Market Efficiency and Regulatory Announcements: The Short-Term Impact of MiFID II and MiFIR

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ABSTRACT

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Market Efficiency and Regulatory Announcements: The Short-Term Impact of MiFID II and MiFIR

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This research examines the impact of the MiFID II and MiFIR announcement on the short-term market efficiency of European stock markets by conducting an event study analysis of the market's reaction. The objective of this research is to evaluate whether the initial announcement of the regulatory framework influenced stock returns and trading activity around the announcement, offering insights into market responsiveness and investor sentiment. This study addresses a gap in the literature by concentrating on the market reaction to European Securities and Markets Authority's (ESMA) announcement on 20 October 2011, which has received little attention in previous studies.

The analysis of abnormal returns and abnormal volumes did not reveal statistically significant values on the announcement day. However, a statistically significant delayed correction of 2.53% in abnormal returns was observed the day following the announcement, suggesting that investors required time to process the regulatory expectations. Despite this, no statistically significant cumulative abnormal returns or cumulative abnormal volumes were recorded in any of the selected event windows, and the influence of unrelated macroeconomic events on certain days after the announcement supports the conclusion of limited impact.

Overall, the findings indicate that the initial MiFID II and MiFIR announcement had a brief and short-lived impact on the short-term efficiency of European stock markets. By reflecting the results on relevant theories and previous studies, the research contributes to a broader understanding of how markets react to major regulatory announcements.

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Tämä tutkimus tarkastelee MiFID II- ja MiFIR-sääntelyn julkistuksen vaikutusta Euroopan osakemarkkinoiden lyhyen aikavälin tehokkuuteen hyödyntämällä tapahtumatutkimusta markkinareaktion analysoimiseksi. Tutkimuksen tavoitteena on arvioida, vaikuttiko sääntelykehikon alustava julkistus osakkeiden tuottoihin ja kaupankäyntiaktiivisuuteen julkistuksen ajankohtana, tarjoten näkökulmia markkinoiden reagointikykyyn ja sijoittajien mielialaan. Tämä tutkimus paikkaa kirjallisuudessa olevaa aukkoa keskittymällä Euroopan arvopaperimarkkinaviranomaisen (ESMA) 20. Lokakuuta 2011 antamaan ilmoituksen markkinareaktioon, jota on käsitelty niukasti aikaisemmissa tutkimuksissa.

Epänormaalien tuottojen ja epänormaalien kaupankäyntivolyymin analyysi ei osoittanut tilastollisesti merkitseviä arvoja julkistuspäivänä. Kuitenkin sitä seuraavana päivänä havaittiin tilastollisesti merkitsevä 2,53 % positiivinen korjaus epänormaaleissa tuotoissa, mikä viittaa siihen, että sijoittajat tarvitsivat aikaa sääntelyodotusten omaksumiseen. Tästä huolimatta missään valituista tapahtumaikkunoista ei havaittu tilastollisesti merkitseviä kumulatiivisia epänormaaleja tuottoja tai volyymejä, ja muiden makrotaloudellisten tapahtumien vaikutus tietyillä ilmoitusta seuranneille päivillä tukee johtopäätöstä vaikutuksen rajallisuudesta.

Kokonaisuudessaan tutkimuksen tulokset viittaavat siihen, että MiFID II- ja MiFIR-sääntelyn alustavalla julkistuksella oli vain lyhytkestoinen ja vähäinen vaikutus Euroopan osakemarkkinoiden lyhyen aikavälin tehokkuuteen. Suhteuttamalla tulokset relevantteihin teorioihin ja aikaisempaan tutkimukseen, tutkimuksen tulokset tukevat laajempaa ymmärrystä siitä, miten markkinat reagoivat merkittäviin sääntelyjulkistuksiin.

ABBREVIATIONS

MiFID II	Markets in Financial Instruments Directive II
MiFIR	Markets in Financial Instruments Regulation
ESMA	European Securities and Markets Authority
AR	Abnormal Return
CAR	Cumulative Abnormal Return
AV	Abnormal Volume
CAV	Cumulative Abnormal Volume
EMH	Efficient Market Hypothesis

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1 Introduction

This thesis examines the short-term market reaction to the announcement of the Markets in Financial Instruments Directive II (MiFID II) and Markets in Financial Instruments Regulation (MiFIR), focusing on their impact on market efficiency. Introduced by European Securities and Markets Authority (ESMA) on 20 October 2011, MiFID II and MiFIR aimed to enhance fair competition, price formation, investor protection and market transparency, shaping European stock markets into a more efficient environment after the 2007-2008 financial crisis (Brab, 2023; ESMA, 2014). This thesis employs an event study methodology to assess the immediate response of European stock markets to the introductory announcement by analysing market efficiency-related indicators, such as returns and trading volume. This study will begin by outlining the regulatory context of European securities markets, followed by an overview of the key provisions of MiFID II and MiFIR and their role in enhancing market efficiency. It will then review relevant literature on the topic before concluding with the research objectives, focusing on market's reaction to the MiFID II and MIFIR announcement.

1.1 Background

MiFID II and MiFIR introduced a significant regulatory shift in response to the regulatory gaps exposed during the 2007-2008 global financial crisis (Busch, 2017). According to Busch (2017), the crisis exposed the weaknesses of existing regulatory framework regarding European securities markets with most noticeable deficiencies being in investor protection and transparency and the overall functioning of financial markets. While MiFID I was seen as a strict directive, its weaknesses were exposed during the crisis, prompting the development of MiFID II and MiFIR to focus on these flaws and enhance market efficiency (Busch, 2017). Consequently, ESMA (2014) responded by announcing the new directive and regulation MiFID II and MiFIR on 20 October 2011, which aimed fill the observed regulatory gaps and strengthen the efficiency of financial markets in Europe.

1.1.1 MiFID II: Key provisions

MiFID II's enhancements are based around the idea of creating a level playing field for European firms as well as for those from outside of the European Union who seek access to the European Single Market. MiFID II affects investment firms, trading venues, data service providers and foreign market participants operating via an EU branch, ensuring homogeneous regulatory requirements, thereby making the market more secure. (Comana et al., 2019, p. 62)

Key provisions ensure that trading occurs on regulated platforms – categorized as regulated markets, multilateral trading facilities and organised trading facilities. Additionally, the introduction of systematic internalisers adds further liquidity and transparency. (Comana et al., 2019, pp. 53–54) MiFID II expands transparency requirements to non-equity instruments, addressing "dark pools", which are private trading platforms with narrow transparency requirements and limit opaque trading through a "double cap mechanism" providing fair price discovery. Additionally, the directive demands pre- and post-trade data to be consistently accessible through consolidated trade mechanisms to improve market consistency and reduce costs. (Comana et al., 2019, p. 57)

Investor protection is crucial for maintaining market confidence and activity. MiFID II improves investor protection by demanding investment service providers to expand their appropriateness tests, restraining inducements for financial intermediaries and regulating independent advice. The directive assures non-discriminatory entry to trading venues and central counterparties. The directive's goal is also to tighten the regulation of algorithmic trading to require trading firms to implement risk control and assure that market makers provide liquidity. Furthermore, it introduces so-called "circuit breaker" for trading venues to be capable to suspend trading in case of powerful price movements that could disrupt the "natural" flow of capital. (Comana et al., 2019, pp. 57–58)

Significant operational change for investment service providers under MiFID II, was the unbundling research costs from trading commissions. This compelled investment service providers to change the way of charging the research fee or absorb these costs themselves. Before the implementation of MiFID II, the cost of research was included in trading commissions and the expenses were not thoroughly revealed. For the investor, this meant

that before the unbundling, higher trading fees reduced investors' returns. (Anselmi & Petrella, 2021)

1.1.2 MiFIR: Key provisions

When compared to MiFID II, MiFIR provides a more direct and concise regulatory framework because it is a regulation with a direct applicability. In contrast, directives like MiFID II require European Union member states to incorporate the given requirements of a directive into their own national law. Since each member state has the discretion to implement the directives as they fit, the outcomes in the implementation of the directive may vary. (Switzer, 2009, p. 63) While both MiFID II and MiFIR are guided by the same principles, MiFIR enforces clear and less generic rules targeted principally at relevant situations which investment firms are facing (Comana et al., 2019, p. 131).

