

# **Does the Capital Market Recognize Financial Misrepresentations? – Fundamental Value and Market Analysis**

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October 2021

## **Abstract**

The efficiency of a (capital) market is a key element in economics (e.g. Marshall 2009; Mankiw 2014). This paper attempts to shed more light on the market efficiency hypothesis in cases of the rare event of a deliberate violation of the GAAP (misrepresentation). The aim of the paper is twofold. The first aim is to determine the amount by which misrepresented firms are overvalued due to the misrepresentation. I therefore compare the actual firm value with a hypothetical firm value based on the fundamental value of the firm without the misrepresentation. The latter is calculated with conventional valuation methods. The second aim is to compare the value difference with the market reaction once the misrepresentation emerges to test market efficiency. The firm's value difference is then compared with the market reaction around the date when the misrepresentation was revealed to the public e.g. with a restatement announcement. The method is thereby an OLS-regression. The analysis is based on a dataset of misrepresenting firms detected by the US Securities and Exchange Commission (AAER cases). The results indicate a substantially higher market value due to the misrepresentation depending on the method of an average value of up to 29.6% and median values ranging from 1.6% to 17.6%. Moreover, the results indicate that the market reaction once the misrepresentation is revealed is independent of the value difference. The results are robust for the valuation method and market reaction horizon. My interpretation is that the results provide statistical and economical evidence of an anomaly in the market efficiency hypothesis.

**Keywords:** Market Efficiency Hypothesis, AAER, Financial Misrepresentation, Accounting Fraud

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## 1. Introduction

Prior literature has analyzed the ability of financial reports to diminish the information asymmetry on capital markets (Frankel et al. 2019). Consequently, the prior literature has identified financial misrepresentations (hereafter misrepresentations) as a significant threat to the existence and efficiency of capital markets (Amiram et al. 2018). The threat can be demonstrated by the question of how a potential investor should evaluate an investment in a firm if the reports on which he bases his valuation are incorrect. This question becomes hard if not impossible to answer.

According to the prior literature, firms who misrepresent their annual reports show higher earnings and higher equity (e.g. Kloppenburg 2021; Palmrose et al. 2004). This, as such, is less surprising since earnings (and in consequence equity) are the result of a series of transactions and book entries within the firm. Thus, they cover and aggregate a variety of financial accounts. Moreover, earnings are an important figure from the perspective of the shareholder because they reflect, among other things, how much of the past year's income is available for distribution to the shareholders. Consequently, since common valuation methods directly (e.g. residual income valuation-model) or indirectly (e.g. discounted cash flow-model) rely on the financial data originating from the annual reports, the firm's value is (very likely) on average higher for a firm during the misrepresentation period than it would be without the misrepresentation. However, it is unknown by how much the value would be influenced and hence whether the valuation bias due to the misrepresentation would be economically significant or whether markets can discern the misrepresentation. Thus, the first research question for this paper is whether this artificially created gain (or loss) in fundamental value is substantial. Substantial is hereby defined statistically and economically.

The knowledge of a substantial gain (or loss) in fundamental value is first and foremost of interest for research. If the difference in fundamental value is non-substantial, it would raise doubts whether further investigations are necessary. In addition to the academic interest other interested groups also exist. Regulators may be less pressured to address the issue if the fundamental value difference is non-substantial. Moreover, investors do not need to take the difference into considerations if it is economically immaterial.

Second, this paper takes the issue further. According to prior literature, the share price drops significantly at the moment when the misrepresentation becomes public knowledge (e.g. Palmrose et al. 2004; Hennes et al. 2008). The question is – given the fundamental value gain

(or loss) due to the misrepresentation – whether there is a linkage between the change in market value during the misrepresentation period and the drop in the share price. A major advantage of my paper is that I base my revaluation of misrepresenting firms on restated financial figures of the same firms and the same firm-years. This allows me to maintain a high degree of comparability between the value of the misrepresented and the non-misrepresented firm.

Theoretically, the paper aims to contribute, especially as regards the second question, to the efficient market hypothesis. The efficient market hypothesis says in its semi-strong form that all publicly available information is fully and in a timely manner included in the current share price. The hypothesis thereby assumes that capital markets are rational (Malkiel and Fama 1970). This means, when applied to this paper, that the bigger the gain (loss) due to the misrepresentation of the fundamental value the stronger the market reaction once the misrepresentation is revealed. The underlying idea is that a larger value gain (loss) means that more value needs to be corrected. However, misrepresentations are rare events (Dechow et al. 2011; Kloppenburg 2021). Thus, the question arises whether the efficient market hypothesis maintains its position in such an uncommon and extreme case as a misrepresentation. Consequently, a further major target group for the paper are the capital market actors. For these actors, the incidence of market efficiency could create favorable economic consequences. For example, shareholders can create a trading strategy based on the actions of their fellow shareholders.

