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*The effects of mandatory audit firm rotation on audit quality: A
comparison between the European Union and the United States*

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Abstract

On June 17th 2016, the EU Audit Regulation went into effect in the European Union. This meant that audit firm rotation was made mandatory in Europe. This study tries to evaluate whether mandatory rotation has a positive effect on the audit quality in Europe. This is done by examining prior literature on the subject, as well as using a difference-in-differences design to analyze the effect of audit quality that mandatory rotation has in Europe, compared to the voluntary setting of the United States. The proxies used to measure audit quality are discretionary accruals and the likelihood of receiving a qualified/adverse audit opinion. The results of the regressions without fixed effects show that mandatory rotation has negative effects on both the level of discretionary accruals and audit opinions. However, after adding fixed effects on industry, country and year level, the effects of mandatory rotation on audit quality becomes insignificant. From these results it can be concluded that mandatory rotation does not have a significant positive influence on the audit quality in Europe. Limitations of this study revolve around the complexity of capturing audit quality. Further research into this subject can mitigate these problems by using more direct measures of audit quality.

Key words: Mandatory Audit Firm Rotation, Audit quality, discretionary accruals, qualified/adverse audit opinion, difference-in-differences design

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Chapter 1 – Introduction

In 2014 the European Commission presented the 2014 EU Audit Regulation, in which it was determined that European Public Interest Entities (PIEs) must rotate between auditors after a period that is legally determined. This predetermined period ranges between a minimum period of 1 year and a maximum period of 10 years. If the time limit of this period is exceeded, the company will be forced to switch from auditors to comply with the law. Additionally, if the maximum term of 10 years is reached, a 4-year ‘cooling off period’ is initiated in which the same auditing firm can’t be chosen. There are exceptions to this rule in two specific cases: When a joint audit is being conducted or if a ‘tendering process’ is started by a firm to prolong the audit engagement. The goal of this law is to increase the independence of auditors and subsequently improve the quality of the auditing process. The standard has gone into effect as of June 17th, 2016, for all member states in the European Union (EU), as well as for Iceland, Liechtenstein and Norway, which are countries participating in the European Economic Area (EEA) (Accountancy Europe, 2022). This is in contrast with the setting in the United States of America (USA), where only audit partner rotation is mandatory at this moment (Kalajanti et al., 2019). These differences in legislation for audit firm rotation could lead to significant differences in audit quality between both settings if the continuation of the auditing process is disrupted by the regular switching between audit firms in the European Union.

With the transition in regulation in the EU, a notable change was made regarding the rotation of audit firms and audit partners in the EU. Due to these changes, it can be expected that the introduction of mandatory audit firm rotation will have its effects on the audit quality in the European Union. Audit quality is a complex concept to capture and measure, in most studies representing the probability that an auditor detects a material misstatement in the financial statements and that he reports this (DeAngelo., 1981; Palmrose., 1988). Given the fact that regulation for mandatory rotation has now been into effect for a considerable amount of years, it now is an adequate opportunity to evaluate the positive and negative effects that mandatory rotation has had on the audit quality in the EU, especially given the fact that most companies have made their first audit firm rotations under the new mandatory setting.

The challenges surrounding this subject revolve around the fact that prior literature on this topic has a lot of mixed evidence regarding the effects that mandatory rotation has on the overall audit quality. Proponents of mandatory rotation mention three main arguments through which mandatory rotation can have a positive effect on audit quality. The first argument that is made implies that the introduction of mandatory rotation leads to an increase in the independence of auditors. This is caused due to auditors shifting their focus from familiarity with the client to creating a good reputation for the external audit market (Cameran et al. (2016). Familiarity with the client decreases in importance due to the fact that audit engagement periods are shorter and having a prolonged relationship with the client isn’t necessary anymore, which leads to auditors being able to exercise more objectivity and

professional skepticism when performing their audits (Hussey, 1999; Kim et al., 2015). The second argument that is mentioned in prior literature states that the introduction of mandatory rotation leads to more audit effort being exercised by auditors. With the introduction of mandatory rotation there will be more incentives for auditors to provide a high-quality audit which leads to auditors putting in more audit effort, for instance by issuing more audit opinions and GCO opinions, and thus improving the audit quality (Arel et al., 2006). The last argument promoting mandatory rotation states that it is an effective tool for circumventing fraud in financial reporting. Prolonged audit engagements could lead to a decrease in auditors independence and professional skepticism and thus would impact an auditor's ability to truthfully detect and report material misstatements. With mandatory rotation these risks are mitigated because audit engagements are shorter and incentives of having a good relationship with the client are inferior to the incentives for having a good reputation as an auditor (Khaksar et al., 2021).

Opponents of mandatory audit firm rotation state that implementation of such legislation leads to a decrease in client-specific knowledge and a disruption in the auditing process. Mandatory rotation causes an auditor-client realignment in the auditing process, where the transition between auditors leads to more misstatements being made in the initial years of the audit engagement (Kuang et al., 2020). It also leads to a decrease in the specialization of auditors which lowers the audit quality (Ewelt-Knauer et al., 2013) and creates more audit costs during the auditing process due to the fact that the transition between auditors accounts for more costs (Kwon et al., 2014).

It is concluded from the findings of prior literature that the effects that mandatory rotation has on audit quality are inconclusive. This study tries to examine all the different effects that mandatory rotation has on the audit quality in the EU by comparing it to a setting without mandatory rotation. To this end, the following main research question has been formulated:

“Does the introduction of Mandatory Audit Firm Rotation positively influence Audit Quality in the European Union?”

To answer this research question, experimental research is conducted that uses European and American firms. The final sample, which is extracted from the Compustat Global and North American database, consists of 9,886 unique firms for a total of 65,978 firm-year observations, with the sample period being 2014-2022. In this study, two difference-in-differences are used for both dependent variables which compare the pre-post differences from the treatment group that implements mandatory rotation (EU) to the pre-post differences from the control group that doesn't implement mandatory rotation (USA). The dependent variables used in this study to proxy for audit quality are discretionary accruals and audit opinions respectively. The independent variable MROTATION indicates if the firm belongs to the treatment group and has made a mandatory rotation after the implementation date, thus capturing the treatment effect. The entire model consists of four regressions, where the first two add an interaction term to indicate the post-treatment effects. The last two regressions add fixed effects on industry, country and year levels to account for time-invariant factors and

inherent differences between the two settings. This is done to assess whether the results obtained in the first two regressions hold up after adding fixed effects.

The results for the regressions without fixed effects show that the introduction of mandatory rotation has a positive influence on decreasing discretionary accruals and increasing the likelihood of qualified or adverse audit opinions being issued. However, after adding fixed effects on industry, country and year levels these effects become insignificant. This infers that the treatment effect found in the first regressions can be attributed to time-invariant factors. It also implied that, after adding fixed effects, the differences between the EU and USA in audit quality can be explained by pre-existing characteristics of both groups rather than by treatment itself (Puhani., 2012). Consequently, there is no evidence found that the introduction of mandatory rotation has a significant effect on improving the audit quality in the European Union. These results were partly in line with the hypotheses. It was expected that mandatory rotation wouldn't have a significant effect on discretionary accruals. However, it was expected that mandatory rotation would have a significant and positive effect on audit opinions.

