Institutional investors seem to be actively trading around the releases of preliminary information, gaining a time advantage (Truong, 2023), while retail investors are more attentive to the information content of annual reports. Given that institutions trade in significantly larger volumes and values than small investors, it is the former that has the capacity to move the market and influence price changes, not the latter.

Despite appearing to have found an answer to the puzzle of market reaction to annual reports, the pursuit of further evidence continued. The enquiry followed the classic study by Easton and Zmijewski (1993), where a market response to 10-K reports was captured but conditioned on the absence of preceding earnings announcements. Consequently, the subsequent analysis involved examining the price reaction to annual reports when no preliminary statements were released. The third hypothesis posited that *there was a market reaction to annual reports in the absence of preliminary statements of annual reports*. Surprisingly, no evidence supporting this claim was found. This result is difficult to explain. While the market responds to the information content of annual reports communicated in preliminary reports, it remains unresponsive when these preliminary statements are not available (given their voluntary nature). This is a puzzling outcome and contradicts the results of Li and Ramesh (2009) and Easton and Zmijewski (1993), who observed price changes around annual reports when they were not preceded by preliminary statements. The answer to this puzzle may align with our earlier discussion regarding the lack of price change around filings of annual reports. The reasoning could be similar — annual reports are lengthy and complex, making it impractical for the market to process them within a day or two, leading to increased extraction costs and delays (Singh, 2018; Blankespoor *et al.,* 2020), which results in no immediate price adjustment. However, attributing the entire price effect to preliminary statements seems overly simplistic. It is plausible that other sources of information, such as earnings press releases, are also released prior to annual report filings around the same time as preliminary reports (De George *et al.,* 2019). This assumption aligns with Easton and Zmijewski's (1993) claim that annual report information becomes public over a multi-day period. Consequently, by the time of filing, annual reports may no longer be price relevant (Chircop *et al.,* 2022; Alduais *et al.,* 2023), or at least not in terms of unexpected information that would be immediately important to the market (Banerjee *et al.,* 2020).

From the Efficient Market Hypothesis (EMH) perspective, the lack of price change around the information content of annual reports indicates market inefficiency. This contradicts the theory of instant price adjustment to new information (Blankespoor *et al.,* 2020; Machmuddah *et al.,* 2020). It is important to remember that despite their historical focus on past performance, these disclosures also shed light on the company's future prospects. Therefore, the argument of price irrelevance does not completely hold; some price reaction should be observable.

Before proceeding to the next enquiry, it was important to determine whether the market reaction to annual reports might be influenced by clustering around calendar time. This phenomenon is often observed due to the concentrated release of financial statements by companies around specific dates, usually regulatory deadlines (MacKinlay, 1997; Monaco, 2023). Two distinct active filing periods, March and June, were identified. Additionally, abnormal price changes in both groups, potentially indicating two clusters, were observed. However, when comparing these two months with the control group (all other submissions), no significant difference in mean returns was found. Consequently, the assertion that the market reaction in the high- intensity filing months of March and June was reliably different from the reaction in other months was rejected.

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In the subsequent investigation, the impact of adopting the NSM / Morningstar system, presumed to provide more instantaneous access to corporate disclosures, on the market response to annual report filings was explored. This involved a comparison between the new (at that time) electronic platform and the traditional paper filing system. The hypothesis put forward was as follows: the market reaction to annual report filings is more prompt after the adoption of the NSM. This aligns with Stice's (1991) dissemination argument, asserting that the method of disclosure impacts response time - a concept rooted in the fundamental relationship between market efficiency and technological advancement within the Efficient Market Hypothesis framework (Bharati et al., 2020; Chapman et al., 2019; Gao and Huang, 2020). The automated diffusion of filings is posited to have a positive impact on market efficiency by providing open access to corporate information, thereby reducing information asymmetry (Gao and Huang, 2020) and improving price discovery (Singh, 2018; Chapman *et al.,* 2019).

The first analysis yielded no significant results for the market reaction to both Morningstar filers and traditional filers. However, in the second examination, a statistically significant market response was observed for first-year filers on the Morningstar platform. The reaction was notable on day 5 preceding the filing date, as well as on days 2 and 4 following the event. This pre-event reaction may suggest investor anticipation of annual reports (Kliger and Gurevich, 2014). Anticipation often materialises through price movements or trading activities before the actual event takes place. It seems, therefore, that investors and traders adjusted their positions based on their expectations of the forthcoming annual information, knowing that it could impact the market (Choi *et al.,* 2017; Fender, 2020).

In terms of the post-event reaction, a delayed response was captured. The delay is attributed to the time required for processing and analysing a disclosure of such complexity and length. This aspect has been previously addressed when discussing the results of the first enquiry. Concerning the second sample, which comprises the last-year filers of the traditional paper system, no significant change in price was observed. These results are consistent with findings from previous studies (Qi *et al.,* 2000; Asthana and Balsam, 2001; Griffin, 2003; Bharati *et al.,* 2020).

For the first time, an abnormal price change around the filings of annual reports was recorded, aligning with the year when the electronic submission system was implemented. While it might be tempting to assert that investors responded more strongly to annual reports submitted with Morningstar compared to reports submitted with the paper filing system, the mean difference in returns between these two filing methods was not statistically significant. Therefore, from a statistical standpoint, the hypothesised effect of the Morningstar filing system on the market had to be rejected.