Moreover, since the paper is concerned with the core feature of accounting, financial reports, it touches on multiple accounting and accounting related theories (e.g. information asymmetry, corporate governance theory). However, the focus of this paper is on the efficient market theory and this will be the central point of the paper, while acknowledging other relevant theories in this context.

The efficiency of a (capital) market is a key element in economics (e.g. Marshall 2009; Mankiw 2014). Financial reports therefore serve the purpose of providing information to the actors on the capital market so that they can allocate funds more optimally/efficiently (Kothari et al. 2010). By its nature, an incorrect (misrepresented) financial report provides in general rather limited informational content. Thus, in an optimal case (from the perspective of market efficiency), the misrepresented report will be ignored by the market participants. In this case, the capital market would not be affected at all. Only the costs for preparing the misrepresented financial report from the firm's side and processing it on the capital market's side would occur.

In a less optimal case, the misrepresentation can significantly distort capital allocation. Market participants would rely fully on the misrepresented report and would allocate funds inefficiently. Those directly affected by an inefficient capital market are the shareholders and further actors on the market. However, since the capital market is a way to finance a firm, there are many stakeholders in the firm who are indirectly affected, such as the employees who require job security or the government, who is interested in tax revenue. Consequently, the results of this paper are of interest to a variety of groups within society, but have a special relevance for capital market actors like shareholders.

In this paper, I compute the fundamental value of a firm for a hypothetical case of no misrepresentation with the help of well-established valuation methods and with the help of the restated financial reports of the same firm for the same fiscal year. My results indicate that there is a substantial difference between the market value based on the misrepresented figure and the fundamental firm value of the same firm based on non-misrepresented figures. The differences are statistically significant and also economically relevant. Furthermore, the results indicate that the capital market is in this particular setting inefficient. There seems to be no statistically significant linkage between the market overpricing due to the misrepresentation and the market reaction once the misrepresentation is revealed.

The remainder of the paper is structured as follows: First, the prior literature is introduced and discussed. This includes the development of the research question as well as a brief explanation of the theoretical surrounding. Second, the method is explained followed by the dataset. Third, the results are presented and discussed. The final section contains a short conclusion including an outlook for future research.

## **2. Prior Literature and Research Question Development**

The term “financial misrepresentation” (short: misrepresentation) has a variety of different names in prior literature. This includes e.g. “misstatement” (Dechow et al. 2011), “misreporting” (Burns and Kedia 2006), or “accounting fraud” (Miller 2006; Palmrose et al. 2004). However, the definition in all cases remains the same as for the current paper as well. It relies on the SEC investigation reports and the SEC definition of a misrepresentation.

The current paper uses the same definition as Amiram (2018) and Kloppenburg (2021): A misrepresentation is the violation of Section 13(b) of the 1934 Securities and Exchange Act. According to this section, firms are required to make and keep books, records, and accounts which fairly and accurately reflect the transactions and dispositions of the firm’s assets.

Moreover, according to the section, firms are required to devise and maintain a system of internal controls to assure accurate reporting. The SEC's mandate is (among others) to investigate and prosecute violations of the section. The results of their investigations are (if successful) disclosed to the public. My dataset is based on these investigation reports.

The typical time-sequence of such a misrepresentation is shown in Figure 1. It initially starts with a violation period. During this period, the GAAP is violated in such a way that also Section 13(b) of the 1934 Securities and Exchange Act is violated. Thus, the financial figures are misrepresented. The violation period is followed by a restatement announcement. A firm is legally required under the US-GAAP (SFAS 154.25) to correct errors in previous financial statements by a restatement.

The restatement for the case of a misrepresentation consists of two parts: The restatement announcement and the disclosure of the restated financial figures. The restatement announcement typically refers to the moment when the firm discloses itself that their previous financial statements should not be trusted. This disclosure is normally done by filing the form 8-K with the SEC but also other options are allowed like a press release (Palmrose et al. 2004). The content of a restatement announcement varies widely. It ranges from a simple statement indicating that the prior years financial reports might not be trusted to a clear explanation of what went wrong including a quantification of the restatement (Palmrose et al. 2004). Common to all restatement announcements is that the capital market is informed about (potential) problems with the financial figures. I define more broadly the restatement announcement in Figure 1. I define it as the moment when the first information about a (potential) restatement becomes public. This includes to a large proportion the firm's own filings and publications. Moreover, it includes newspaper articles, analyst reports, and other public sources discussing a possible restatement. Furthermore, part of the restatement is the disclosure of the restated financial figures (SFAS 154.26). This can take place at the same time as the restatement announcement (Palmrose et al. 2004). However, in the case in this paper it did not.