This study provides insights for regulators and audit clients as well as contributing to the existing literature. Firstly, the conclusions drawn from this study can help regulators in determining whether mandatory rotation legislation benefits the overall audit quality of firms. The results of the study can thus contribute to making decisions on regulations for audit firm rotation. It also helps audit clients evaluate the possible benefits and costs that switching regularly from auditor entails.

Moreover, this study also contributes to academic literature. This is done by introducing a research setting that hasn't been examined extensively by prior literature, this setting being the comparison between the EU and USA. Because this study examines two regions with different regulations regarding MAFR, an effective comparison can be made to analyze the effects of mandatory rotation legislation on the audit quality of firms. The importance of implementing the USA as a control group is also mentioned in the study by Reid & Carcello (2017), where they argue that to fully examine the results of a mandatory audit firm setting, it needs to be compared to a control group that doesn't have such legislation to fully evaluate the effectiveness of mandatory rotation.

The next chapter of the thesis provides a literature review on the concepts of MAFR and audit quality along with institutional settings of MAFR in the EU and United States, whereafter prior literature on the effects of MAFR on audit quality is examined. The third chapter discusses the hypotheses that are developed for the research. After that, the selection of the data and the sample will be explained along with all relevant variables and empirical models used in the research. The results of this empirical research will be displayed in the results section. Lastly, the findings from the empirical research will be used to answer the research question in the conclusion, accompanied with the limitations of the study and suggestions for further research in the discussion.

Chapter 2- Literature Review

In this chapter an extensive review is done on the literature surrounding the concepts of Audit Firm Rotation and Audit Quality. This also includes an analysis on the institutional settings that are present in the European Union and the United States about the existing regulation around audit firm rotation. This is done to gain a further understanding of the topic. After that, the existing evidence surrounding the effects of audit firm rotation on audit quality will be examined. This information is used to develop hypotheses for the empirical analysis that will be done in the next chapters.

2.1 Mandatory Audit Firm Rotation

The main objective of an audit firm is evaluating financial statements to detect possible material misstatements. Audit firm rotation refers to switching between audit firms, whereby the choice which audit firm is employed lies by the client itself. The only addition that must be made when comparing a regular rotation of an audit firm with the rotations under MAFR is the compulsory nature of the switch that is made by audit clients (Jackson et al., 2008). The most common argument that is made to advocate for the implementation of MAFR argues that it can mitigate negative effects on the quality of an audit, which can be caused by a long auditor-client relationship. Such an extensive relationship can lead to a decline in an auditor's independence and objectivity, which in turn can have a negative effect on the quality an auditor provides (Cameran et al., 2016). It is mentioned by the PCAOB and the European Commission, which oversee the accounting and auditing standards for the USA and Europe respectively, that auditor independence will be improved if an audit engagement period is set to a fixed period (PCAOB., 2011). An auditor's independence is one of the main principles that he must maintain to give fair judgement on the financial statements and identify possible violations of financial reporting regulations, which can affect the quality of the audit (Ewelt-Knauer et al., 2012). An increased rotation among auditors could have various effects on the quality of the audit that is being performed.

2.2 Institutional setting of Mandatory Audit Firm Rotation in the European Union

Developments in the field of audit firm rotations in the EU started after the financial crisis, where in 2010 the 'Green Paper on Audit Policy: Lessons from the Crisis' was released by the European Commission. This policy was released with the goal to address various elements of the auditing profession, which included the scope of audits, auditors' independence and the rotation of audit firms. These topics were discussed to figure out in which ways the auditing profession can help contribute to financial stability in the EU and discuss the governance role of auditors (Humphrey et al., 2011). With the announcement of the 2014 EU Audit Reform, all Public Interest Entities (PIEs) within the European Union were mandated to change auditors between a predetermined period. A European PIE is a company that is listed on a

European market and that is governed by the law of an EU member state, this also includes credit institutions and insurances. This definition applies to every individual enterprise that falls under this jurisdiction, so factors like size of the firm and business segments are not relevant for this classification (European Commission., 2016). This legislation applies to all 27 member states (It did apply to the United Kingdom as well until Brexit in 2020) as well as in Liechtenstein, Iceland and Norway because those countries are bound by legislation as members of the EEA. The transition period to incorporate these regulations into national law ended on the 17th of June 2016 (Deloitte., 2015).

The main part of the directive entails that an audit engagement should not be shorter than one year and should not exceed a period of ten years, followed by a ‘cooling off period’ of 4 years in which the same auditing firm can’t be chosen. The maximum engagement period for an ‘audit partner’ is predetermined at 7 years with a 3-year ‘cooling off period’. The individual member states do have flexibility in determining their minimum and maximum engagement period, as long as this period does not violate the predetermined boundaries (Deloitte., 2015). There are two situations in which a PIE may prolong the duration of their audit engagement. The first exception applies to PIE’s that want to extend their audit engagement and start a ‘tendering process’ with supervision of the audit committee, through which the audit engagement can be extended to up to 10 years. The other circumstance through which an audit engagement can be extended occurs when a firm is audited by ways of a joint audit. In that case, the maximum engagement period can be extended to up to 24 years (PwC., 2015).

2.3 Institutional setting of Mandatory Audit Firm Rotation in the United States

Following the financial scandals in the early 2000s that affected the North American market, a series of reforms to the financial reporting standards occurred in the United States. The most significant developments were the establishment of the Public Company Accounting Oversight Board (PCAOB) and the Sarbanes-Oxley Act of 2002 (SOX), which focused on the importance of auditor independence and started to examine possible benefits of mandatory firm rotation by introducing Section 203 of SOX. This section requires that the lead and reviewing partners of an auditing project must be mandatorily rotated after five consecutive years on an audit engagement, which started the debate around mandatory audit firm rotation in the USA. (Arel et al., 2006). The PCAOB announced their aspirations for implementing a mandatory audit firm rotation in 2011 by introducing the ‘Concept Release on Auditor Independence and Auditor Rotation’, in which a proposal was made to implement mandatory switching from auditors. These rotations between audit firms would counteract risks of familiarity and a biased audit that comes with an extended audit-client relationship (Roush et al., 2011). After the release of the proposed law, the possible benefits and costs of regularly switching from auditors have been examined, while also taken into account the reactions of investors and other stakeholders (Reid & Carcello., 2017). As of now, audit firm rotation is not mandatory in the United States and there isn’t any progress made towards installing such legislation because in 2013, the House of Representatives passed the ‘Audit Integrity and Job

Protection Act', through which the SOX Act was altered. With this amendment the PCAOB was denied the authority to mandate companies to switch from auditors after a certain period, which halted the progress on implementing MAFR in the United States (Tysiac., 2013).