As this study does not record a strong market reaction beyond the first year of the new system's operation, it is premature to assert that the adoption of the electronic platform has increased market efficiency in response to annual reports. No evidence was found to support the notion that Morningstar has delivered the same benefits as the U.S. EDGAR in disseminating the information content of annual reports to the market. Consequently, it was not possible to draw the same conclusion as prior studies regarding the advantage of the electronic filing system over the traditional paper method (Qi *et al.,* 2000). However, it was observed that the reaction occurred during the transaction period, specifically during the first year of the new system's adoption. Therefore, it is plausible to assume that the market is sensitive to technological alterations in information dissemination methods. This proposition resonates with the findings of Bharati *et al.* (2020) study, which delves into understanding the impact of regulatory changes on investor behaviour and the informational value of 10-K filings. Their research revealed heightened market responsiveness in the context of a new regulatory environment.

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In the final enquiry, two significant market reactions were identified: a negative response to lengthy annual reports and a positive response to succinct annual reports. Additionally, it was observed that word count served as an indicator of financial performance. The hypothesis put forward was that *the market reaction to filings of lengthy annual reports is delayed or negative*. Two types of analysis were conducted.

Firstly, in the event study, the price change around the filings of annual reports was measured for two groups: those with a high word count and those with a low word count. The market reaction varied depending on the length of the disclosure. Reports with a high number of words were discounted by the market. Strongly negative abnormal returns, immediately after the filing date, were recorded. In contrast, shorter reports achieved positive abnormal returns of the same magnitude. Thus, there was clear evidence supporting the impact of the length of reporting on the price change. The abnormal price movement was captured on the day of filing and the day after, and further, it was both statistically and economically significant.

It is important to note that these results do not support the first part of the above premise regarding the delayed response to longer disclosures. The recorded reaction is strong and immediate, it does not last long, after day 1, it reverts back to the pre-filing levels. This finding goes against the anticipated outcome documented in Cready and Mynatt (1991) and Bhattacharya *et al.* (2021) of a delayed reaction and, in You and Zhang (2009), of underreaction. Moreover, it stands in opposition to Bloomfield's (2002) Incomplete Revelation Hypothesis (IRH) (discussed below). Concerning the positive market reaction to succinct annual reporting, this finding, though unexpected, aligns with a similar association noted in the literature. In Seeback and Kaya (2022), for instance, a strong positive price response was observed when a corporate narrative exhibited high specificity, proxied by the length factor. Both findings, therefore, suggest that the size of a narrative serves as an explanatory factor for price efficiency.

In the second analysis, the multivariate regression, the same subject was examined but from a slightly different perspective. The aim was to determine whether the length factor (measured in words) had the capacity to predict market reactions. The 'words' coefficient was indeed negative, validating our univariate findings regarding the negative association between the length of annual reports and short-term abnormal returns. This relationship remained robust even after applying controls for the company's characteristics, including the book-to-market ratio, share turnover, institutional ownership and pre-filing returns. The 'words' coefficient was statistically significant[115], indicating that the word count holds strong explanatory power for post-filing abnormal returns. This finding aligns with results reported by You and Zhang (2009), Miller (2010), Loughran and McDonald (2014), Seeback and Kaya (2022) and D'Augusta *et al.* (2023). These studies documented strong coefficients[116] for length or length-related measures (e.g., file size). Therefore, it can be concluded that excessive

[115] The regression model was run several times based on a different treatment of standard errors.
[116] Expect for Seeback and Kaya (2022) where the coefficients are statistically insignificant.

reporting is likely to be discounted by the market, while concise writing is probably positively apprised.

Two points arise in relation to the captured market reaction. Recording significant abnormal returns in the immediate event window (0,1) was a surprising result. As mentioned earlier, this contradicts findings from other studies and also disagrees with the Incomplete Revelation Hypothesis. According to Bloomfield (2002), the market should react more strongly to information that is more easily extracted (succinct reports), and it should underreact to information that has higher collection and processing costs (lengthy reports).

"Information that is hard to extract from financial statements will not be reflected in stock prices" (Bloomfield, 2002).

This implies that the effectiveness of communicating price-relevant information should impact investor response time. The information content of complex and lengthy disclosures should not be reflected, at least not immediately, in stock prices (Ejaz *et al.,* 2022; Nadeem, 2022). Narrative complexity creates uncertainty, leading to disagreement in the market. This, in turn, manifests in higher price volatility, thus serving as a source of market risk (D'Augusta *et al.,* 2023). These results, therefore, contradict Bloomfield's theory; a prompt price response to lengthy reports should not be observed. There is also the second part of the 'incomplete revelation' notion that states that the price reaction is stronger to information that is easier to extract and process. Again, this was not the finding; the reaction to succinct reports was of the same or similar magnitude as to lengthy reports. Therefore, evidence was found that counters the Incomplete Revelation Hypothesis.

On the other hand, however, the results support the Efficient Market Hypothesis, as an immediate and strong response to both lengthy and succinct reports was captured. The fact that information with higher extraction costs has been effectively incorporated into stock prices implies the efficiency of the market. Even though these results do not fully support Bloomfield's argument, at least his call has been addressed. At the end of his paper, he says: research which would *"examine how differences in extraction costs are associated with differences in price reaction..." and showed "evidence of such a difference would support the IRH."* I examined the difference in the length of reporting, which is associated with costs, perhaps more processing than extraction. Differences in price reaction between disclosures with high and low processing costs were shown, with one price reaction opposing the other (negative vs positive). It was demonstrated that those differences were statistically significant. However, contrary to expectations, results do not fully support the IRH because an efficient reaction to costly information was found.