MiFIR introduces a share trading obligation which mandates shares to be traded on regulated markets, systematic internalisers or comparable third country trading venues, ensuring compliance with the pre-trade transparency requirements. The regulation prevents systematic internalisers from matching small orders at midpoint unless tick size rules are met, ensuring more competitive trading and fairer price. Lastly, MiFIR strengthens competition by addressing the regulation of unlicensed entities operating similarly to multilateral trading facilities or regulated markets. (Rookhuijzen & Bassi, 2023)

MiFIR aims for a broad increase in financial market transparency by forcing transparency requirements beyond European Economic Area (EEA), requiring non-EU countries such as Switzerland to implement new regulations. The regulation commands clear and consistent pre- and post-trade transparency. For alternative financial instruments such as derivatives, structured finance products and bonds, article 8 requires financial institutions to openly inform current bid and offer prices along with the depth of trading interests, so necessary pre-trade data is obtainable. In addition, article 10 demands post-trade data from financial institutions by requiring transaction details like price, volume and time to be available as near real-time as possible. Regarding pre- and post-trade data, similar requirements apply to simpler equity-like instruments demanded by articles 3 and 6 to ensure comprehensive transparency across all financial instruments. (Comana et al., 2019, p. 124)

MiFIR article 26 gives a clear and detailed example of transparency requirements. The article mandates investment firms to practise “complete and accurate” transaction reporting, including traded instruments, execution details, client and staff member identification and algorithms used. Additionally, the designation of a potential short sale must be announced when exchanging shares and sovereign debt. Reports must be submitted as soon as possible. (Comana et al., 2019, p. 135)

1.2 Previous research

Previously, MiFID II’s impact on the stock market has been studied from various viewpoints. However, previous research has primarily focused on impact of its implementation rather than its announcement. This difference is crucial, as investors adjust to their expectations based on new information, likely causing significant price and liquidity changes before the directive and regulation are implemented.

Miloș (2021) studied the directive’s impact on volatility in Europe’s emerging and developing stock markets, finding that the implementation did not reduce the volatility in more developed markets. Instead, Miloș (2021) found that all analysis intervals considered, the effect on volatility was positive, suggesting that the directive caused uncertainty. In a different study, Miloș et al. (2021) found that while the directive improved liquidity in the German stock market, it had no significant effect on the Romanian stock market. The researchers stated that the difference in the outcome could be explained by the variety in the countries’ level of stock market development and financial education. Similarly, Favaretto, Lepone & Lepone, (2023) analysed the influence of MiFID II’s tick-size reduction on liquidity in the London Stock Exchange, concluding that minimum tick-size rules narrowed bid-ask spreads, reduced trade values and the cost of trading, sped up the quote updates, increased aggressive trades and decreased price impact.

While previous literature focus on MiFID II’s effects after its enforcement, event studies have been utilized to provide insight into how investors response to regulatory announcements. Kawas and Dockery (2023) employed an event study methodology to investigate stock price reactions to regulatory announcements intended to enhance the stability of the UK financial system. Kawas and Dockery (2023) found that market participants responded positively to announcements of the Banking Act of 2009 and the

Financial Service Bill of 2012, as they were widely seen as necessary reforms in the post-crisis financial environment. However, the study noted that the response varied based on the source of the regulation, as certain measures appeared to have been already priced in. More specifically, Kawas and Dockery (2023) observed negative market reactions particularly to certain EU regulatory announcements, reflecting concerns about their potential impact on the financial sector. Notably, Kawas and Dockery (2023) found that the financial sector experienced an adverse market reaction when MiFID II and MiFIR were approved by the European Parliament on 15 April 2014, likely due to increased compliance burden. Despite some mixed reactions, the study concluded that the announced regulations aimed at improving financial stability were overall perceived positively (Kawas & Dockery, 2023). In addition, the findings align with the key focus of this research, as it suggests that investors response to regulations before their implementation.

Previous research present mixed findings, indicating that the regulatory impact varies depending on market conditions, investor expectations and financial maturity. However, the lack of research specifically addressing the response to the initial announcement of MIFID II and MiFIR, leave a gap in the literature. Kawas and Dockery (2023) provide valuable observations regarding the topic of this research, as their findings suggest that the approval of MiFID II and MiFIR had a negative impact on the financial sector. However, this research focuses on the initial announcement rather than the later approval by the European parliament. In summary, previous research provides a solid foundation for the development of this research.

1.3 Research objectives

The regulatory context of European securities markets, key provisions of MiFID II and MiFIR, and prior research have been outlined. MiFID II and MiFIR were introduced to enhance transparency, market efficiency and investor protection. Nevertheless, a key question remains: how did the stock markets react to the introduction of MiFID II and MiFIR? Did the announcement strengthen the European stock markets in the short term, or did it introduce uncertainty? While long-term and post-implementation impacts have been previously studied, little attention has been given to the immediate reaction. This study aims to fill that gap.

Existing research has explored various aspects of MiFID II's effects on liquidity, volatility and price formation (Favaretto, Lepone & Lepone, 2023; Miloș, 2021; Miloș et al., 2021). However, very little research has specifically analysed the stock market's pre-implementation reaction to MiFID II and MiFIR. Kawas and Dockery (2023) identified a negative response in the financial sector to the European Parliament's approval, but broader response remains unclear. Understanding the initial reaction is crucial, as regulatory changes can influence market behaviour, trading activity and investor sentiment even before full implementation (Christensen, Hail & Leuz, 2016). By focusing on initial response by employing an event study, this reseach provides insights into whether the MiFID II and MiFIR announcement immediately influenced market efficiency or introduced uncertainty.

To achieve this, the main research question will be the following:

Q1: *How did the introduction of MiFID II and MiFIR impact the short-term market efficiency of European stock markets?*

To assist with the main research question, two sub-questions guide the analysis:

Q2: *What are the effects of introduction of MiFID II and MiFIR on abnormal and cumulative abnormal returns during the event window?*

Q3: *How did the introduction of MiFID II and MiFIR affect trading activity in European stock markets during the event window?*

The first sub-question *Q2* examines price reactions with the use of abnormal returns (AR) and cumulative abnormal returns (CAR). Applying an event study methodology to calculate and analyse ARs and CARs allows for a comprehensive assessment of market response to the regulatory announcement by determining whether asset returns deviated from the expected levels (MacKinlay, 1997). In addition to evaluation of returns, liquidity is analysed (*Q3*) using the event study approach, as enhancing market liquidity was a key objective of MiFID II and MiFIR. Investigating changes in abnormal volumes (AV) and analysing cumulative abnormal volumes (CAV) as proxies for liquidity around the announcement provides valuable insights into the market reaction and whether the regulatory framework influenced initially influence the markets as intended (Brown, Crocker & Foerster, 2009). By integrating the analysis of ARs and AVs, this research aims to offer a comprehensive assessment of how MiFID II and MiFIR influenced the short-term market efficiency.

1.4 Structure of the thesis

The structure of the thesis subsists of five chapters. The first chapter provides a short overview of the European securities markets and explains the rationale behind the increasing regulatory requirements. It introduces the key provisions of MiFID II and MiFIR, the two major regulatory frameworks designed to improve the financial environment and outlines their intended objectives. Additionally, it establishes the earlier research on the topic and defines the objectives of the study. The second chapter delivers a detailed overview of the theoretical framework used in the research, covering the Efficient Market Hypothesis, Agency Theory and Market Microstructure. These theoretical perspectives help analyse the market reactions by explaining the observed phenomena through established knowledge while providing scientific credibility to the study. The third chapter provides a detailed description of the event study methodology employed in this research, including the data selection and processing. Findings of the empirical research are reported in the fourth chapter, presenting the results of the analysis. The findings on abnormal returns and abnormal volumes around the announcement are systemically reported and interpreted in relation to the research questions. Finally, the fifth chapter summarizes the key research findings and discuss their implications in relation to the theoretical framework, while stating the study's limitations and providing possible ideas for further research.

2 Theoretical framework

Second chapter of the thesis establishes the theoretical framework that underpins this research. The objective of this study is to examine stock market's reaction to the announcement of MiFID II and MiFIR, through the lens of three key theories: the efficient market hypothesis (EMH), agency theory and market microstructure. These theories offer complementary viewpoints on how stock markets function in response to new regulations. The EMH is central for this research, as it assumes that stock market participants consider all available information when pricing securities (Fama, 1970). Agent Theory provides understanding into behavioural dynamics between investors and investment intermediaries, helping to explain market behaviour in response to regulatory changes. Market microstructure delivers a useful framework for understanding how trading mechanism, liquidity and information asymmetry influences price formation and market efficiency during regulatory shifts (Madhavan, 2000). This chapter introduces and analyses these three theories, evaluating on their theoretical foundations and relevance to this research.

2.1 Efficient Market Hypothesis

This research explores the markets' initial reaction to the announcement of MiFID II and MiFIR, making it crucial to examine the topic in the lens of the efficient market hypothesis (EMH). The EMH Popularized by Eugene Fama (1970), argues that in ideal markets investors assume that all available information on security has been included in its price, and for markets to be considered efficient all available information must be reflected in the prices. Both Fama's arguments are especially relevant for this thesis, as they provide theoretical ground for exploring European stock markets immediate response to a relevant announcement on stock market regulation during the event window. Accordingly, the focus of this study is on examining the short-term efficiency of European stock markets and investigating whether the announcement caused any observable changes in market efficiency.