2.4 Audit Quality

There isn't a universal definition on how to describe 'audit quality' used in prior literature. It is a complex variable. There are also many ways to measure audit quality. One of the main ways used to describe audit quality comes from the paper of DeAngelo (1981), which argues that the quality of audit services is based on the "market-assessed joint probability that an auditor will both discover a breach in the client's accounting system and report the breach". In this case, audit quality is valued by an auditor's technical capabilities, which is his ability to detect material misstatements, and an auditors' independence, which is captured by the likelihood that an auditor reports on the detected errors. In another study by Palmrose (1988) audit quality is defined as the probability that the audited financial statements include no material misstatements. This definition implies that the quality of the audit is based on the level of assurance it can provide for the users of financial statements. There are also many ways to measure audit quality mentioned by prior literature. The paper from Aghaei (2011) divides various measurements of audit quality into two groups: direct measures and indirect measures. A few examples of direct measures of audit quality are variables like financial reporting compliance with the SEC, quality control review and going concern qualification. These measures are hard to generalize for populations of interests, so the measures used in prior literature mainly use indirect measures. Examples of indirect measures are audit fees, audit size, audit tenure and industry expertise.

Another variable that is frequently used in prior literature to measure audit quality is the discretionary accruals of a firm. These are used as a proxy for audit quality and represent the absolute value of the estimated total discretionary accruals. The reason behind this is that a high number of discretionary accruals is a characteristic of earnings management and a focus on reaching short term goals. Earnings management itself is indicative of poor financial reporting quality and thus low audit quality (Svanström., 2013). The last variables that are used in prior literature to proxy for audit quality are audit opinions and going concern opinions. An audit opinion indicates whether the financial statements are free from material misstatements (unqualified opinion) or if there are (doubts of) material misstatements present (qualified or adverse opinion). A going concern opinion is a review whether a firm is able to continue its operations. The audit quality is determined by the degree of accuracy that these audit opinions and GCO opinions portray (Christensen et al., 2016).

2.5 Effects of MAFR on Audit Quality

There is mixed evidence portrayed in prior literature about the effects of MAFR on audit quality. The proponents of MAFR have three central arguments supporting their case: With the introduction of MAFR there will be an increase in the independence of auditors, increased audit quality through audit effort and a reduced risk of fraud. The paper from Lennox et al. (2014) finds that audit quality increases in the years surrounding audit firm rotation due to a higher audit effort. In these transition years they find a higher frequency of audit adjustments, which is a proxy for audit quality. These are made by either the current auditor in the last year of their audit engagement or the new auditor in their first year after the mandatory rotation. They argue that MAFR brings a “fresh” perspective to the audit through an increase of diverse expertise, while also reducing the risk of fraud because auditors are less incentivized to release biased reports to maintain their relationship with the client. The paper from Kim et al. (2015) examines the effect of MAFR on audit quality in Korea. They find that through the introduction of MAFR, a significant increase in auditor independence can be achieved due to auditors being less incentivized to keep familiarity with their clients. Because of shorter audit engagement periods the focus is shifted to exercising more audit effort to uphold a good reputation, thus improving the audit quality. They also find that newly appointed auditors are more likely to hand out a GCO opinion to financially distressed firms under MAFR compared to auditors under voluntary audit firm rotation. Lastly, they conclude that firms that are audited by auditors under MAFR have higher accrual quality and less discretionary accruals, which are used as proxies for audit quality.

These arguments are substantiated by the study from Corbella et al. (2015), which examined the effect of mandatory audit firm rotation on audit quality in Italy. They find that audit quality, which is proxied by two measures of abnormal accruals, improves following the implementation of mandatory firm rotation. They also find that overall audit fees don't significantly increase under MAFR. The only caveat that is made in this study is that these results only apply to firms that aren't audited by Big 4 firms. The paper of Cameran et al. (2016) finds that after implementation of MAFR auditors become more aware of the importance of their perceived audit quality and reputation towards potential clients. It diminishes the expected future benefits from upholding a good relationship with their current client because of the maximum engagement limit of their audit. Therefore, they find that in the last three years of the audit engagement the abnormal working capital accruals improve significantly, which are used as proxy for accounting conservatism and thus audit quality. In this period the investors' perception of the audit quality, measured by earnings response coefficients, also improves.

The study by Arel et al. (2006) infers that auditors are more likely to issue a qualified or adverse audit opinion when they are subjected to MAFR, compared to auditors that have a continuing relationship with their clients. Audit firms become more independent in assessing the “fairness” of the financial statements due to shorter audit engagement periods because they have to rely less on being familiar with the client. This decreases the likelihood of biased audit opinions and therefore fraud within the auditing process. The final benefit that is

mentioned by prior literature is that mandatory rotation of audit firms can positively influence fraud detection. The paper from Khaksar et al. (2021) infers from their research that a longer tenure reduces an auditor's independence and professional skepticism which will subsequently lead to an impairment of an auditor's ability to detect fraud and prevent fraudulent financial reporting. They state that the rotation of auditors can circumvent this by shifting the auditor's focus from familiarity towards the client to professional care and delivering a high-quality audit.

There are also some arguments depicted by prior literature that have negative views on MAFR and its effects on audit quality. These papers argue that MAFR will lead to higher audit fees and a decrease in audit quality due to loss of client-specific knowledge and consistency issues in the audit process. The paper from Ruiz-Barbadillo et al. (2009) concludes that MAFR may have adverse effects on audit quality. They suggest that an auditor's reputation concerns, viewed by the market of audit clients, create incentives to improve their independence to boost their reputation. They also find that these incentives have a greater impact on the reporting of an auditor when there aren't any requirements for mandatory rotation and find that the market-based incentives "crowd out" the possible risks of an impairment on the auditor's independence. This indicates that the introduction of mandatory rotation may have an adverse effect on the independence of auditors and thus audit quality.

This is in accordance with the paper from Kuang et al. (2020), which examines the effects of MAFR on audit quality in the United States. They find no evidence that a material improvement was made regarding the audit quality of firms following a mandatory rotation. Instead, they find that auditor-client realignment that occurs following a mandatory rotation can contribute to a decrease in audit quality. This realignment is caused by a loss of client-specific knowledge due to the rotation of auditors. The new auditor will have to adjust his auditing process to suit the specific requirements of a client which can lead to more misstatements in the initial years of an audit engagement following a mandatory rotation. The paper from Ewelt-Knauer et al. (2013) builds further upon this argument. They state that MAFR may lead to a significant decrease in the specialization of auditors, because of disincentives for audit firms to specialize. This can lead to a significant increase in audit failure in the years before an auditor gathers all relevant company-specific knowledge. They also argue that the implementation of MAFR can lead to a higher market concentration towards Big 4 firms, through which small and medium size audit firms will suffer. This is because of the assumption that medium-sized audit firms don't have enough expertise and resources to deal with frequent rotations. Finally, they state that the transition costs that auditors must make to understand their client's business model and organizational structure will lead to higher audit fees for the client. The paper from Kwon et al. (2014) also examines the effect of MAFR on audit quality and audit fees, taking the setting of Korea. They find that in the post-implementation period of mandatory rotation overall audit quality doesn't change significantly. They also conclude that overall audit costs increased in the post-implementation period of MAFR for both the audit firm and the client, indicating that the mandatory rotation policy has an adverse effect for all parties involved in the auditing process.