The result of the negative reaction to excessive reporting invited further questions. Why does the market so strongly discount lengthy annual reports compared to succinct ones? It was considered that the answer might lie in the 'obfuscation theory' related to opportunistic managers (Bloomfield, 2008; Li, 2008; Hassan, *et al.,* 2019; DeHaan *et al.,* 2021; Nadeem, 2022). The intuition was that the theory was reflected in the findings of the third enquiry, in the negative returns around the releases of lengthy annual reports. Therefore, the enquiry was pursued further, but this time with an interest in determining whether the length of reporting could offer insights into a company's fundamentals.

The premise that *'weaker financial performance was associated with a longer annual report'* was put forward. To test this, the word count was regressed on financial variables. The results revealed a robust association between the number of words in annual reports and a company's recent financial performance. This finding, though presented in the opposite direction, aligns with the results reported by Hassan *et al.* (2019). In their study, they showed that more profitable companies[117] tend to release annual reports of higher readability[118], attributing this pattern to a managerial strategy of intentional obfuscation aimed at enhancing the corporate image. A similar observation, albeit on a slightly different topic, is presented in DeHaan *et al.* (2021). They found evidence of strategic obfuscation in mutual funds, using unnecessarily complex and lengthy disclosures to hide unfavourable information and excessive fees, ultimately aiming to gain higher returns from retail investors.

To appreciate these findings, let's remind ourselves the 'managerial obfuscation theory', which posits that longer reports are written by managers to hide adverse predictions of the financial performance of their companies and to obfuscate recent (past twelve months) weak financial results.

"People are more apt to spend more effort explaining what is going on if they are attempting to cover something up" (Li, 2002).

The objective is to manipulate the market price of the company's stock (Bloomfield, 2008), with the aim of preserving, or at least not harming, the market value of the company (Hassan, *et al.,* 2019; DeHaan *et al.,* 2021). This is well reflected in Dyer *et al.* (2017), who argue that companies that experienced losses tend to report bad news in vague and foggy discourses. Furthermore, adverse information can be obfuscated through the use of technical language (Nadeem, 2022) or hidden in footnotes

[117] Measured by ROA.
[118] Readability score captured by the 'Flesch Reading Ease' score, which is based on the number of words in each sentence and the number of syllables in each word of a narrative.

(Athanasakou *et al.,* 2020). If the management is successful, the market underreacts to the information content of those lengthy disclosures. There is lower trading activity on the market (D'Augusta, *et al.,* 2023), and the incorporation of bad news into the stock price is delayed (Li, 2008). Investors do not recognise the disappointing information immediately, and as a result, the price of a stock, for the time being, is unaffected or even overvalued (De George, *et al.,* 2019). On the other hand, if the market is efficient, then it reacts immediately to the lack of specificity and high levels of textual redundancy. Moreover, it recognises bad news, which is buried in an excessive amount of words, consequently discounting the information content of that report. We need to remember that those who trade on expensive information (high extraction costs) are wealthier and more sophisticated investors (Miller, 2010; D'Augusta, *et al.,* 2023). Those participants are also likely to deduce the 'bad fruit' in hand and sell the stock. This, perhaps, would explain our negative price change. Applying the same logic, it could be argued that shorter reports convey positive news about the financial future of a company. The succinctness of a disclosure is again a deliberate strategic management action. This time, however, the aim is to lower the costs of information processing and to reduce information asymmetries (Loughran and McDonald, 2010; Gao and Huang, 2020). Moreover, to differentiate itself (good results) from the 'lemons' (Li, 2008). Therefore, as Haleem *et al.* (2022) stress, the quality of reporting is essential. The market endorses this concise reporting, but it also responds to good news, which is then reflected in positive abnormal returns. And this would explain the positive market reaction to shorter annual reports observed in this study.

However, if we bypass the concept of managerial opportunism (the obfuscation theory) and apply the 'ontology theory', then we could state that bad news is simply more complicated to communicate. It requires a longer discourse, more explanations and justifications. On the contrary, good news, generally, is easier to present; hence, fewer words are used in structuring a disclosure that would communicate it (Bloomfield, 2008; Li, 2008). Equally, the ‘attribution theory’ may be true, which is a narrative strategy employed to manage communication with company’s shareholders (Munyon *et al.,* 2019). It is well-documented that managers tend to attribute bad news to external sources (Miller and Ross, 1975; Dyer *et al.,* 2016; 2017). Discussing external events would require more textual discourse (Bloomfield, 2008). To prove this theory, however, we would need to conduct a content analysis of annual reports, something perhaps for the next study. A similar theory refers to ‘management by expectation’. This is where the demand to address bad news in a comprehensive manner comes from the market (Frankel *et al.,* 2007; Matsumoto *et al.,* 2007). Providing a detailed explanation of poor or below-expectation performance can assist an investor in the assessment of the company's future prospects (Caglio, 2020). Similarly, as above, to prove this premise would require additional analysis.

Overall, it is not very clear whether longer annual reports are perceived by the market as verbose and complex disclosures generating higher processing costs, and for this reason, they evoke a negative market reaction. Or whether they are indicative of poorer financial performance. The multivariate analysis provides statistical evidence supporting the latter claim, but then the results of the univariate analysis (the event study) are economically and statistically significant, which strengthens the former proposition. Regardless, two negative relationships were identified: the first between the length of annual reports and the market reaction, and the second, between the length of annual reports and the company’s financials. This study, therefore, challenges the traditional view that more disclosure is beneficial to investors (Dyer *et al.,* 2017), and it confirms Miller’s (2010) belief that:

"*Too much information can be as much of a problem as too little".*

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5.3 Concluding Remarks

5.3.1 Closing the enquiry

To bring all those findings into one answer to one question: *Does the market react to annual reports?* The answer is: *No, it does not.*

1) The market does not react significantly to annual reports. Firstly, much of the necessary information for investment or trading decisions is found in preliminary statements of annual reports (De George *et al.,* 2019; Mushinada and Veluri, 2019). Secondly, the market requires time to assimilate and process the vast amount of information contained in these disclosures, often necessitating several days to observe any price effect (Pernagallo and Benedetto, 2020; Ejaz *et al.,* 2022; Nadeem, 2022).