The EMH assumes that "market knows the best" and "no investor can beat the market", meaning that all accessible information is efficiently reflected in security prices. For this

theory to hold true, investors must act rationally, basing their choices on all available information. If irrational investors exist, their trading is random, and their inefficient influence gets cancelled out by rational arbitrageurs, whose trading restores efficiency. Rational investors, under the EMH, value assets based on their fundamental value. The fundamental value of an asset typically determined by discounting its future cash flows utilizing the r factor, which contains the risk-free rate and the risk premium. This approach is well known as Net Present Value (NPV) method. (Laos, 2012, pp. 97–98)

In his definitive paper, Fama (1970) identified three levels of market efficiency called weak-form, semi-strong form and strong-form, as visually presented in the Figure 1, each level represents a varying level of information incorporation into asset prices. Weak-form asserts that assets' prices reflect only their historical market data. This form suggests that performing technical analysis using assets historical performance does not provide a competitive advantage, as the information is already reflected in the price. (Fama, 1970) Given that this research explores market's reaction to regulatory announcement, it is necessary to assume that European stock markets are more efficient than the weak-form, as only then would public information be quickly reflected in prices. Weak-form efficiency does not consider other price formation variables like changes in the regulation or other events influencing market prices.

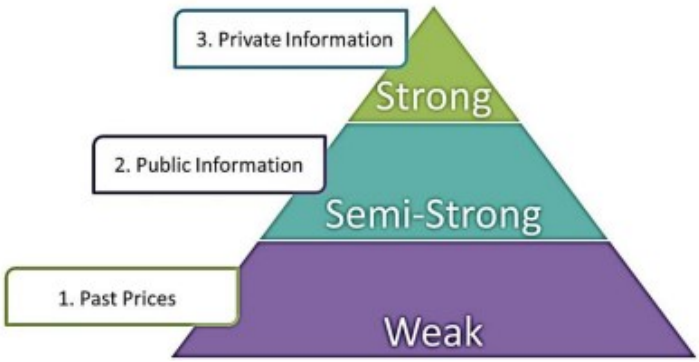

Figure 1. Visual representation of the three levels of market efficiency presented by Ying et al. (2019)

Semi-strong form assumes that assets' prices include all publicly available information (e.g., changes in regulation, earnings announcements, etc.) (Fama, 1970). Under this form of

efficiency, investors are not able to consistently attain competitive advantage in stock market using public information, as this information is already reflected in the prices (Agrrawal, Agrrawal & Agarwal, 2023). Given that the focus of this research is on market's response to the MiFID II and MiFIR announcement, which are public regulatory changes, it is mandatory to consider that European stock markets operate at least at the semi-strong form of efficiency for the findings to be considered reliable. Fama (1970) points out that markets response on different public announcements has been statistically significant although adjustments have been small in some cases.

Strong-form of market efficiency implies that certain investors or entities possess exclusive access to knowledge crucial for securities pricing, in addition to information that is accessible to public. In this form, no individual investor can attain higher than expected investment profits because the information available is already included in the market price. (Fama, 1970) The strong-form of market efficiency has received mixed empirical evidence which can be explained by the prohibition of insider trading, as investors or company insiders who are exposed to insider information are forbidden to utilize it in financial markets (Agrrawal, Agrrawal & Agarwal, 2023). In this research, the occurrence of strong-form efficiency would be indicated by anticipatory trading and a more limited reaction after the announcement. Moreover, the regulatory framework such as MiFID II and MiFIR have strengthened market transparency and investor protection, further decreasing the likelihood of strong-form efficiency prevailing over time.

In the context of this research, the EMH contributes the theoretical framework for evaluating how European stock markets reacted to the MiFID II and MiFIR announcement. The semi-strong form is most relevant to this thesis' as it assumes that all publicly accessible information, such as regulatory announcements, are included in the prices and price formation happens efficiently. This research also investigates the level of market efficiency at which markets responded to the announcement of MiFID II and MiFIR.

2.2 Agency Theory

Agency Theory delves into the dynamic relationship between two cooperating parties with differing interests: the principal, who assigns decision-making authority to the other party called the agent. Conflicts often arise in the principal-agent relationship when their interests

are not aligned, leading to agency costs. Two main issues emphasized by agency theory are adverse selection, where the agent possesses hidden intentions and information unknown to the principal, and moral hazard, where the agent may act in their own benefit instead of the principal's best interest. (Eisenhardt, 1989)

The framework is especially relevant for this research on stock market efficiency, as it investigates how MiFID II and MiFIR, by addressing agency problems, may enhance market efficiency. In financial markets investors serve as principals while financial intermediaries such as banks and advisors act as agents. Investors often authorize decision-making to intermediaries, relying on their expertise. However, conflicts of interest occur when financial professional prioritize personal gain by exploiting commissions or performance-based incentives at the expense of investors' best interests. These conflicts can lead inefficiencies in financial markets, creating an unfair environment for non-professional investors. Information asymmetry is common in this setting as financial advisors possess greater knowledge and expertise than the average investor.

Given the potential for financial professionals to act in self-interest at the expense of the investor, MiFID II and MiFIR introduced important mechanisms to decrease agency problems. The regulations aimed to improve market transparency, investor protection and overall market efficiency. For example, appropriateness tests, inducement reductions and stricter compliance requirements for financial advisory services are designed to reduce information asymmetry. By reducing opportunities for adverse selection and moral hazard, MiFID II and MiFIR contribute to a more transparent and efficient market, levelling the playing field for European investors. Moreover, the unbundling investment services and the ban on unpaid research under MiFID II further reduce the conflicts of interest (Huettinger & Krašauskaitė, 2020).

In connection to the main research question, *Q1* asks how MiFID II and MiFIR impacted short-term market efficiency. Agency theory suggests that by restraining agency problems and enhancing transparency, these regulations likely led to a more efficient market, which in theory leads to a positive reaction. By addressing issues such as adverse selection and moral hazard, the announcement of MiFID II and MiFIR was expected to boost investor confidence, further supporting this argument.

Moreover, in relation to the sub-questions Q2 and Q3, the regulatory announcement may have influenced market expectations regarding future regulatory adjustments. This anticipation likely led to positive abnormal returns as investors priced in the expected impact of increased transparency and decreased agency problems. Similarly, in the terms of trading activity, the announcement potentially caused a short shift in investor behaviour, as investors response to the anticipated impact on market structure and efficiency. This conclusion aligns with Fama's (1970) argument that all accessible information is reflected in an asset's price.

2.3 Market Microstructure

Market microstructure is an area of finance which explores the mechanisms that dictate financial markets, emphasizing liquidity, trading processes and price formation. While traditional finance theories assume that markets are frictionless, market microstructure recognises friction causing factors such as bid-ask spreads, strategic trading behaviour and trading venue fragmentation. (Madhavan, 2000) This chapter covers key findings from market microstructure research and its relevance to the short-term market reaction following the announcement of MiFID II and MiFIR.

Market microstructure research highlights the importance of asymmetric information in price formation. Madhavan (2000) points out that informed traders hope to capitalize on their private information in their trades with the uninformed, who possess only publicly available information, thus leading to adverse selection. To offset the effects of adverse selection, market makers adjust the bid-ask spread, which impacts liquidity and transaction costs (Madhavan, 2000). In addition, Madhavan (2000) points out that trading costs such as inequal information, inventory costs and transaction fees decrease the price of the asset. Since MiFID II and MiFIR were introduced to reduce information asymmetry and increase transparency, their announcement likely positively influenced investors' expectations and trading strategies, affecting price formation in European stock markets.

According to the market microstructure literature, shift in market transparency requirements also affect market liquidity and volatility. Increase in transparency, such as dissemination bid-ask quotes and market depth, may reduce liquidity as market participants get more cautious about placing orders as they are able to wait for better opportunities. Also, disclosure of retail order flows may increase the volatility since revealing details about

“noise” in the market system exaggerates asymmetric information effects reducing market liquidity. While transparency decreases volatility and improves liquidity in liquid markets, it can lead to higher implicit transaction costs and decrease liquidity in thinner markets, which is consistent with the findings of Miloș et al. (2021). (Madhavan, 2000)

Sufficient liquidity is fundamental for efficient capital markets as it ensures efficient execution of trades without significant price disruptions. Market microstructure provides understanding how liquidity interacts with price formation and market behaviour. While liquid markets are generally considered efficient, Madhavan (2000) notes that increased trading volume may slow the price formation process, as it can lead to temporary inefficiencies in information processing. The 2011 regulatory announcement may have temporarily caused shifts in market liquidity as market participants reassessed trading strategies. In addition to market size, depth and volume, Madhavan (2000) identifies variance as a factor influencing the speed of price adjustment. If market participants anticipated structural changes following the announcement, shifts in liquidity and volatility could have influenced how quickly prices adjusted to the new information. These insights are especially relevant to this research, as the announcement of MiFID II and MiFIR likely cautioned investors to reassess their expectations regarding market transparency and trading conditions. (Madhavan, 2000)

In conclusion, market microstructure is relevant for understanding the impact on the MiFID II and MiFIR announcement on European stock markets. It contributes a broad theoretical framework for understanding how financial markets act under the shifting conditions of transparency, information asymmetry and liquidity. The literature suggested that increase in transparency can improve market efficiency but may decrease liquidity and increase volatility in certain market conditions (Madhavan, 2000). These insights are relevant to the research questions of this thesis. However, it is crucial to keep in mind that the initial announcement on MiFID II and MiFIR did not trigger a change in regulation, but investors priced in the expectations of future changes. This assumption is related to Fama’s (1970) arguments on market efficiency.