Chapter 3 - Hypothesis Development

In the following chapter, the hypotheses are formulated on the effects of mandatory rotation on audit quality in the EU, which are assessed in the data analysis part of the study. The main research question that is chosen for this research is as follows:

RQ: *Does the introduction of mandatory audit firm rotation (MAFR) have a positive influence on audit quality in the European Union?*

To examine the effects that mandatory rotation has on the audit quality in Europe, a comparison is made with the voluntary audit firm rotation setting of the United States. As mentioned in the literature review, currently only audit partner rotation is mandatory in the United States, compared to the EU where both audit firm rotation and audit partner rotation are mandatory. These varying forms of legislation of audit rotation could lead to significant differences in audit quality between both settings. The paper by Kalanjati et al. (2019) examines the effects of both audit partner rotation and audit firm rotation on audit quality. They conclude that if both the predecessor and succeeding auditor communicate effectively, cumulative audit partner rotations positively influence audit quality. They also find that audit firm rotations are negatively associated with audit quality due to loss of client-specific knowledge and a more significant disruption of continuation in the auditing process. These findings implicate that the audit setting in the United States could be significantly preferable for improving the audit quality than the audit setting in the EU.

The research question will be split up into two hypotheses, as the dependent variable audit quality is also divided into two different proxies. The first proxy for audit quality is discretionary accruals. The paper from Kim et al. (2015) found that with the introduction of MAFR, a decrease in discretionary accruals was made, which was their proxy for audit quality. The study from Silvestre et al. (2018) examines the effect of audit rotation on audit quality in Brazil. They also proxy audit quality using discretionary accruals and found that after audit firm rotation the volume of discretionary accruals had decreased, thus improving the earnings quality. The paper from Jackson et al. (2008) also examined the effect of MAFR on audit quality with discretionary accruals as their dependent variable. They found no significant increase or decrease in discretionary accruals when the tenure of an auditor increases (i.e., with no auditor rotation). Considering these differing arguments, it is suspected that the introduction of MAFR doesn't have a significant influence on decreasing the level of discretionary accruals. This is due to the conviction that an increased auditor independence will not significantly prevent managers from swaying earnings through their discretionary accruals. Therefore, the first hypothesis has been formulated as follows:

Hypothesis 1: *The introduction of mandatory audit firm rotation (MAFR) will have no positive influence on decreasing discretionary accruals in the EU.*

The second proxy that is used to capture audit quality is audit opinion. Completing audit opinions is the primary objective of an auditor and can be used as a proxy for auditor's independence and thus audit quality. With an increase in auditor independence caused by the

introduction of mandatory audit rotation, it can be assumed that the likelihood will increase that auditors will issue a qualified/adverse audit opinion to preserve their reputation. In the literature review it was argued by the study from Cameran et al. (2016) that MAFR increases the incentives for upholding a good reputation and maintaining independence for auditors. The paper from Arel et al. (2006) states that the introduction of mandatory audit rotation for firms can lead to an increase in qualified/adverse opinions being issued by auditors. This is due to a shift of focus towards maintaining auditor independence and providing better audit quality. This is in accordance with the paper from Firth et al. (2012) which also concludes that MAFR improves the likelihood that qualified or adverse audit opinions are issued by auditors. Considering these arguments, it is suspected that the implementation of MAFR leads to an increase in qualified/adverse audit opinions being issued by auditors. Therefore, the second hypothesis is formulated as follows:

Hypothesis 2: The introduction of mandatory audit firm rotation (MAFR) will have a positive influence on qualified or adverse audit opinions being issued in the EU.

Chapter 4 – Research Design and Data

This section gives an overview of the research design and data selection of the research. Firstly, the data collection and sample selection will be explained. After that, the research design will be elaborated on further by describing all main variables used in the research. Lastly, the empirical models used in the research will be described.

4.1 Data collection and Sample selection

The data used to answer the hypotheses has been obtained through the Wharton Research Data Services (WRDS). Within this database, the specific databases Compustat North America and Compustat Global are used to obtain information for respectively American and European PIE's. The data period used in this research spans from 2014 - 2022, with June 17th, 2016, being the transition date for mandatory rotation in the EU. There is a split between two groups (EU and USA) and time periods (before June 17th, 2016, and after) implemented in the data analysis. It is assumed that all selected European firms will be affected by mandatory rotation, because only European countries without a delayed implementation of MAFR were chosen. Given the fact that there aren't any regulations regarding mandatory rotation present in the United States, it is assumed that all rotations in the United States were voluntary. In Table 1 a detailed description is given on the sample selection of the research. Before the initial sample was created, all firms that were inactive and firms that perform financial services were excluded. The countries that are part of the EEA (Norway, Iceland) are also excluded due to a delayed implementation of MAFR, with the addition of the countries Croatia and Slovenia due to also impeding the implementation. Finally, observations with missing data were removed. The final sample included 9,886 unique firms with a total of 65,978 observations. More details on the sample can be found in Appendix A, B and C.

Table 1: Sample selection of the research

	Observations
Initial dataset, combining the observations from the Compustat Global and North America database for the years 2014-2022	361,999
Less	
Companies not located in the EU or USA	(239,651)
Companies from Croatia, Slovenia, Norway and Iceland	(1,944)
Companies with missing data	(54,426)
Final sample	65,978

4.2 Description of variables

4.2.1 Dependent variables

As mentioned before, the dependent variable that is used in this study is audit quality. It is concluded from the literature review that audit quality is a complex concept to capture. There are also several ways to measure audit quality discussed in prior literature (Elshafie & Nyadroh., 2014). This study captures audit quality using two proxies that are used often by prior literature. These proxies are the following: discretionary accruals and audit opinions.

The first proxy that is used to capture audit quality are discretionary accruals (DA). Discretionary accruals are used in prior literature to capture the level of earnings management that is present within a firm, with the higher level of earnings management implicating a lower level of audit quality (Türel et al., 2017). The first model that is commonly accepted and used in prior literature is the so-called Jones model from the paper by Jones (1991), in which a formula was constructed to calculate the level of discretionary accruals. There are also some modifications made to the original Jones model by various authors. For this study, the formulas from the papers by Kothari et al. (2005) and Widyaningsih et al. (2019) are used to construct a formula that calculates the discretionary accruals of a firm. The discretionary accruals are calculated by taking the absolute value of the residual from the following regression:

$$TACC_{it} = \beta_0 + \beta_1 \left(\frac{1}{ASSETS_{it-1}} \right) + \beta_2 (\Delta REV_{it} - \Delta REC_{it}) + \beta_3 PPE_{it} + \epsilon_{it}$$

Table 2: Description of the variables used in the Discretionary Accruals model

Variable	Description
TACC	Total accruals of a firm, measured as the net profit minus the net cash flow from operations
ASSETS	Total assets of a firm
ΔREV	Relative change in revenues
ΔREC	Relative change in accounts receivables
PPE	Net amount of Property, Plant and Equipment
ϵ	Error term of the regression (i.e., the residual)

Table 2 presents the description of the variables used in the DA model. All variables are measured in year t, except for ASSETS which is measured in year t-1. The variables TACC, REV and PPE are scaled through dividing them by the beginning-of-year ASSETS, taken from the paper by Türel et al. (2017).