It appears that the filing of an annual report is not a price-sensitive event.

2) However, the market, does differentiate between textual characteristics of disclosures. It discounts excessive reporting (You and Zhang, 2009; Lee, 2012; D’Augusta *et al.,* 2023), while positively appraising succinct ones (Alduais *et al.,* 2022).

‘Therefore, less is more’.

3) One of the possible reasons of the second observation is that the length of an annual report reflects financial performance of the company in question. An achievement, usually, does not require many words. Actions, or in this case strong financial results, speak for themselves. On the other hand, a disappointing performance needs explanation, justification, excuses and even deflection (Li, 2002; Caglio, 2020; Nadeem, 2022). Those are many extra words that would not have been written if the company was reporting satisfactory results.

The word count could be indicative of financial performance.

4) In terms of examing efficiency in the electronic method of a disclosure submission (Singh, 2018; Blankespoor, 2019; Gao and Huang, 2020), the instant and freely available access to filings (Blacke, 2010) has not improved the response time of the British market to annual reports. No strong evidence was recorded of the enhanced price discovery under the NSM system.

There is no evidence that the NSM has improved market efficiency.

5) Findings of this study also suggest that the market is unresponsive to the information content of annual reports, which aligns with observations made by Chapman *et al.,* 2019; Alduais *et al.,* 2022 and Chircop *et al.,* 2022. On the other hand, the market is fully attentive and reactive to the releases of preliminary statements of annual reports.

The preliminary statements of annual reports serve as a substitute for the information content of annual reports.

5.3.2 Novel aspects of the enquiry

This research addresses a gap by focusing on the British market's response to annual reports, a topic previously under-examined compared to the dominant U.S.- centric studies. This work, therefore, adds new insights into a different market context, particularly in relation to the dissemination method of corporate disclosure. The investigation of the impact of the transition from the paper-based to the electronic filing system on market efficiency is a new enquiry. Additionally, it is also a timely topic, especially considering the current technological advancement, such as AI in information dissemination.

The study examines the market’s price sensitivity to the preliminary statements of annual reports. A relatively unexplored area, particularly concerning the comparison between the immediate market reaction to these statements and the subsequent reaction to full annual reports. The observed efficient response of the British market to the preliminary statements indicates that the information content of these reports is of value to investors. To the researcher’s best knowledge, this finding has not been previously reported in other studies.

Furthermore, as far as the researcher is aware, efficient market reaction to lengthy annual reports has not been explicitly documented before. This finding challenges our understanding of markets exhibiting delayed reactions to disclosures that are more complex and costly to process. In addition, the observation of a statistically significant positive abnormal response to concise reporting has also not been previously reported.

5.3.3 Practical and policy implications

The results of this study challenge the Efficient Market Hypothesis, showing that market reactions to annual report filings are not immediate and vary based on report complexity. This suggests that the current policy should emphasise the importance of report readability and simplicity to facilitate quicker investor response and improve market efficiency.

The reported negative market reaction to lengthy reports, contrasted with positive responses to succinct ones, indicates a need for the policy to guide companies towards more concise and clear reporting. This may involve setting standards for report length and complexity. Similalrly, the observation of managerial obfuscation, where lengthier reports might conceal poorer financial performance, highlights the need for a policy promoting transparency and penalising intentional obfuscation in financial reporting.

Furthermore, the study draws attention to the role of technology in market efficiency. While the adoption of the electronic corporate disclosure system represents a step forward, advancements in machine learning, particularly generative AI, suggest the Financial Conduct Authority should explore integrating such technologies into the National Storage Mechanism. Accelerating technological progress is important for ensuring faster and broader access to corporate disclosures.

From a practical standpoint, the subject of this study holds strong relevance to emerging AI technology and machine learning tools. AI has the potential to condense lengthy annual reports into concise summaries, thereby mitigating the impact of report length on market reaction. Furthermore, AI could help in processing complex reports more effectively (Smith, 2018), addressing concerns related to disclosure complexity and readability. Integrating AI into the analysis of corporate disclosures could lead to more timely and informed market responses.

Further, AI can analyse annual reports to determine the underlying sentiment, enabling investors to promptly assess the overall tone of the report. Additionally, AI has the capability to aid in pattern recognition and predictive analysis (Cao, Jiang, Yang and Zhang, 2023). For instance, it can detect anomalies in financial reporting, such as discrepancies or unusual patterns, which may signal financial distress (Xie, 2019) or obfuscation in corporate reporting.

From a trader's perspective, AI can analyse historical data, including past market reactions to lengthy annual reports, to predict future abnormality in price movement (Chopra and Sharma, 2021), thereby aiding in the development of trading strategies. AI systems can also monitor real-time market reactions to new reports and adjust trading strategies accordingly (Gazali, Jumadi, Ramlan, Abd Rahmat, Uzair and Mohid, 2020). This is particularly relevant when the market underreacts or reacts with a delay to annual reports.

These recommendations aim to enhance market efficiency, improve reporting transparency, and reduce the risk of managerial obfuscation, thereby safeguarding investors. By utilising AI in these several capacities, investors and traders are enabled to make decisions that are more informed timely, and strategically sound.