The short-term market efficiency following the announcement can be investigated through changes in price formation and trading activity as investors responded to the anticipated regulatory setting. Abnormal and cumulative abnormal returns may express how investors priced in the expectations into asset prices, while shifts in trading behaviour reflect investors

adjustments in anticipation of regulatory change. Overall, market microstructure provides a robust theoretical foundation for evaluating how the announcement of MiFID II and MiFIR influenced short-term market efficiency, returns and trading activity, supporting the research's analysis of how stock markets react to anticipated regulation.

3 Methodology and data

This chapter outlines the methodology and data used in the empirical section of the research to examine the impact of the MiFID II and MiFIR announcement on the European stock markets. Since this study seeks to measure the market's reaction to a specific regulatory event, the well-established event study methodology is utilized. The method enables the measurement of an economic event's influence on stock values as highlighted by MacKinlay (1997), and for evaluating its effect on trading activity as demonstrated by Nanda an Barai (2021). This research focuses on evaluating the market's initial reaction to ESMA's announcement of the new regulatory framework on 20 October 2011, which serves as the event date for this event study. By analysing potential shifts in returns and trading volumes following the announcement through an event study, deviations from expected market behaviour can be identified. This chapter consist of the introduction to the event study methodology, detailing its mathematical foundation and the key steps to conduct the study, followed by the description of data used in the analysis.

3.1 Event Study methodology

The event study methodology is a valuable research tool for assessing how specific events influence financial markets. Since its early applications by Ball and Bown in 1968 and Fama et al. in 1969, the method has been applied in a wide range of contexts. It has been used to evaluate influence of company specific events as well as broad macroeconomic changes. (MacKinlay, 1997)

The event study methodology is especially relevant to this thesis as MacKinlay (1997) notes that event studies are broadly employed in the field of law and economics to examine the impact of change in the regulatory environment to the value of firms. In essence, an event study helps to identify the direct impact of a given event on stock performance by measuring the deviation between abnormal returns (AR) and expected returns over a defined period surrounding the event day. In addition to the more well known ARs, the same methodology can be applied to analyse trading volumes in the event window by calculating abnormal volumes (AV), as demonstrated by Nanda and Barai (2021). The event study methodology

aligns with Fama's (1970) assumptions of the efficient market hypothesis, which assumes market rationality and efficiency, meaning that the influence of the event is directly reflected in stock prices. (MacKinlay, 1997)

3.1.1 Determining the timeline

First, the event windows used in this event study analysis are identified. The event window is defined around the event of interest, incorporating daily data from both before and after the event day to evaluate potential market anticipation before the event and adjustment following the announcement. As presented in Figure 2, event date is marked as $t = 0$, while the event window spans from T_1 to T_2, representing the period of interest for analysing market behaviour surrounding the event day. (MacKinlay, 1997)

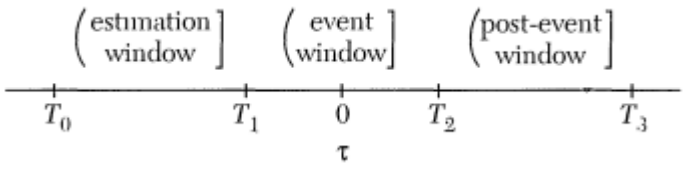

Figure 2. Timeline of event window applied in event studies presented by MacKinlay (1997)

For this study, the chosen event date is the ESMA's initial MiFID II and MiFIR announcement on 20 October 2011. MacKinlay (1997) suggests expanding the period of interest by multiple days to improve accuracy and to obtain more observation days. This event study analyses whether some market participants had private information and how quickly and strongly the published information was priced in. For precise assessment, multiple event windows are used. This study employs a 7-day and a 11-day event windows as used by Biswas (2022), and a 21-day event window as suggested by Vaihekoski (2022, p. 246). In relation to Figure 2, time spans within these windows are defined as $T_1 = -3$ to $T_2 = 3$, $T_1 = -5$ to $T_2 = 5$ and $T_1 = -10$ to $T_2 = 10$.

To calculate the expected returns, a suitable estimation window must be defined. As visually presented in the Figure 2, the estimation period precedes the event window in the timeline,

ensuring that the estimated normal performance model parameters remain unaffected by the returns occurring around the event (MacKinlay, 1997). The length of the estimation window varies across event studies. However, this study follows Vaihekoski's (2022, p. 244) recommendation and employs a robust estimation window of 250 trading days for each event window.

3.1.2 Calculating ARs and CARs

First, expected returns over the estimation window are calculated, as abnormal returns represent the deviation between the actual returns and expected returns. More specifically, expected returns reflect how the asset would have performed in the absence of the event. Event studies typically employ statistical or economic models including constant mean return model, market model, factor models, Capital Pricing Asset Model (CAPM) and Arbitrage Pricing Theory (APT) (MacKinlay, 1997).

Since this research examines the reaction of a broad European index to the MiFID II and MiFIR announcement, the constant mean return model is utilized to calculate the expected returns over the estimation period. This statistical model presumes that an asset's average return stays constant over time, making it straightforward and efficient approach for evaluate the expected return of broad market indices (MacKinlay, 1997). With this model, the expected returns are estimated with the following formula:

$$E(R_{it}) = \frac{1}{N}\sum_{t=1}^{N} R_{it}$$

where, at the time *t,* $E(R_{it})$ is the expected return, R_{it} is the actual return of the index and N is the number of days in the estimation window.

Alternative models for estimating expected returns such as the market model, can sometimes be more effective as it removes the portion of the returns explained by market movements, thereby reducing the variance of ARs. However, in this study, using model such as the market model is not appropriate since the index being examined represents a broad market benchmark. Comparing a broad European index to another similar one is redundant as their high correlation between the two indices would lead to uninformative estimations. Moreover, it is empirically stated the constant mean return model generates comparable

results with the more complex models. Since this research does not examine individual stocks, the constant mean return model is utilized to generate reliable expected returns for the index. (MacKinlay, 1997)

In addition to MacKinlay (1997) stating the constant mean return model being comparable with more complex models, the mean reversion model and the autoregressive model were also tested to calculate reliable expected returns for the event study. Expected returns were calculated using Mercangöz's (2021, p. 306) AR(1) formula and the mean reversion model applied by Akarim and Sevim (2013). All three models provided very similar values for expected returns. Given the supporting literature, and the weak statistical significance of the autoregressive model's intercept, the constant mean return model is employed to calculate the expected values in this event study.

Abnormal returns (AR) describe the deviation between the observed returns and expected returns during the event window and is used to measure the impact of the event to the given asset's return. Abnormal returns are calculated with the following formula:

$$AR_{it} = R_{it} - E(R_{it})$$

where, at the time *t*, AR_{it} represents the AR of the index, R_{it} is the actual return and $E(R_{it})$ is the expected return of the index. (MacKinlay, 1997)

Next, daily ARs are aggregated to evaluate the accumulated impact of the event of interest. Aggregating ARs is important since it is beneficial to examine the behaviour of returns over the event window (Vaihekoski, 2022, p. 247). Cumulative abnormal returns (CAR) are calculated by combining daily ARs over each event window by utilizing the following formula:

$$CAR_i(t_1, t_2) = \sum_{t_1}^{t_2} AR_{it}$$

where CAR_i represents the index *i*'s CAR over the event window, AR_{it} is the AR of index in the time *t* and t_1 and t_2 determine the event window (MacKinlay, 1997).

3.1.3 Calculating AVs and CAVs

To assess the impact of the event on trading activity, the same well-founded methods used for calculating ARs are applied to analyse trading volume, ensuring a comprehensive evaluation of the market's reaction. Expected volumes are estimated over the same 250-day estimation window, representing the natural trading activity in absence of the event. The same constant mean return formula is modified and applied to calculate expected volumes as follows:

$$E(V_{it}) = \frac{1}{N}\sum_{t=1}^{N} V_{it}$$

where, at the time *t,* $E(V_{it})$ represents the expected trading volume, V_{it} is the actual trading volume of the index and N is the number of days in the estimation window.

Similarly, abnormal volumes (AV) quantify the deviation between observed and expected trading volumes within the event window, offering insights into whether the regulatory announcement also had an impact on trading activity. AVs are measured with the following equation:

$$AV_{it} = V_{it} - E(V_{it})$$

where, at the time *t*, AV_{it} illustrates the AR of the index, V_{it} is the actual trading volume and $E(V_{it})$ is the expected trading volume of the index.