The second proxy that is used to capture audit quality is the variable OPINION, which indicates whether a qualified or adverse audit opinion is issued. This can be seen as a sufficient proxy for audit quality and is a more tangible measure of audit quality than DA. An auditor that has a considerable level of independence will be more likely to issue a qualified or adverse audit opinion (Chung et al., 2019). Audit opinions also function as a measure for

audit effort that an auditor puts in to detect if there are any material misstatements. More audit effort will lead to a higher likelihood that undetected material misstatements are detected. Through this, more qualified or adverse opinions are issued which will subsequently increase the audit quality (Chen et al., 2019). OPINION is a binary variable, assuming the value of 1 if a qualified or adverse opinion is issued and indicating a zero otherwise.

4.2.2 Independent variable

The independent variable that is used in this research is the variable MROTATION. This variable indicates if a firm is under the legislation of mandatory rotation and has made a mandatory rotation after the implementation date of the legislation. The comparison that is made in this research isn't focused on the number of rotations between European firms but more on examining the two different regimes, those being the mandatory regime of the EU and voluntary regime of the United States. The assumption that is made in this study revolves around the anticipation of auditors regarding the new legislation. While the implementation date occurred on June 17th, 2016, the initial proposal of the law was introduced in 2014. Due to this, it is presumed in this study that prior to the implementation period, reactions to the announcement were made in the EU. Consequently, the maximum engagement period for many firms ended in recent years. This assumption is validated by the fact that a significant number of rotations were made after the implementation period in the EU. MROTATION is a binary variable, which assumes the value of 1 if a firm in the EU has made a rotation after June 17th, 2016. In this case it will indicate a 1 for all subsequent years of that firm to thoroughly capture the effect that the rotation has on the audit quality for each individual firm used in the sample. If these conditions aren't met it indicates a zero.

4.2.3 Control variables

Control variables are implemented in the model to limit the influence of other confounding variables on the dependent variables and thus improving the internal validity of the research. The first control variable that is used is ROA. The paper from Kothari et al. (2005) finds that it is required to account for firm performance and do this by adding ROA as a control variable to their model. The second control variable is FirmSize. This is a variable that is used by Türel et al. (2017) to control for the fact that audit quality may be lower for bigger companies after mandatory rotation, due to a significant decrease in influence on the auditor. The third control variable is BIG4. This variable indicates whether the auditor is part of the Big4. This variable is chosen to account for the differences in expertise and resources between the Big4 and smaller auditing firms that can influence audit quality (Eshleman & Guo, 2014). The fourth control variable is LEV, which indicates the financial leverage of a firm. The paper from Francis & Wang (2008) states that companies that are in financial distress are negatively associated with audit quality. For instance, companies with debt covenant violations are more incentivized to manage earnings through discretionary accruals. The last control variable is CFO. This is the cash flow generated from operating activities. Previous research by Cameran et al. (2016) concludes that cash flows from operations have an inverse relationship with accruals and thus audit quality. Table 3 gives an overview of all the control variables that are used in this study, including how they are calculated.

Table 3: Description of the dependent, independent and control variables

Variable	Definition
DA	Discretionary accruals, calculated by taking the absolute value of the residual from the TACC regression, a higher DA indicating a lower audit quality
OPINION	Variable that indicates 1 if a qualified or adverse audit opinion is issued
MROTATION	Variable that indicates 1 if the firm falls under the treatment group and has made a rotation after the implementation date
ROA	Return on assets, calculated by dividing net income by total assets
FirmSize	The size of a firm, calculated by taking the natural logarithm of a firm's total assets
BIG4	Variable that indicates 1 if the auditor belongs to the Big4
LEV	Leverage of the firm, calculated by dividing the total liabilities by the total assets
CFO	Cash flow from operations, calculated by dividing the cashflow from operations by total assets

Table 3 presents the description of all variables used in the regressions. All variables are continuous, except for OPINION, MROTATION and BIG4 which are binary variables.

4.3 Empirical models

The empirical model that is used in this research is the difference-in-differences design (DiD). This model is used to effectively compare the differences between the EU and the United States, where the pre-post results from the treatment group (EU) are compared to the pre-post results from the control group (USA). The difference-in-differences design is dependent on the so-called parallel trends assumption, which requires that the difference between treatment and control group is constant over time (Marcus & Sant'Anna., 2021). These requirements are affirmed by the fact that the descriptive statistics for both groups in the sample are similar. For both dependent variables two separate difference-in-differences are done. The terms POST, Treatment and PostTreatment are added to the regressions. These variables separate the post-treatment group from the pre-treatment and control group. The interaction term MROTATION * PostTreatment captures the effects of mandatory rotation. Fixed effects on industry, country and year-level are added to the second and fourth regression to control for the different moments in time that rotations happen for each observation and for the inherent differences between settings. The regressions used to answer both hypotheses are therefore expressed as the following formulas:

(1)

$$DA = \beta_0 + \beta_1 \text{MROTATION} * \text{PostTreatment} + \beta_2 \text{POST} + \beta_3 \text{Treatment} + \beta_4 \text{ROA} + \beta_5 \text{FirmSize} + \beta_6 \text{BIG4} + \beta_7 \text{LEV} + \beta_8 \text{CFO} + \varepsilon$$

Regression for hypothesis 1 without fixed effects

(2)

$$DA = \beta_0 + \beta_1 \text{MROTATION} * \text{PostTreatment} + \beta_2 \text{POST} + \beta_3 \text{Treatment} + \beta_4 \text{ROA} + \beta_5 \text{FirmSize} + \beta_6 \text{BIG4} + \beta_7 \text{LEV} + \beta_8 \text{CFO} + \text{Industry fixed effects} + \text{Year fixed effects} + \text{Country fixed effects} + \varepsilon$$

Regression for hypothesis 1 with fixed effects

(3)

$$\text{OPINION} = \beta_0 + \beta_1 \text{MROTATION} * \text{PostTreatment} + \beta_2 \text{POST} + \beta_3 \text{Treatment} + \beta_4 \text{ROA} + \beta_5 \text{FirmSize} + \beta_6 \text{BIG4} + \beta_7 \text{LEV} + \beta_8 \text{CFO} + \varepsilon$$

Regression for hypothesis 2 without fixed effects

(4)

$$\text{OPINION} = \beta_0 + \beta_1 \text{MROTATION} * \text{PostTreatment} + \beta_2 \text{POST} + \beta_3 \text{Treatment} + \beta_4 \text{ROA} + \beta_5 \text{FirmSize} + \beta_6 \text{BIG4} + \beta_7 \text{LEV} + \beta_8 \text{CFO} + \text{Industry fixed effects} + \text{Year fixed effects} + \text{Country fixed effects} + \varepsilon$$

Regression for hypothesis 2 with fixed effect

Chapter 5 - Results

5.1 Descriptive statistics

Table 4 gives an overview of the descriptive variables of the sample. The dependent variable DA and Opinion have a mean of 0.10 and 0.01 respectively. The independent variable MROTATION has a mean of 0.10.