5.3.4 Future research

During the process of writing up the results and then discussing them, a few new questions arose, which have given a foundation to new enquiries.

Examine market reaction to other pre-disclosure releases and compare them with market reaction to preliminary report.

It would be wrong to assume that the entire price effect of the pre-event window, - 20 to -5, was attributed only to preliminary statements of annual results (preliminary reports). We know that there are other pre-disclosure announcements, statements, releases of annual reports. These disclosures are based on the actual and predicted content of the final annual reports. Our abnormally active pre-event window has an approximate duration of 15 days before the filing, this is indicative of several points of information release. Even though those announcements and statements are of a smaller significance in terms of value relevance information, it would be reasonable to assume that the market responds to them. Therefore, another project could investigate whether investors are equally interested in those releases. It would be worth examining the magnitude, if any, of the reaction to the other type of preliminary information. Then, comparing it to the abnormal price change around releases of the preliminary reports.

Examine market reaction to the latest change in the dissemination method.

In the second enquiry, market reaction during the transition period in 2010 from the old to the new method of submission of corporate disclosures was identified. This indicted that the market was sensitive to technological change. In April 2020, the provider of the National Storage Mechanism changed, with the Morningstar service being suspended, and now the NSM is operated by the FCA itself (FCA, 2020). Therefore, the premise of the market being more attentive to filings of annual reports during the first year of adoption of the new system could be tested again with a new sample of 2020 filers.

A second enquiry, which would also look at the impact of technological change on the market, could focus on the topic of XBRL. The XBRL was discussed when reviewing the 'digital future of reporting'. The XBRL is a new reporting format, a standardised machine – readable computer language, which aims at reducing costs and time of processing a corporate disclosure. In a sense, the promise is similar to what it once was for the EDGAR and for the Morningstar to improve efficiency in the market and accessibility and exchange of financial data and information. It seems that the adoption of XBRL on the British market has already begun, although, without a hard deadline for mandatory implementation, as was the case for the U.S. market in 2009. Nevertheless, this should not deter us from making an initial assessment of the benefits of this new technology, which could be a task for the next enquiry.

To examine the market reaction to annual reports post 2016.

The current technological progress, particularly in AI and machine learning, could significantly impact the efficiency of market reactions to corporate information. The advancements in AI enable rapid analysis and interpretation of large volumes of data, including complex financial reports, potentially leading to faster and more accurate market responses (Xie, 2019; Cao *et al.,* 2023). Advanced algorithms can identify patterns, trends and anomalies in corporate disclosures, thereby improving the ability to predict market movements and reduce reaction times (Chopra and Sharma, 2021). It would be worthwhile to assess the extent to which this technological progress has improved efficiency in the market by comparing the latest market reaction to the information content of annual reports with the findings of this study.

To identify which theory is more likely reflected in lengthy annual reports.

What is the alternative explanation to the ‘obfuscation theory’ for companies producing an annual report of an excessive word count? Is it the ‘ontology theory’, or the ‘attribution theory’, or maybe the ‘management by expectation’. All three theories are plausible. Conducting a thematic content analysis of annual reports would be necessary to answer this question effectively.

5.3.5 Limitations

In this section, a few methodological limitations are identified that could potentially compromise the results. As noted by Hirshleifer and Teoh (2003) and Tetlock *et al.* (2008), the effort to capture a market reaction is not a small one and not free from statistical challenges.

- The first limitation concerns the sample composition. The study sample comprises filings of annual reports from FTSE100 companies, which are large companies, leading to a bias toward the ‘size’ factor. This may undermine the generalisability of the results. However, as noted by Brown and Warner (1985), the Market Adjusted Returns (MAR) model appears to be relatively independent of the size factor.

- Despite the MAR being the most recommended model by Brown and Warner, *“generating the most favourable performance”,* it comes with limitations. The model assumes that the normal return for every stock is the same as the return on the market index. This implies that every stock has the same return and returns of all stocks are equal to the market return. Therefore, any excess in return above the average of the market is regarded as abnormal. The model does not account for the risk factor. Riskier stocks commanding higher expected returns, due to investor risk aversion, are not considered (Kliger and Gurevich, 2015). The assumption is that each stock’s systematic risk is 1. Perhaps, an application of the Asset Pricing model would increase the power of the test, as it would account for additional information about determinants of actual returns, such as the security’s beta (the systematic risk).

- Another issue is the use of daily data. Daily data has the advantage of capturing the precise day of the event. However, one of the drawbacks is that it could significantly deviate from normality, particularly, distributions of daily returns tend to be leptokurtic (Kliger and Gurevich, 2015). In comparison, monthly data, for example, would not exhibit this limitation. The issue, to some extent, is dealt by averaging abnormal returns and by the application of the larger sample; therefore, those deviations from normality should not cause substantial distortions of results.

- A further limitation of the MAR model is its sensitivity to the calendar time clustering of the filings (Brown and Warner, 1980). The issue is examined in section 4.2.3 and was found to be of no concern. However, the applied model underperforms when events cluster in time. In this instance, other models, which adjust for the security systematic risk and market realised returns, could detect abnormal returns in month ‘0’ more often.

Acknowledging those limitations, I decided to carry on the research, as the benefits of applying the MAR model outweighed its drawbacks. I believe that I chose the most feasible and most efficient method for this enquiry, thus the limitations should not undermine the conclusion of this study.

5.3.6 Contributions

This research contributes[119] to the literature on the market reaction to releases of corporate disclosures in several ways:

- It documents that the market remains silent to the information content of annual reports. This finding, therefore, does not support the Efficient Market Hypothesis (EMH).