For the evaluation of the aggregated impact of event on trading activity, daily AVs are summed across each event window, following the same method as for CARs. Cumulative abnormal volumes (CAV) are calculated with the following formula:

$$CAV_i(t_1, t_2) = \sum_{t_1}^{t_2} AV_{it}$$

where CAV_i represents the CAV for index *i* over the event window, AV_{it} is the AV of index in the time *t* and t_1 and t_2 determine the event window.

3.1.4 Statistical significance and research hypothesis

To detect which values are statistically significant, the estimated abnormal values and cumulative abnormal values will be tested using a t-test. It is widely assumed that ARs follow a normal distribution (Corrado, 2011, p. 210). The statistical significance of abnormal value (AR and AV) is calculated using the following formula:

$$t(A_{it}) = \frac{A_{it}}{\sqrt{Var(A)}} \sim N(0,1)$$

where A_{it} is the abnormal value of the index in the time *t* and the $\sqrt{Var(A)}$ represents the standard deviation of AR or AV in the estimation window. (MacKinlay, 1997; Vaihekoski, 2022, p. 248)

Similarly, the statistical significance of cumulative abnormal values (CAR and CAV) is calculated with:

$$t(CA_{it}) = \frac{CA_{it}}{SE_{CA}} \sim N(0,1)$$

where CA_{it} represents cumulative abnormal value (CAR or CAV) of the index *i* in the time *t*, and SE_{CA} stands for the Standard Error (SE) of cumulative abnormal value, which is calculated using following formula:

$$SE_{CA} = \sqrt{Var(A)} \times \sqrt{N}$$

where the $\sqrt{Var(A)}$ represents the standard deviation of AR or AV in the estimation window and the N is the number of days in the event window. (MacKinlay, 1997; Vaihekoski, 2022, p. 249)

After calculating the t-values for ARs, CARs, AVs and CAVs, each t-value is converted to a two-tailed p-value using an Excel function, since the results can be either positive or negative. When the response could go in either direction a two-tailed test is applicable (Wilson, Keating & Beal, 2015, p. 47). This research assesses the statistical significance of the results based on the standard 95% ($p \leq 0.05$) confidence level and takes into consideration the 99% ($p \leq 0.01$) confidence level for exceedingly significant findings (Wilson, Keating & Beal, 2015, p. 45).

The study's null hypothesis (H_0) supposes that the announcement of MiFID II and MiFIR did not produce a significant impact on measured returns or trading activity, meaning that abnormal values or cumulative abnormal values are zero (MacKinlay, 1997). The null hypothesis holds if the p-value of abnormal value exceeds 0.05. The null hypothesis is rejected if the p-value of abnormal value is 0.05 or lower, leading to the acceptance of the alternative hypothesis (H_1), indicating that the market reacted to the announcement, influencing the examined values.

The research hypotheses are as follows:

H_0: *the announcement of MiFID II and MiFIR did not produce a significant effect on a measured value*

H_1: *the announcement of MiFID II and MiFIR had a significant impact on measured value*

3.2 Data

This section describes the data used in the event study analysis. Since this research examines MiFID II's and MiFIR's announcement's overall market reaction, a broad index is required to represent the performance of European stocks during the event window. For this purpose, the STOXX® Europe 600 index is used as a proxy for the European markets. This index provides extensive coverage, comprising 600 components across 17 European countries and 11 industries, representing approximately 90% of the investable market (STOXX, 2025). The STOXX® Europe 600 index data is also used for the evaluation of possible abnormal trading activity during the selected event windows.

In the broadest event window, the 21-day event window, the estimation window spans from t = -260 to t = -11, while the event window itself spans from t = -10 to t = 10, with the event day (t = 0) set as 20 October 2011. As a result, the overall dataset contains STOXX® Europe 600 closing prices and daily volumes from 19 October 2010 (t = -261) to 3 November 2011. The dataset includes only daily data from trading days, meaning weekends and public holidays are not included in the dataset. Although the estimation window begins at t = -260, data from t = -261 is included to account for the calculation of logarithmic returns, which requires the previous day's closing price. Consequently, the dataset comprises a total of 272 trading days. To facilitate the analysis, the data has been divided into three sections, enabling

the calculation of abnormal returns and abnormal volumes across 7-day, 11-day and 21-day event windows, with each window incorporating the designated 250-day estimation period.

The dataset was sourced from LSEG Workspace by selecting the determined exchange dates for STOXX® Europe 600 index based on the event time, incorporating daily closing prices and trading volume. The dataset was then imported into Excel to manage any possible null values, facilitate the execution of event studies and refine the data for the presentation of the results.

To compute abnormal returns, the daily returns (R_{it}) must be calculated from the imported data. For the 7-day, 11-day and 21-day event windows and their corresponding estimation periods, daily returns are calculated using the index's closing prices. Logarithmic returns are generally utilized to measure daily returns and are calculated with the following formula:

$$R_{it} = \ln\left(\frac{P_t}{P_{t-1}}\right)$$

where P_t represents the closing price for the current day, and P_{t-1} represents the closing price from the day before (Alexander, 2008, p. 23).

4 Research results

This chapter presents research results from the events studies conducted to examine the impact of MiFID II and MiFIR on short-term market efficiency of European stock markets. The analysis explores how the market reacted before, during and after the announcement date, providing insights into investor sentiment and potential short-term efficiency changes. The chapter is structured into two sections, presenting and the empirical findings on the behaviour of index returns and trading activity within the selected event windows. The sub-research questions *Q2* and *Q3* are addressed based on the research results, contributing to the overall answer to the main research question (*Q1*). Finally, these findings are evaluated within the context of previously established theoretical framework to ensure a comprehensive analysis.

4.1 Index returns

The first section analyses abnormal returns and cumulative abnormal returns across 7-day, 11-day and 21-day event windows, identifying potential patterns in market reactions. By analysing the statistical significance of AR and CAR values on the determined 95% confidence level, this section evaluates whether the MiFID II and MiFIR announcement had a measurable impact on the returns of the index. The findings, summarized in the Tables 1, 2 and 3, address the research question *Q2*: "*What are the effects of MiFID II and MiFIR on abnormal and cumulative abnormal returns during the event window?*".

In the pre-announcement period ($t < 0$) abnormal returns exhibited light fluctuations across all event windows. Neither 7-day and 11-day event windows produced any significant ARs or clear patterns, as p-values remained above 0.404 between $t = -5$ and $t = -1$ (Tables 1 and 2). However, within the 21-day event window, a statistically significant AR of 2.76% was observed at $t = -10$ with a p-value of 0.028 (Table 3). Despite the significance, the fact that $t = -10$ is relatively far from the event date ($t = 0$) and absence of a clear pattern over the pre-announcement period suggest that the result was likely not driven by market anticipation or private information regarding the regulatory announcement.

Table 1. Abnormal returns of STOXX® Europe 600 index for the 7-day event window

Date	t	AR	t-statistic	p-value
17-Oct-11	-3	-0.92 %	-0.72	0.469
18-Oct-11	-2	-0.33 %	-0.26	0.793
19-Oct-11	-1	0.63 %	0.49	0.622
20-Oct-11	0	-1.51 %	-1.18	0.237
21-Oct-11	1	2.53 %	1.99	0.048
24-Oct-11	2	1.33 %	1.05	0.296
25-Oct-11	3	-0.68 %	-0.53	0.594
	CAR	1.05 %	0.31	0.756

The results on returns indicate a mixed initial market reaction to the announcement of MiFID II and MiFIR, with initial negative returns on the event date followed by a positive correction. Across all event windows (Tables 1, 2 and 3), abnormal returns (AR) on the announcement day (t = 0) ranged from -1.48% to -1.51%, with p-values between 0.236 and 0.237. While the date of the announcement (t = 0) recorded the most significant negative return compared to the preceding days in each event window, the negative reaction was not powerful enough to reach statistical significance.

Table 2. Abnormal returns of STOXX® Europe 600 index for the 11-day event window

Date	t	AR	t-statistic	p-value
13-Oct-11	-5	-1.06 %	-0.84	0.404
14-Oct-11	-4	0.88 %	0.69	0.490
17-Oct-11	-3	-0.92 %	-0.73	0.469
18-Oct-11	-2	-0.33 %	-0.26	0.793
19-Oct-11	-1	0.63 %	0.50	0.621
20-Oct-11	0	-1.51 %	-1.19	0.237
21-Oct-11	1	2.53 %	1.99	0.048
24-Oct-11	2	1.33 %	1.05	0.295
25-Oct-11	3	-0.68 %	-0.53	0.594
26-Oct-11	4	0.26 %	0.20	0.840
27-Oct-11	5	3.56 %	2.80	0.005
	CAR	4.68 %	1.11	0.267

Contrary to the pre-announcement period, the post-announcement period (t > 0) recorded more pronounced abnormal returns. On t = 1 AR values grew between 2.53% and 2.55% while being statistically significant at the 5% level with p-values ranging from 0.042 to 0.048 across all event windows displayed on Tables 1, 2 and 3. The selection of the alternative hypothesis (H_1) on t = 1 indicates a positive market correction following the initial negative

reaction, suggesting that investors reassessed the announcement's impact more favourably. As presented in Tables 2 and 3, at t = 5, AR increased notably to 3.56% to 3.58% with p-values around 0.005, marking another statistically significant reaction. However, the 21-day event window recorded one final significant AR of -3.45% at t = 8 with a p-value of 0.006, indicating a prominent negative response from the market (Table 3). While the ARs at t = 5 and t = 8 are noteworthy, their opposite directions and timing suggest that their statistical significance is likely driven by another macroeconomic event rather than the MiFID II and MiFIR announcement.