Table 4: Descriptive statistics of the sample

<i>Variable</i>	<i>Mean</i>	<i>St. Dev</i>	<i>Min</i>	<i>P25</i>	<i>Median</i>	<i>P75</i>	<i>Max</i>	<i>N</i>
<i>DA</i>	0.10	0.12	0	0.03	0.07	0.11	0.72	65,978
<i>Opinion</i>	0.01	0.10	0	0	0	0	1	65,978
<i>MROTATION</i>	0.10	0.30	0	0	0	0	1	65,978
<i>FirmSize</i>	5.84	2.55	1.31	3.84	5.86	7.77	10.42	65,978
<i>BIG4</i>	0.52	0.50	0	0	1	1	1	65,978
<i>CFO</i>	0.01	0.15	-0.33	-0.03	0.05	0.11	0.21	65,978
<i>LEV</i>	0.57	0.29	0.11	0.35	0.55	0.75	1.21	65,978
<i>ROA</i>	0.08	0.27	-0.16	-0.05	0.01	0.08	0.95	65,978

Table 4 represents the descriptive statistics of the sample used in the regressions, rounded at two decimals. For each variable the following descriptives are presented: mean, standard deviation, minimum, 25th percentile, median, 75th percentile, maximum and number of observations. Continuous variables are winsorized at the 5% and 95% level.

5.2 Correlation matrix

Table 5 gives an overview of the correlations between the variables of the sample. When looking at these correlations, there is no case of multicollinearity found due to all correlations being lower than 0.7. This indicates that there is only a weak to moderate linear relationship between the variables (Ratner, 2009). The highest correlation is found between the variables ROA and CFO ($r=0.649$, $p=0.003$)¹. This is expected because both variables are a measure of profitability. The dependent variables DA and Opinion have no significant correlation between each other ($r=-0.001$, $p=0.784$), which means that the likelihood of a qualified or adverse opinion being issued doesn't influence the level of discretionary accruals. The independent variable has a significant correlation with Opinion ($r=0.018$, $p=0.003$), which implies that mandatory rotation influences the likelihood of a qualified or adverse opinion. It also has a significant and negative correlation with DA ($r=-0.072$, $p=0.002$), which indicates that mandatory rotation influences the discretionary accruals that are managed within a firm. Notable correlations are also present for the ROA variable, which is significantly correlated with DA ($r=-0.546$, $p=0.003$) and FirmSize ($r=0.488$, $p=0.008$). This implies that a higher return on assets positively decreases the likelihood of earnings management through discretionary accruals and that profitability increases when a firm is larger in size. Big4 also has a significant and positive correlation with FirmSize ($r=0.521$, $p=0.008$), which implies that larger firms are more likely to have a Big4 auditor than smaller firms.

¹ r stands for the correlation between variables and p represents the corresponding p-value

Table 5: Pearson correlation matrix of the sample

Variable	1	2	3	4	5	6	7	8
DA (1)	1							
OPINION (2)	-0.001 (0.784)	1						
MROTA TION (3)	-0.072*** (0.002)	0.018*** (0.003)	1					
FirmSize (4)	-0.346*** (0.001)	-0.043*** (0.005)	-0.026*** (0.001)	1				
BIG4(5)	-0.238*** (0.001)	-0.052*** (0.002)	-0.004 (0.301)	0.521*** (0.008)	1			
CFO (6)	-0.438*** (0.001)	-0.001 (0.822)	0.025*** (0.007)	0.478*** (0.006)	0.241*** (0.003)	1		
LEV (7)	0.247 (0.751)	0.029* (0.08)	-0.038*** (0.005)	0.133*** (0.006)	0.010* (0.07)	-0.083** (0.010)	1	
ROA (8)	-0.546*** (0.003)	-0.013*** (0.001)	0.032*** (0.001)	0.488*** (0.008)	0.231 (0.649)	0.649*** (0.003)	-0.162*** (0.006)	1

Table 5 presents the correlation coefficients between the variables used in the regression, rounded at three decimals. P-values in parentheses, rounded to three decimals. ***, **, * denote significance at the 1%, 5% and 10% level respectively.

5.3 Regression results and Evaluation of hypotheses

5.3.1 Hypothesis 1

Table 6: Regression results with DA as the dependent variable

Variables	DA	DA
POST	-0.0040*** (0.003)	0.0094 (0.322)
Treatment	-0.0457*** (0.002)	0.0183 (0.845)
MROTATION * PostTreatment	0.0021 (0.102)	0.0013 (0.362)
ROA	-0.0215*** (0.002)	-0.0211*** (0.002)
FirmSize	-0.0083*** (0.007)	-0.0093*** (0.007)
CFO	0.0965*** (0.003)	0.0950*** (0.003)
BIG4	-0.0175*** (0.002)	-0.0148*** (0.002)
LEV	0.0693*** (0.002)	0.0723*** (0.002)
Industry Fixed Effects	No	Yes
Country Fixed Effects	No	Yes
Year Fixed Effects	No	Yes
Observations	65,978	65,978
Adjusted R-Squared	0.0387	0.0394

Table 6 presents the coefficients from the regressions with DA as the dependent variable, rounded to four decimals. The first column gives an overview of regression 1, which has no fixed effects. The second column gives an overview of regression 2 that includes industry, country and year level fixed effects. The interaction term MROTATION * PostTreatment captures the effect of mandatory rotation. P-values in parentheses, rounded to three decimals. ***, **, * denote significance at the 1%, 5% and 10% level respectively.