- It presents evidence of the supremacy of preliminary information over the full information content of annual reports.

- It extends the literature on the dissemination method of corporate disclosure and highlights investor sensitivity to technological changes.

- It presents a scenario where the previously silent market reaction becomes rapid and strong when the content of information is of an excessive length. Similarly, it reports a rapid and strong reaction to concise reporting. The market's prompt response

[119] Chapter 1, section 1.6, also discusses the contribution of this study.

to lengthy reporting, and its subsequent discounts, serves as evidence of market efficiency, contrary to the first result. This novel finding, previously undocumented, challenges the status quo of delayed market reactions to disclosures with higher processing costs.

- The above finding implies that an abundance of information may be a concerning indicator, potentially serving as a proxy for disappointing or below expectation financial performance. This result should be of interest to momentum traders as well as investors in general.

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APPENDIX

Appendix 1: Comparison of MAR model with CMR model

	Market Adjusted Returns Model		Constant Mean Return Model	
	Full Sample		Full Sample	
Event Day	AAR	PAAREt_test	AAR	PAAREt_test
-20	0.21%***	0.00	0.11%	0.15
-19	0.09%	0.19	0.01%	0.91
-18	0.17%***	0.01	0.13%*	0.09
-17	0.15%**	0.02	0.15%**	0.04
-16	0.15%**	0.02	0.12%	0.12
-15	-0.01%	0.92	-0.12%*	0.10
-14	0.08%	0.21	0.11%	0.16
-13	0.09%	0.15	0.05%	0.54
-12	0.19%***	0.00	0.23%***	0.00
-11	0.01%	0.83	0.00%	0.96
-10	0.13%**	0.04	0.25%***	0.00
-9	0.12%*	0.07	0.00%	0.96
-8	0.02%	0.78	-0.03%	0.73
-7	0.11%**	0.08	0.02%	0.77
-6	0.00%	0.96	-0.03%	0.70
-5	0.09%	0.19	0.11%	0.13
-4	0.02%	0.76	0.01%	0.93
-3	-0.02%	0.72	-0.02%	0.83
-2	-0.04%	0.55	-0.12%	0.11
-1	0.07%	0.29	0.07%	0.36
0	0.04%	0.57	0.05%	0.49
1	0.05%	0.43	-0.02%	0.74
2	0.05%	0.48	0.09%	0.26
3	0.01%	0.84	-0.01%	0.95
4	-0.04%	0.52	-0.08%	0.27
5	0.03%	0.69	-0.02%	0.84
6	0.06%	0.34	0.18%**	0.02
7	0.01%	0.84	0.00%	0.99
8	-0.09%	0.19	-0.11%	0.16
9	0.01%	0.88	-0.01%	0.86
10	0.08%	0.24	0.06%	0.43
11	-0.06%	0.36	0.04%	0.57
12	-0.04%	0.53	-0.01%	0.90
13	0.03%	0.65	0.03%	0.70
14	-0.02%	0.77	0.02%	0.76
15	-0.12%	0.07	-0.14%*	0.06
16	0.02%	0.78	0.07%	0.39
17	0.00%	0.98	-0.14%*	0.06
18	-0.01%	0.88	-0.02%	0.78
19	0.07%	0.31	0.17%**	0.02
20	-0.01%	0.86	0.04%	0.62

Appendix 2: Testing for Financial Crisis effect (additional analysis)

It is possible that results from section 4.3.1 *'Traditional method versus electronic system',* may be influenced by a time dependent factor, unrelated to the filing system, the 2007- 2008 Financial Crisis (FC).

The traditional pre-Morningstar filing sample includes years during the financial crisis, thus it is possible that the market was more attentive to corporate discourses, and more responsive to information content of annual reports during this period. This could explain the stronger returns documented in table 4.5 for the traditional filing group (2006-2010). To investigate this possibility, a control sample, Financial Crisis (FC), has been constructed, containing annual reports from the years of the crisis, 2008, 2009 and 2010[120].

Table on the next page presents abnormal returns of three samples:

1) Traditional filers from the pre-crisis period, 2006 and 2007
2) Traditional filers from times of the crisis: 2008, 2009, 2010
3) Electronic Morningstar filers from the post crisis time: 2011-2017

If higher returns for the traditional filers, as documented in table 4.5, are caused by the financial crisis period and not by the filing itself, then the middle FC group should significantly differ from the other two groups. The test of significance is based on the independent samples *t*- test.

[120] The 2008 is the beginning of the FC; the 2009 and 2010 were the years of the European debt crisis (Constancio, 2012).

Table: AAR for: Pre-financial crisis group, Financial crisis group and Post-financial crisis group