Table 3. Abnormal returns of STOXX® Europe 600 index for the 21-day event window

Date	t	AR	t-statistic	p-value
6-Oct-11	-10	2.76 %	2.21	0.028
7-Oct-11	-9	0.81 %	0.65	0.516
10-Oct-11	-8	1.76 %	1.41	0.161
11-Oct-11	-7	-0.21 %	-0.17	0.865
12-Oct-11	-6	1.70 %	1.36	0.174
13-Oct-11	-5	-1.04 %	-0.83	0.406
14-Oct-11	-4	0.90 %	0.72	0.471
17-Oct-11	-3	-0.90 %	-0.72	0.473
18-Oct-11	-2	-0.31 %	-0.25	0.804
19-Oct-11	-1	0.65 %	0.52	0.602
20-Oct-11	0	-1.48 %	-1.19	0.236
21-Oct-11	1	2.55 %	2.04	0.042
24-Oct-11	2	1.36 %	1.09	0.278
25-Oct-11	3	-0.65 %	-0.52	0.601
26-Oct-11	4	0.28 %	0.22	0.823
27-Oct-11	5	3.58 %	2.87	0.004
28-Oct-11	6	-0.10 %	-0.08	0.935
31-Oct-11	7	-2.17 %	-1.74	0.083
1-Nov-11	8	-3.45 %	-2.77	0.006
2-Nov-11	9	0.98 %	0.79	0.432
3-Nov-11	10	2.14 %	1.72	0.087
	CAR	9.16 %	1.60	0.111

For broader evaluation of the impact of the announcement, cumulative abnormal returns (CAR) were analysed across the selected event windows. In the shortest event window (7-day event window) presented in the Table 1, a minor CAR of 1.05% was observed with a weak p-value of 0.756, expressing no statistically significant aggregated effect. As the event window lengthened, the CAR values increased. The 11-day event window showed more noticeable CAR of 4.68% while the 21-day event window recorded even greater CAR of

9.16%. However, neither result was statistically significant with p-values of 0.267 and 0.111 (Tables 2 and 3).

In conclusion, the findings on abnormal returns suggest that the market reaction of the MiFID II and MiFIR announcement was mixed with initially being negative but followed by a significant positive correction. The lack of statistically significant abnormal returns on the event date (t = 0) implies that investors did not react heavily at the time of the announcement. However, a statistically significant positive correction recorded on t = 1 suggests a delayed response, indicating that investors required more time to process the regulatory implications. Finally, the significant but opposing abnormal returns observed at t = 5 and t = 8 were likely influenced by external macroeconomic factors, such as the outcomes of the Euro-Zone summit (European Council, 2011).

To summarize the cumulative abnormal returns, none of the recorded aggregated values were statistically significant, supporting the retention of the null hypothesis (H_0) in all event windows. However, a clear pattern emerged as CAR values tended to increase while p-values decreased as the as event window expands. However, also this trend is influenced by external macroeconomic events, such as the already detected EU summit at t = 5 (European Council, 2011). Given this, the 7-day event window (Table 1) provides the most reliable statistical perspective of the regulatory announcement, as it minimizes the influence of unrelated market factors.

To answer the sub-research question *Q2*, MiFID II and MiFIR announcement indicate a limited impact on the market in the short-term. While the initial faint negative impact was followed by a significant positive correction, no lasting effect or pattern was detected. The CAR values, which support the null hypothesis (H_0) further support the argument on MiFID II and MiFIR did not trigger a lasting effect on short-term returns. However, the market's initial reaction aligned with the expectations.

The empirical findings on returns show that investors incorporated the MiFID II and MiFIR announcements into asset prices, which can be observed from the index's abnormal returns. This supports Fama's (1970) semi-strong form of EMH. However, the impact was not as quick as expected by the theory as the investors did not response heavily at the time of the announcement (t = 0), and a delayed response was observed at t = 1 as investors needed time to process the new information. The observation of markets efficiently incorporating new

information into stock prices further support the argument that the 7-day event window provides the most reliable data for this research, as all relevant information had enough time to be reflected in the price. In addition, no observations regarding the strong-form of market efficiency was recorded from the returns as analysis on returns did not indicate anticipatory trading before the announcement.

The positive abnormal return after the announcement at t = 1 suggest that the investors positively valued the anticipated regulatory changes, as theorized by agency theory. With introduced transparency improvements and decrease in conflicts of interests, the announcement likely increased investor confidence, adding to market efficiency (Huettinger & Krašauskaitė, 2020). However, the findings, particularly on CARs, indicate that the positive expected changes theorized by agency theory were short-lived.

From the market microstructure perspective, the initial mixed reaction, followed by the positive correction, can be connected investors adjusting expectations on information flow and trading conditions. For instance, the introduced improvements may have led investors to positively reevaluate the pricing of assets, as they adjusted for the expected reduction in trading costs and adverse selection (Madhavan, 2000). In addition, the market microstructure influence was shortly lived in the analysis of MiFID II's and MiFIR's announcement.

4.2 Index trading volumes

The second section presents the findings on abnormal volumes and cumulative abnormal volumes of the announcement across the 7-day, 11-day and 21-day event windows. The results, displayed in Tables 4, 5 and 6, are evaluated to identify trends in trading activity and assess their statistical significance based on the determined 95% confidence level. By examining daily volume fluctuations and their relevance, this section addresses research question *Q3*: *"How did MiFID II and MiFIR affect trading activity in European stock markets during the event window*?"

Before the MiFID II ad MiFIR announcement (t < 0), abnormal volumes (AV) fluctuated randomly, with no statistically significant activity on any day as all pre-announcement p-values exceeded 0.415 (Tables 4, 5 and 6). In the 7-day event window displayed in Table 4, all pre-announcement days (t -3 to t = -1) recorded negative while the event day t = 0 marked

a positive, but not significant deviation from the mean. However, due to lack of statistical significance, no robust conclusions can be drawn from this pattern or from any other trading volume results regarding market anticipation of this event.

Table 4. Abnormal volumes of STOXX® Europe 600 index for the 7-day event window

Date	t	AV	t-statistic	p-value
17-Oct-11	-3	-239 906 838	-0.27	0.786
18-Oct-11	-2	-398 822 538	-0.45	0.652
19-Oct-11	-1	-364 731 568	-0.41	0.680
20-Oct-11	0	231 474 062	0.26	0.793
21-Oct-11	1	-130 415 148	-0.15	0.883
24-Oct-11	2	-584 413 508	-0.66	0.509
25-Oct-11	3	-421 424 938	-0.48	0.634
	CAV	-1 908 240 473	-0.82	0.415

As stated on the previous paragraph, the event day t = 0 recorded a positive value, peaking at approximately 252 million in the 21-day event window (Table 6). However, AV at t = 0 remained statistically insignificant with p-values ranging around 0.78, indicating that investors did not react to the announcement with a significant trading activity (Tables 4, 5 and 6). The statistically insignificant AV reaction at t = 0 aligns with the abnormal return findings, further supporting the conclusion on lacking initial response from investors.

Table 5. Abnormal volumes of STOXX® Europe 600 index for the 11-day event window

Date	t	AV	t-statistic	p-value
13-Oct-11	-5	355 652 251	0.40	0.688
14-Oct-11	-4	-145 849 399	-0.16	0.869
17-Oct-11	-3	-234 511 789	-0.27	0.791
18-Oct-11	-2	-393 427 489	-0.44	0.657
19-Oct-11	-1	-359 336 519	-0.41	0.685
20-Oct-11	0	236 869 111	0.27	0.789
21-Oct-11	1	-125 020 099	-0.14	0.888
24-Oct-11	2	-579 018 459	-0.65	0.513
25-Oct-11	3	-416 029 889	-0.47	0.638
26-Oct-11	4	-569 588 769	-0.64	0.520
27-Oct-11	5	1 573 680 601	1.78	0.076
	CAV	-656 580 452	-0.22	0.823

Following the announcement day, abnormal volumes showed a mixed changes across the post-event period (t > 0). AVs from t = 1 to t = 4 resulted all as a moderately negative, with all AVs being highly insignificant across all event windows with every p-value exceeding 0.509 (Tables 4, 5 and 6). Similarly with abnormal returns, notable spikes were recorded on 11-day and 21-day event windows with AVs of approximately 1.58 billion at t = 5 with a p-value around 0.075 and 1 320 million at t = 8 with a p-value of 0.139 (Tables 5 and 6). As the spiking values occur on the same distant days from t = 0 as with ARs, it is again very likely that the notable values are due to influence unrelated to the regulatory announcement. In addition, while both values being notable, they failed to reach the required 5% level statistical significance.