Table 6 provides the results for regression 1 and 2, which have DA as the dependent variable. When looking at the regression results, it can be concluded that both regressions have comparable results. The variable Post has a significant and negative effect for the first regression and an insignificant and positive effect for the second regression ($\beta=-0.0040$, $p=0.003$; $\beta=0.0094$, $p=0.322$). For the variable Treatment, only the first regression shows a significant effect ($\beta=-0.0457$, $p=0.002$, $\beta=0.0183$, $p=0.845$). The interaction term MROTATION * PostTreatment, which captures the effect of mandatory rotation, has an insignificant and positive effect for both regressions ($\beta=0.0021$, $p=0.102$; $\beta=0.0013$, $p=0.362$)

². The control variables in the DA model all have significant effects on DA for both regressions. The variable ROA has a significant and negative influence on DA in both regressions ($\beta=-0.0215$, $p=0.002$; $\beta=-0.0211$, $p=0.002$). This is in line with the paper from Kothari et al. (2005), which argues that firms with higher relative profitability manage less discretionary accruals within the firm. The variable Firmsize also has a significant and negative effect on DA for both models ($\beta=-0.0083$, $p=0.007$; $\beta=-0.0093$, $p=0.007$), which indicates that bigger firms manage relatively less discretionary accruals in their company and thus contradicting the argument that managers from bigger firms exert more influence on auditors and manage more discretionary accruals (Türel et al., 2017). The third control variable CFO has a significant and positive effect on discretionary accruals ($\beta=0.0965$, $p=0.003$; $\beta=0.0950$, $p=0.003$). This implies that a higher amount of cash flow also increases the level of discretionary accruals. This is in line with the assertion that cash flows have an inverse relationship with audit quality through an increase in the relative amount of discretionary accruals (Cameran et al., 2016). The fourth control variable BIG4 has a significant and positive influence on DA ($\beta=-0.0175$, $p=0.002$; $\beta=-0.0148$, $p=0.002$), indicating that firms with a Big4 auditor have less discretionary accruals, which infers that Big4 auditors can drive more influence on restricting a firms' discretionary accruals level (Lai, 2013). The last control variable LEV has a significant positive relationship with DA ($\beta=0.0693$, $p=0.002$; $\beta=0.0723$, $p=0.002$), which shows that firms with a relatively higher leverage ratio have a higher level of discretionary accruals due to having to rely on earnings management to meet their earnings targets (Anagnostopoulo & Tsekrekos, 2016).

The results of the regressions implicate that the introduction of mandatory rotation in the EU has not significantly decreased the level of discretionary accruals. These findings are in accordance with the paper by Kwon et al (2014), which argues that the introduction of mandatory rotation will have no significant effects on the decrease of discretionary accruals and thus have no positive influence on the overall audit quality. The adjusted R-Squared for this model is 3,9% for both regressions, implicating that the variance in DA can't be moderately explained by MROTATION. Hypothesis 1 stated that mandatory rotation will not have a positive effect on reducing discretionary accruals. It can be concluded from the regression results that mandatory rotation does not have a significant effect on the decrease of discretionary accruals. In contrast, it has an insignificant and positive effect on DA which implies that, after mandatory rotation, the level of discretionary accruals marginally increased in the EU relative to the control periods in the EU and USA. The first hypothesis, after examining these results, will therefore not be rejected.

² β represents the coefficient displayed in both regressions and p represents the corresponding p-value

5.3.2 Hypothesis 2

Table 7: Regression results with Opinion as the dependent variable

Variables	Opinion	Opinion
POST	-0.0033*** (0.001)	-0.0017 (0.986)
Treatment	0.0189*** (0.002)	0.0100* (0.055)
MROTATION * PostTreatment	-0.0025* (0.063)	-0.0002 (0.901)
ROA	-0.0047* (0.056)	-0.0033 (0.170)
FirmSize	-0.0005** (0.017)	-0.0014*** (0.006)
CFO	0.0082* (0.051)	0.0037 (0.418)
BIG4	-0.0085*** (0.002)	-0.0006 (0.553)
LEV	0.0157*** (0.002)	0.0162*** (0.002)
Industry Fixed Effects	No	Yes
Country Fixed Effects	No	Yes
Year Fixed Effects	No	Yes
Observations	65,978	65,978
Adjusted R-Squared	0.01252	0.0550

Table 7 presents the coefficients from the regressions with Opinion as the dependent variable, rounded to four decimals. The first column gives an overview of regression 3, which has no fixed effects. The second column gives an overview of regression 4 that includes industry, country and year level fixed effects. All continuous variables are winsorized at the 5% and 95% levels. P-values in parentheses, rounded to three decimals. ***, **, * denote significance at the 1%, 5% and 10% level respectively.

Table 7 shows the results for the third and fourth regression that have Opinion as their dependent variable. The variable Post has a significant and negative effect for the third regression but an insignificant and negative effect for the fourth regression ($\beta=-0.033$, $p=0.001$; $\beta=-0.017$, $p=0.986$). For the variable Treatment, both regressions show a significant and positive effect ($\beta=0.0189$, $p=0.002$, $\beta=0.0100$, $p=0.055$). The interaction term with the independent variable MROTATION has a significant and negative effect on Opinion for the regression without fixed effects, but an insignificant and negative effect for the regression with fixed effects ($\beta= -0.0025$, $p=0.064$; $\beta=-0.0002$, $p=0.901$). The control variables ROA, CFO and BIG4 are insignificant in the regression with fixed effect so they are not discussed. FirmSize has a significant and negative effect on Opinion for both regressions ($\beta=-0.0005$, $p=0.017$; $\beta=-0.0014$, $p=0.006$), meaning that bigger firms are less likely to receive a qualified/adverse audit opinion, which is in accordance with the paper from Türel et al.

(2017), which states that bigger firms can exert more influence on auditors, thus lowering audit quality. LEV is significant and positively associated with Opinion for both regressions ($\beta=0.0157$, $p=0.002$; $\beta=0.0162$, $p=0.002$). This indicates that firms with a relatively higher leverage ratio are more likely to receive a qualified/adverse audit opinion due to firms with higher leverage have relatively more financial distress (Francis & Wang., 2008).

When evaluating the results of these regressions, it can be determined that the effect of mandatory rotation on the issuance of qualified/adverse audit opinions is negative. This is in contrast with previous research by Arel et al. (2006) which states that auditors under MAFR are more likely to issue a qualified or adverse audit opinion due to an increase in independence. The adjusted R-Squared isn't particularly high, representing 1,3% and 5,5%, which infers that the variance in Opinion can't be moderately explained by MROTATION. In summary, the results indicate a significant and negative effect of mandatory rotation on Opinion for the regression without fixed effects and an insignificant and negative effect in the regression with fixed effects. These combined results infer that mandatory rotation doesn't have a significant positive effect on the issuance of qualified or adverse audit opinions. The second hypothesis, which stated that mandatory rotation will positively influence the issuance of qualified/adverse audit opinions, will therefore be rejected.

Taking all results into account, it is clear that mandatory rotation doesn't have a significant and positive effect on the proxies for audit quality. For the dependent variable DA, both regressions indicate an insignificant increase in the level of discretionary accruals after the implementation of mandatory rotation in the EU. The third regression shows a significant and negative effect of mandatory rotation on qualified and adverse audit opinions being issued. However, after adding fixed effects in the fourth regression, this effect becomes insignificant. This implies that the significant treatment effects that are obtained in the regressions without fixed effects are caused by time-invariant factors and pre-existing characteristics of the groups, which are captured by the fixed effects (Puhani., 2012). Consequently, the overall results show that mandatory rotation doesn't have a positive influence on the two proxies of audit quality. After adding fixed effects to the regressions, the introduction of mandatory rotation shows insignificant effects on both discretionary accruals and audit opinions. This implies that there is an insignificant difference between the treatment and control group after the implementation of mandatory audit firm rotation in Europe. Implications of this for the research will be discussed in the conclusion and discussion.