Testing for the Financial Crisis Effect

Event Day	Pre FC group (2006, 2007) (N= 94) AAR	PAAREt_test	FC group (2008, 2009, 2010) (N= 228) AAR	PAAREt_test	Post FC group (2011-2017) (N= 559) AARE	PAAREt_test
-20	-0.07%	0.63	0.43%	0.01 **	0.15%	0.03 **
-19	-0.05%	0.74	0.03%	0.86	0.12%	0.08 *
-18	0.06%	0.71	0.39%	0.03 **	0.12%	0.09 *
-17	0.05%	0.75	0.18%	0.30	0.15%	0.03 **
-16	-0.03%	0.86	0.46%	0.00 ***	0.07%	0.31
-15	-0.04%	0.79	-0.16%	0.38	0.06%	0.35
-14	0.06%	0.70	0.09%	0.60	0.10%	0.16
-13	0.06%	0.71	-0.03%	0.86	0.11%	0.12
-12	0.02%	0.91	0.36%	0.04 **	0.14%	0.04 **
-11	0.05%	0.72	-0.07%	0.70	0.07%	0.32
-10	0.12%	0.42	0.23%	0.19	0.06%	0.35
-9	0.13%	0.38	0.14%	0.43	0.08%	0.22
-8	-0.06%	0.68	-0.08%	0.64	0.08%	0.23
-7	-0.04%	0.80	0.25%	0.16	0.06%	0.42
-6	-0.14%	0.35	-0.16%	0.35	0.11%	0.11
-5	0.22%	0.15	0.34%	0.06 *	-0.03%	0.68
-4	-0.20%	0.20	0.04%	0.83	0.04%	0.56
-3	-0.05%	0.74	0.11%	0.53	-0.06%	0.39
-2	-0.09%	0.57	-0.17%	0.34	0.02%	0.81
-1	-0.05%	0.76	0.23%	0.19	0.02%	0.77
0	-0.05%	0.75	0.05%	0.80	0.04%	0.59
1	0.27%	0.08 *	0.04%	0.82	0.02%	0.82
2	0.11%	0.48	0.02%	0.91	0.04%	0.51
3	-0.02%	0.88	-0.02%	0.92	0.02%	0.75
4	0.03%	0.84	-0.03%	0.84	-0.05%	0.42
5	-0.15%	0.32	0.21%	0.23	0.02%	0.81
6	0.00%	0.99	0.12%	0.51	0.04%	0.56
7	-0.12%	0.42	0.02%	0.92	0.04%	0.57
8	-0.12%	0.42	0.11%	0.55	-0.16%	0.02 **
9	-0.21%	0.17	0.01%	0.95	0.07%	0.33
10	-0.15%	0.32	0.23%	0.19	0.05%	0.43
11	0.03%	0.83	-0.10%	0.58	-0.06%	0.40
12	-0.06%	0.68	0.10%	0.57	-0.08%	0.22
13	0.03%	0.86	0.14%	0.44	-0.01%	0.88
14	0.01%	0.95	0.23%	0.20	-0.10%	0.14
15	-0.32%	0.04 **	-0.12%	0.50	-0.11%	0.10
16	0.05%	0.72	0.16%	0.37	-0.04%	0.57
17	-0.36%	0.02 **	-0.09%	0.60	0.11%	0.12
18	0.06%	0.71	-0.12%	0.49	0.04%	0.55
19	-0.02%	0.88	0.13%	0.45	0.03%	0.66
20	0.02%	0.90	-0.20%	0.26	0.04%	0.59

CAAR	Pre FC (a)		FC (b)		Post FC (c)		Mean Difference (a-c)		(f) Group FC	(n) Group Pre FC / Post FC	Mean Difference (f-n)	Sig. equal variances not assumed (Tamhane)
[-5;-1]	**-0.16%**	0.63	0.55%	0.17	**-0.01%**	0.89	-0.15%	0.66	FC		0.72%	0.35
	(-.477)		(1.390)		(-0.072)		(-0.434)	t value			0.56%	0.34
[-3;-1]	**-0.19%**	0.49	0.18%	0.57	**-0.02%**	0.77	-0.16%	0.56	FC		0.36%	0.72
	(-.692)		(0.569)		(-0.192)		(-0.590)				0.20%	0.88
[0; 0]	-0.05%	0.75	0.05%	0.80	**0.04%**	0.66	-0.09%	0.65	FC		0.09%	0.97
	(-.317)		(0.254)		(0.541)		(-0.46)				0.01%	1.00
[1; 3]	**0.36%**	0.18	0.04%	0.13	**0.08%**	0.39	0.27%	0.34	FC		-0.31%	0.84
	(1.330)		(0.134)		(0.684)		(0.963)				-0.04%	1.00
[1; 5]	**0.24%**	0.49	0.22%	0.55	**0.04%**	0.53	0.19%	0.56	FC		-0.02%	1.00
	(0.684)		(0.551)		(0.277)		(0.590)				0.18%	0.95
[- 5,5]	**0.02%**	0.96	0.82%	0.17	**0.07%**	0.51	-0.05%	0.928	FC		0.79%	0.62
	(.044)		(1.378)		(0.301)		(-0.091)				0.75%	0.50

The figures in the above table document the market reaction to the traditional filers and the electronic filers, including the control sample (financial crisis sample). With the exception of a few random observations [121], we observe a lack of a significant abnormal activity around the filing day 0 for all three samples. The Cumulative Average Abnormal Return (CAAR) panel shows greater detail of information.

Excluding the FC sample

In this analysis, the focus is on the control financial crisis (FC) sample, as it is a part of the traditional filers group, which in table 4.5 achieved higher returns that the electronic Morningstar group. This was contrary to expectation, as it was anticipated that the electronic group would capture stronger results. If the financial crisis impacted results of the traditional group, then we should try to exclude that period and see whether there are any changes in returns.

From this task, it is expected that the FC sample has the highest returns, moreover, is significantly different from the other two samples. If this is confirmed, then it can be claimed that the returns of the traditional sample were impacted by the financial crisis. This would mean that those higher returns are attributed to the FC period rather than to the paper filing system.

As expected, the control FC sample achieved higher returns across most of the examined windows. For the cumulative period of 11 days (-5, 5), returns of the FC

[121] Significant abnormal returns around the event day:

- pre FC sample: 0.27%, day 1
- FC sample: -0.34%, day -5
- post FC sample: -0.16%, day 8

group are 0.79% higher than returns of the pre- FC group, moreover, 0.75% higher than of the post- FC group, as indicated in the fourth column of the CAAR panel (Mean Difference, f-n). The economic difference in returns between the FC sample and the other two samples seems substantial; therefore, it could be assumed that the financial crisis had a strong influence on the results of the traditional group, presented in table 5.5. Nevertheless, statistically, the mean difference between those three samples is insignificant, across all six windows, as shown in the fifth column (Sig), which would imply that, statistically, those three samples do not vary from each other.