Table 6. Abnormal volumes of STOXX® Europe 600 index for the 21-day event window

Date	t	AV	t-statistic	p-value
6-Oct-11	-10	724 481 498	0.82	0.415
7-Oct-11	-9	106 721 978	0.12	0.904
10-Oct-11	-8	-403 350 112	-0.45	0.650
11-Oct-11	-7	40 979 138	0.05	0.963
12-Oct-11	-6	353 399 428	0.40	0.691
13-Oct-11	-5	371 236 428	0.42	0.676
14-Oct-11	-4	-130 265 222	-0.15	0.883
17-Oct-11	-3	-218 927 612	-0.25	0.805
18-Oct-11	-2	-377 843 312	-0.43	0.671
19-Oct-11	-1	-343 752 342	-0.39	0.699
20-Oct-11	0	252 453 288	0.28	0.776
21-Oct-11	1	-109 435 922	-0.12	0.902
24-Oct-11	2	-563 434 282	-0.63	0.526
25-Oct-11	3	-400 445 712	-0.45	0.652
26-Oct-11	4	-554 004 592	-0.62	0.533
27-Oct-11	5	1 589 264 778	1.79	0.075
28-Oct-11	6	405 867 148	0.46	0.648
31-Oct-11	7	-46 277 372	-0.05	0.958
1-Nov-11	8	1 319 586 048	1.49	0.139
2-Nov-11	9	705 669 938	0.79	0.428
3-Nov-11	10	1 130 585 758	1.27	0.204
	CAV	3 852 508 957	0.95	0.345

Over the selected event windows, cumulative abnormal volumes (CAV) varied widely across the event windows, yet none of them were statistically significant. 7-day CAV was -1.91 billion with a p-value of 0.415, 11-day CAV was -656 million with a weak p-value of 0.823 and 21-day CAV recorded the highest value at 3.85 billion with a p-value of 0.345

(Tables 4, 5 and 6). While 21-day event window displayed in Table 6 marked a more notable CAV compared to the narrower windows, its lack of statistical significance and the influence of unrelated events detected on the longer event windows suggest that the MiFID II and MiFIR announcement did not generate abnormal aggregated trading activity.

The analysis of abnormal volumes and cumulative abnormal volumes addresses research question *Q3*. The findings indicate that the 20 October 2011 MiFID II and MiFIR introductory announcement did not cause a statistically significant impact on short-term trading activity on the measured index. The results were completely clear, as the null hypothesis (H_0) held true for every calculated trading volume value at the 95% confidence level, indicating no effect from the regulatory announcement. No evidence of abnormal anticipatory trading activity was observed before the event, aligning with the results from abnormal return analysis. A statistically insignificant pattern was detected during transition from pre-event period to the event day. While four consecutive days of negative abnormal volumes preceded the announcement, AV increased by 596 million from t = -1 to t = 0, suggesting a minor reaction to the event. The more pronounced post-event volume fluctuations occurring several days after the event appear unrelated to the announcement, as they coincide with spiking days in the abnormal returns analysis. The statistically insignificant cumulative abnormal volumes supporting the null hypothesis (H_0), further strengthen the conclusion that the regulatory announcement had no measurable impact on trading activity in the European stock market on any examined event window.

According to the already established semi-strong form of market efficiency on the European market, the public announcement of MiFID II and MiFIR should quickly be reflected to trading behaviour (Fama, 1970). However, the recorded insignificant trading volume during the selected event windows indicate that the regulatory announcement had no statistically significant effect on trading volume. In relation to the efficient market hypothesis, this suggests that prices adjusted without requiring a significant shift in trading activity. In addition, the findings further support the assumption of semi-strong efficiency in European stock markets as no prominent anticipatory trading was recorded from trading volume before the announcement, rejecting the strong-form efficiency assumption.

According to market microstructure, in addition to prices, investors' latent demands are portrayed in trading volumes, which can serve as a useful proxy in demonstrating variation in returns. Despite the minor increase in abnormal volume on the event day (t = 0), neither

this change nor any other calculated value was statistically significant. These findings indicate that MiFID II and MiFIR announcement did not significantly affect trading activity of the index. This result aligns with the market microstructure, as increase in transparency does not always lead to increase in liquidity proxies, such as trading volume, even though MiFID II and MiFIR were designed to affect liquidity. The most likely explanation is that the anticipated changes were not considered substantial enough to significantly alter liquidity and investor trading strategies during the event windows, even though they did have a clear influence on returns at t = 1. As a result, no statistically significant connection between abnormal returns and abnormal volumes can established in this case. To visually present the relationship between abnormal returns and abnormal volumes, appendices for ARs and AVs for 7 day-event windows has been created, as the 7-day event window proved to be the most reliable in this analysis of the MiFID II and MiFIR announcement (Appendix 1, Appendix 2). (Madhavan, 2000)

5 Conclusions

This research analysed the impact of the MiFID II and MiFIR announcement on the short-term market efficiency of European stock markets using an event study approach to evaluate investors' reactions. The analysis focused on whether the regulatory announcement had a significant influence on stock market returns and trading activity, offering insights into investor sentiment and market efficiency. By analysing abnormal returns and abnormal volumes around the time of the announcement, commit to understanding how investors initially responded to the regulatory announcement. Therefore, these findings help fill the research gap regarding the lack of studies on the market reaction to the initial announcement of MiFID II and MiFIR, as previous research from Favaretto et al. (2023), Miloș (2021), Miloș et al. (2021) and Kawas and Dockery (2023) did not focus on the initial announcement of 20 Ocrober 2011.

The findings on abnormal returns indicate that the announcement did not trigger a statistically significant reaction on the event date. However, a delayed positive correction was observed following the day of the announcement. These results suggest that investors required time to process the expectations of the ultimately positive regulatory framework. However, the absence of statistically significant cumulative abnormal returns across any measured event window, along with the influence of other macroeconomic events on certain dates, implies that the overall market response was limited and short-lived. Similarly, the evaluation of abnormal trading volumes showed no statistically significant deviation from the expected volumes. The insignificance of cumulative abnormal volumes further strengthens the conclusion that the MiFID II and MiFIR announcement did not substantially alter short-term trading activity. Regarding the main research question, the introduction of MiFID II and MiFIR had a minimal impact on the short-term market efficiency of the European stock markets, with the response being both limited and brief.

5.1 Discussion

These findings can be considered reliable, as the methodological details and data was carefully selected to ensure robustness. Among the three methods tested for calculating

expected returns, the constant mean return model was chosen as the most suitable. The announcement was examined across three event windows, with the 7-day event window proving to be the most reliable for drawing robust conclusions, as it minimized unrelated macroeconomic events. Furthermore, the observed reactions were compared with the theoretical expectations of efficient market hypothesis, agency theory and market microstructure, to evaluate their alignment.

From theoretical perspective, the findings align well with the efficient market hypothesis, particularly with the expected Fama's (1970) semi-strong form of efficiency, as the announcement was incorporated into stock prices, albeit the minor delay. The lack of evidence for anticipatory trading based on abnormal returns and abnormal volumes before the announcement supports the rejection of the strong-form market efficiency in European stock markets.

Agency theory provides additional insight, as the anticipated improvements in decreasing conflicts of interest and increasing transparency likely contributed to the positive response from investors. This suggests that the investors recognized the reforms as beneficial, expecting increased market efficiency and fairness. Although, the markets' initial reaction aligned the theoretical expectations, the lack of sustained reaction indicate that the effects of the regulatory announcement were short-lived.

Market microstructure further clarifies the findings, as investors adjusted their expectations regarding renewing trading conditions, with positive delayed returns and insignificant rise in trading volume on the day of the announcement. Still, the short-lived and brief response suggests that the MiFID II and MiFIR announcement was not perceived as having a significant impact trading dynamics. This delayed and mixed response in returns combined with slightly increased liquidity in event day, aligns with market microstructure, which suggests that increased trading volume slows the price formation (Madhavan, 2000). While this finding aligns with the theory, it contrasts with the widely studied relationship of returns and liquidity. Brown et al. (2009) argue that for liquid and large assets, such as the STOXX® Europe 600 index, the relationship between volume and returns are positive, in contrast for illiquid assets, the relationship is negative. However, in this study's 7-day event window, the relationship between abnormal returns and abnormal volumes exhibited a negative pattern after the announcement and a weak or even non-existent relationship prior to the announcement, as displayed in Appendix 1 and Appendix 2. This contrary finding is

likely due to the impaired price formation process caused by the announcement. Additionally, as a clear negative relationship between abnormal returns and abnormal volumes can be visually observed, it is important to remember that none of the abnormal volumes were statistically significant (Appendix 1 and Appendix 2).