Chapter 6- Conclusion and Discussion

In this study various implications of introducing mandatory audit firm rotation are examined with the goal of determining the effects that it has on the audit quality in the European Union. To answer this question both a literature review as well as data analysis, using a difference-in-differences design, are done. In the literature review, the institutional audit firm rotation setting in Europe is compared with the setting in the United States, with the goal to interpret all relevant differences in audit setting between the EU and USA. After that, prior literature that evaluates the effects of mandatory rotation on audit quality is examined, which provides mixed evidence on whether mandatory rotation contributes to an increase in audit quality. Proponents of MAFR state that with the implementation of mandatory rotation audit quality increases through an increased independence of auditors (Lennox et al., 2014). They also state that an increase in audit effort is achieved by implementing mandatory rotation which increases audit quality (Kim et al., 2015). The last argument that is made argues that by introducing mandatory rotation there will be a reduced risk of fraud in the auditing process due to auditors being more incentivized to increase their reputation and less incentivized to increase the familiarity with their clients (Khaksar et al., 2021). Opponents of mandatory rotation argue that the introduction of mandatory audit firm rotation reduces client-specific knowledge that is essential for performing a high-quality audit (Ewelt-Knauer et al., 2013) and that it creates consistency issues which can disrupt the entire auditing process (Kuang et al., 2020). The results of the difference-in-differences designs show that the introduction of mandatory rotation has had no positive effects on both discretionary accruals and audit opinions. For the regressions without fixed effects, mandatory rotation results in an insignificant and positive effect on the level of discretionary accruals and a significant and negative effect on audit opinions. After adding fixed effects on industry, country and year level to the regressions, the introduction of mandatory rotation results in an insignificant and positive effect for the discretionary accruals and an insignificant and negative effect on audit opinions. From these results it can be concluded that there is no evidence found in this study which confirms that the introduction mandatory rotation has a positive influence on improving the audit quality in the EU. These findings were partly in line with the hypotheses, where it was prognosed that the effect of mandatory rotation on discretionary accruals would not be significant, yet it was expected that mandatory rotation would have a significant and positive effect on the issuance of qualified or adverse audit opinions.

This study adds to the existing literature on mandatory rotation by introducing a new setting to examine the effects of mandatory audit firm rotation on audit quality. By comparing the mandatory European audit firm rotation setting to the voluntary American setting, overall effects of implementing regulations regarding audit firm rotation can be evaluated appropriately. The results of the study have implications for both regulators and audit firm clients. Regulators can use this study to evaluate the effects on the overall audit quality that introducing legislation for audit firm rotation has. Audit firm clients can evaluate benefits and costs associated with switching between audit firms.

There are also some limitations associated with this study. As is mentioned before in the study, audit quality is a difficult concept to capture into a few variables. The use of discretionary accruals isn't the most direct way of measuring audit quality, due to it being a relatively volatile variable for each individual firm, which is concluded in the paper by Elshafie & Nyadroh (2014). Due to data availability concerns for other possible proxies of audit quality, discretionary accruals are still used as a proxy for audit quality. The second limitation is the results found in the regressions. For both models, after adding fixed effects, the effects of mandatory rotation on discretionary accruals and audit opinions are insignificant. However, most studies on mandatory rotation in other settings that use the same proxies for audit quality find that it has no significant effects on audit quality (Kuang et al., 2020; Kwon et al., 2014). The low adjusted R-Squared for both models indicates that the variance in Opinion and DA cannot be explained significantly by mandatory rotation. This can decrease the validity of the research. However, most studies that use discretionary accruals or audit opinions as proxies for audit quality have similar values for R-Squared. Lastly, comparing two different regions like the EU and USA, is always subject to omitted characteristics and variables that have influence on overall results. This is present in all comparisons between different settings, so there is not much that can be done to avoid these differences, although both settings share comparable results for all variables and fixed effects are used to control for inherent differences between settings.

Potential future research surrounding mandatory rotation could focus on implementing more direct measures of audit quality, such as GCO opinion or audit restatements. These variables could be more effective in capturing relevant characteristics of audit quality. Another way to expand the research on MAFR is by comparing different settings that have different rules regarding audit firm rotation with each other over longer periods of time. This study tries to contribute to this by comparing two different settings that haven't been examined extensively before, but additional research could definitely help in determining the overall benefits and costs that implementing mandatory audit firm rotation entails.

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Appendix A: Firms, observations and year of first rotation for each country

Country	Firms	Observations	First rotation year
Austria	43	351	2016
Belgium	78	601	2016
Cyprus	49	363	2017
Czech Republic	8	42	2019
Germany	475	3,496	2016
Denmark	137	862	2017
Spain	132	951	2016
Estonia	23	150	2017
Finland	153	1,047	2016
France	492	3,607	2016
Great Britain	933	6,661	2016
Greece	123	989	2017
Hungary	20	138	2018
Ireland	33	237	2017
Italy	312	1,883	2016
Lithuania	26	182	2017
Luxemburg	38	241	2018
Latvia	9	61	2018
Malta	18	133	2016
The Netherlands	114	785	2016
Poland	590	4,182	2016
Portugal	39	314	2016
Romania	67	541	2017

Russia	166	1,203	2016
Slovakia	4	27	2021
Sweden	793	4,942	2016
Switzerland	164	1,297	2016
United States of America	4,847	30,692	-
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Total	9,886	65,978	-
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Appendix A presents the number of firms, observations and the first year that an audit firm rotation was made for each country in the sample. There is no first year of rotation for the United States due to these rotations not being included in the study.

Appendix B: Observations for each year of the sample

Observations	European Union	United States
2014	3,021	2,843
2015	3,499	3,014
2016	3,691	3,096
2017	3,925	3,187
2018	4,087	3,346
2019	4,226	3,481
2020	4,381	3,568
2021	4,670	3,810
2022	3,786	4,347
Total	35,286	30,692

Appendix B presents the observations between the European Union and United States for each year of the sample.

Appendix C: Observations per industry for the EU and USA

Industry	SIC Code	Observations EU	Observations USA
Agriculture, Forest and Fishing	0-999	301	12,219
Mining	1000-1499	2,373	1,075
Construction	1500-1799	1,240	1,101
Manufacturing	2000-3999	16,425	9,114
Transportation and Communication	4000-4999	4,223	2,319
Wholesale Trade	5000-5199	1,386	656
Retail Trade	5200-5999	1,689	1,127
Services	7000-8999	7,347	2,888
Public Administration	9000-9999	302	193
Total		35,286	30,692

Appendix C presents the different industries, denoted by the SIC codes, which the observations of the EU and USA are involved in.