I try one more time: when comparing only two samples - the traditional, pre-FC group (a) with the electronic, post-FC group (c) - and excluding the influence of the financial crisis sample (b), the results mirror those in table 5.5. The second 'Mean Difference' column (a-c) reports the differences in price change between those two samples. The market reacted more strongly to the traditional filers across all six event windows, even without the influence of the FC sample. However, from a statistical point of view, the difference is insignificant across all six event windows, suggesting that it is difficult to reliably distinguish between the market reaction to either of those two groups (pre-FC and post-FC). Therefore, the findings of the main test and the results of table 5.5 are confirmed.

One more observation needs to be made, even though statistical differences between the samples are no longer being tested. If we look at the pre-event period (-20, -12) in the AAR table, a lack of significant abnormal activity is observed in the pre-FC group. In fact, the reported returns are economically smaller, around 0.05%, than the returns of the other two samples (FC group and post- FC group). On the contrary, these two other groups captured a significant abnormal price change, with the FC group gaining returns around 0.40%, once again higher than returns of the post FC group, averaging 0.13%. I do not provide a strong answer for the lack of this pre-event abnormality. It is possible that during those earlier years, 2006 – 2007, preliminary statements of annual reports were not released. If that were the case, a higher reaction around the event day 0 would be expected. Indeed, such a result can be observed in day 1 after the filing, with statistically significant average abnormal returns of 0.27% recorded.

Appendix 3: AAR and CAAR for high and low word count samples (full event window)

Marekt Adjusted Returns Model

Event Day	LN_High Word Count (N=356)		LN_ Low Word Count (N=407)	
	AAR	PAARt_test	AAR	PAARt_test
-20	0.08%	0.46	0.19%	0.06 *
-19	0.19%	0.06 *	0.01%	0.89
-18	-0.01%	0.89	0.38%	0.00 ***
-17	0.05%	0.60	0.23%	0.022 **
-16	0.33%	0.00 ***	0.07%	0.49
-15	-0.11%	0.26	0.12%	0.24
-14	0.12%	0.22	0.04%	0.71
-13	0.04%	0.73	0.08%	0.40
-12	0.04%	0.69	0.29%	0.00 ***
-11	-0.06%	0.53	0.10%	0.33
-10	0.11%	0.29	0.13%	0.19
-9	0.17%	0.10 *	0.09%	0.39
-8	0.05%	0.63	-0.05%	0.63
-7	0.09%	0.35	0.16%	0.12
-6	0.00%	0.97	0.03%	0.74
-5	0.05%	0.64	0.18%	0.07 *
-4	0.02%	0.87	-0.02%	0.81
-3	-0.09%	0.36	0.06%	0.54
-2	0.05%	0.65	-0.09%	0.38
-1	0.09%	0.40	0.07%	0.50
0	-0.22%	0.03	0.22%	0.03 **
1	-0.18%	0.07 *	0.24%	0.02 **
2	-0.01%	0.96	0.03%	0.75
3	0.10%	0.32	-0.06%	0.52
4	-0.07%	0.46	0.05%	0.64
5	0.05%	0.61	0.05%	0.61
6	0.15%	0.15	-0.01%	0.95
7	0.02%	0.87	0.08%	0.44
8	-0.12%	0.24	-0.04%	0.68
9	0.01%	0.90	0.01%	0.95
10	-0.02%	0.85	0.16%	0.11
11	-0.11%	0.26	-0.04%	0.72
12	0.00%	0.98	-0.05%	0.61
13	-0.01%	0.90	0.09%	0.38
14	0.04%	0.73	-0.04%	0.69
15	-0.05%	0.62	-0.19%	0.06 *
16	-0.03%	0.79	0.11%	0.28
17	0.12%	0.25	-0.17%	0.09 *
18	-0.05%	0.62	0.01%	0.93
19	0.13%	0.20	-0.01%	0.90
20	-0.04%	0.72	-0.05%	0.63

Appendix 4: Regression model 2: WRDS and financial performance ROE and Tobin Q

	(1) WRDS	(2) WRDS	(3) WRDS	(4) WRDS
ROE	-0.000850**		-0.00660	
	(-2.32)		(-1.25)	
INCOME	-0.195***	-0.201***	-0.566***	-0.494***
	(-4.77)	(-5.40)	(-3.07)	(-2.87)
MC	0.189***	0.186***	0.196***	0.191***
	(24.29)	(24.65)	(17.17)	(21.65)
MB	-0.00945	0.00537	0.162	0.0436
	(-0.62)	(0.38)	(1.34)	(1.58)
RD	0.0399***	0.0379***	0.0407**	0.0393***
	(3.66)	(3.55)	(2.58)	(3.34)
LEV	0.0325***	0.0327***	0.0183	0.0225*
	(3.09)	(3.16)	(1.15)	(1.85)
TOBIN		-0.0452***		-0.0728
		(-4.07)		(-1.46)
N	402	411	402	410
R-sq	0.658	0.665	0.285	0.608
adj. R-sq	0.653	0.660	0.274	0.603
F	126.8	133.4	61.78	114.6
OLS_ROE	✓			
OLS_TOBIN		✓		
2SLS_ROE			✓	
2SLS_TOBIN				✓

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

The End