Kawas and Dockery (2023) recorded mixed market reactions from financial institutions to regulatory announcements, with positive responses to UK government-led announcements and negative responses to EU announcements such as the approval of MiFID II and MiFIR. Similarly, this study found insignificant negative abnormal returns on the event day before the significant positive correction at t = 1, suggesting a slight inefficiency in valuing regulations to stock prices. These findings align with Kawas and Dockery's (2023) observation of short-term inefficiencies in how markets price regulatory announcements. However, despite these similarities, the overall market response to MiFID II and MiFIR differs between the studies. This is likely due to differences in event selection, as their study examined the approval of European Parliament on 15 April 2014. Additionally, Kawas and Dockery (2023) focused solely on financial sector rather than focusing on the European market as a whole. Given that MiFIR II and MiFIR imposed the greatest regulatory burden on financial institutions, their sector-specific negative response is understandable. Although both studies employed the event study methodology, Kawas and Dockery (2023) employed an EGARCH and GJRGARCH approach to evaluate the market reaction to the announced regulations.

5.2 Limitations

While this research provides valuable insights into market reactions to MiFID II and MiFIR, certain limitations must be recognized. As the event study methodology relies on the assumption that publicly available relevant information is efficiently incorporated, external macroeconomic events, such as the Euro-Zone summit, likely influenced the abnormal returns and abnormal volumes, particularly at later event dates (Fama, 1970; Vaihekoski, 2022, p. 250). Therefore, the most reliable event window for this research was the 7-day event window, as it minimizes the influence of unrelated market factors. However, it must still be acknowledged that the data around the time of the announcement may also be influenced by other unrelated factors not addressed in this research. This highlights the core

limitation of event studies as economic events can overlap, making it difficult to isolate individual events (Vaihekoski, 2022, p. 250). This issue is relevant in this research as the index used in this study is broad. Although this research employed a robust 250-day estimation window for each event window, it is essential to recognize that the forecasted expected returns and expected volumes used in the analysis are based on models rather than actual market data, which could influence the accuracy of the calculated values (MacKinlay, 1997). Additionally, this research relies on a single index-based analysis, which may not entirely capture the heterogeneous impact across different industries or financial instruments. Nevertheless, the objective of this research was to analyse the European stock market as a whole, as MiFID II and MiFIR were designed to affect the European stock market conditions holistically.

As stated in the introduction, conclusions of this research can be only applied to the initial market reaction and not to assess the long-term or the post-implementation effects of MiFID II and MiFIR, as ultimate impact of regulatory shifts may unfold over a much over period than those event windows examined in this study. While this research focused on short-term market reactions surrounding ethe 20 October 2011 announcement, the actual enforcement did not take place until 3 January 2018 (Busch, 2017). Therefore, investors may have adjusted their expectations on MiFID II and MiFIR over the years as news about the regulatory package emerged. For instance, Kawas and Dockery (2023) analysed the market reaction to the 15 April 2014 European Parliament's approval of MiFID II and MiFIR in the financial sector.

The use of abnormal volumes limited the ability to assess liquidity more comprehensively. Other liquidity proxies such as bid-ask spread, could have provided more diverse insights into efficiency and market microstructure effects of MiFID II and MiFIR announcement (Laruelle & Lehalle, 2014, p. 1). For instance, as stated by market microstructure, the bid-ask spread increases with volatility, and examining this relationship would have been interesting in relation to the regulatory announcement (Laruelle & Lehalle, 2014, p. 136). Bid-ask spread analysis was not conducted, as required data was not available from the LSEG Workspace.

It is also crucial to note that applying the findings of this research to theories such as agency theory and market microstructure should be done with caution. These theories generally analyse and compare actual long-term shifts in market infrastructure, strategies and

relationships, while this study focuses on how investors initially reacted to announcements of such changes. For reflections on these theories to be considered accurate, it is assumed that the market follows Fama's (1970) semi-strong form of market efficiency. This assumption is essential, as it presumes that theoretical expectations were included in the prices.

5.3 Further research

Further research on this topic could build on these insights by conducting sector-specific analyses, as different industries likely responded differently to the MiFID II and MiFIR announcement. Conducting industry specific analyses would also complement the findings of Kawas and Dockery (2023), who focused on the impact within the financial sector. Additionally, the further research could explore investors response to the MiFID II and MiFIR by examining behaviour on other key event dates, such as the European Parliament's approval, the final confirmation of the regulatory rules and announcements regarding implementation delays. While the true effect of regulations becomes evident only after full implementation, extensive research has already been conducted from that perspective. One important consideration when studying the impact of MiFID II after its implementation is that, as a directive, MiFID II allows member states the flexibility to implement the new requirements in their own way, potentially leading to slightly different market reactions across EU countries. Finally, a comparative analysis of similar regulatory announcements in Europe and global financial markets could provide valuable findings and help determine whether consistent patterns appear across different regulatory events.

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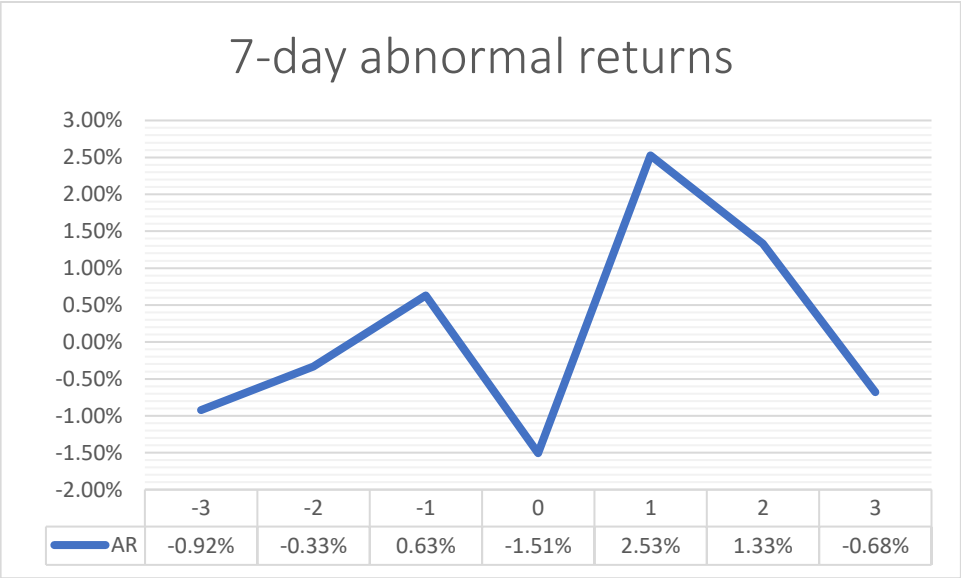
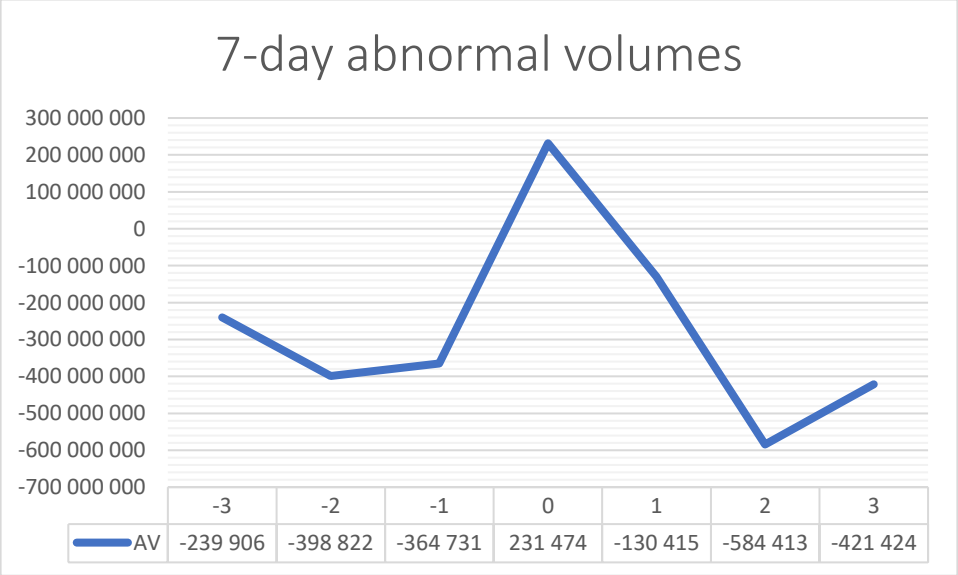
Appendices

Appendix 1. Abnormal returns across the 7-day event window



Appendix 2. Abnormal volumes across the 7-day event window