Given the misrepresentation was unknown by the management, there are multiple ways for the management or directors to obtain knowledge of the misrepresentation and, given the misrepresentation was known by the management or directors, there are events which may have persuaded the management to admit the misrepresentation publicly. An example of a misrepresentation which might be unknown to the management could be a misrepresentation by a subsidiary. If the top-management of the parent company did not have a sufficient internal control system it would consequently be unaware of the misrepresentation. An example of a

misrepresentation which is known to the management could be a misrepresentation that maximizes the management bonuses. In this case, the top-management deliberately caused the misrepresentation with full knowledge.

There are multiple ways for the top-management to obtain knowledge of a misrepresentation or ways in which the top-management can be persuaded to admit the misrepresentation. This can include the already mentioned suspicions raised in newspaper articles or analyst reports, it can also be a whistle blower, an auditor, or a question from the SEC. In cases where the SEC has doubts about the disclosed financial statements, they start their inquiry with asking the particular firm questions (Karpoff et al. 2008). These questions could result in the firm identifying their misconduct and announcing a restatement. Moreover, these questions could be the consequence of the restatement announcement since the announcement is typically a triggering event for the SEC to look into a case (Dechow et al. 2011). Thus, the beginning of the SEC investigation can be prior to or after the restatement announcement.

In the following, two processes are seen to run parallel: the restatement and the SEC investigation. The restatement continues after the announcement by the firm preparing the corrected restated financial figures (Palmrose et al. 2004). These are then normally disclosed with one of the next quarterly or annual reports. Parallel to the firm's internal process, the SEC runs its investigation. At the end of its investigation, the SEC can either dismiss the case or prosecute the firm. In the latter case, they prepare an Accounting and Auditing Enforcement Report (AAER). The SEC makes the AAERs publicly available on their website<sup>1</sup>.

There is an extensive literature about the market reaction around the restatement announcements of misrepresenting firms (e.g. Palmrose et al. 2004; Hennes et al. 2008; Gordon et al. 2013). Subsequently, the restatement announcement serves as an indicator of the first point in time when the potential misconduct was made public. A restatement can possibly be caused by an (unintentional) error (Hennes et al. 2008). However, in this paper the intention to alter the financial statements is a central aspect. Therefore, the focus lies solely on misrepresentations and consequently neglects errors. Palmrose et al. (2004) identify on average a drop in market value of -20% in the window 0, i.e. 1 day for firms restating because of a prior (intentional) misrepresentation. Hennes et al. (2008) measure the window as -1,+1 decline in market value of around -12%. Thus, misrepresentations have a drastically negative impact on

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<sup>1</sup> <https://www.sec.gov/divisions/enforce/friactions.htm>

firm value once they become public. In a window of 180 days around the announcement of the restatement for a misrepresenting firm, Hennes et al. (2008) measures a drop of up to -25%. Moreover, the authors could identify a drift in the period -90 days to -8 days of the market value of around -13%. The authors interpret the drift as a signal for a prior suspicion by some capital market actors.

With regard to the reasons for the negative market reaction, the prior literature mainly identified three reasons. First, in a sample of restating firms, Palmrose and Scholz (2004) could identify litigation cases against 38% of the restating firms. The likelihood of litigation increased if the restatement was caused by a misrepresentation. Second, managers suffer a reputational penalty. This reputational penalty could be found for CEOs (Desai et al. 2006; Arthaud-Day et al. 2006), CFOs (Feldman et al. 2009; Arthaud-Day et al. 2006; Collins et al. 2009), and outside directors (Arthaud-Day et al. 2006; Srinivasan 2005). The result of the reputational penalty is an increased management turnover as a tool for the firms to regain trust and market value. Third, restatements especially due to misrepresentations must typically correct relevant values like earnings or equity downwards (Palmrose et al. 2004; Kloppenburg 2021). Thus, there is also a decline in the market value due to a decline in figures used for the firm's valuation.

Theoretically, this paper is based on the efficient market hypothesis. This hypothesis states in its semi-strong form that all publicly available information is instantaneously included in the current share price (Malkiel and Fama 1970). A misrepresentation as such is information relevant to the capital market. The full set of information about the misrepresentation becomes known to the capital market at a later stage. However, the latest point in time when the capital market knows about the misrepresentation is when the first clear evidence of the misrepresentation is revealed e.g. by a restatement announcement. Nevertheless, prior research has shown that before a misrepresentation period, earnings management typically occurs (Ettredge et al. 2010). Ettredge et al. (2010) observed earnings management in the same way as capital market actors. Hence, he observed the warning signal of a lower earnings quality typically occurring before a misrepresentation was revealed. Jensen (2005) theoretically and Badertscher (2011) empirically showed that misrepresenting firms are overvalued by the capital market compared to their fundamental value. This overvaluation slowly builds up/increases, first during the earnings management period and then during the misrepresentation period. Thus, it can be concluded that hints of a (potential) misrepresentation can be found even before the revelation of the misrepresentation.



Although the prior literature acknowledges the fact that the fundamental information originating from annual reports were misrepresented to increase the market value of equity (or other short term benefits for firms and/or their manager), there has so far been (to the best of my knowledge) no research done to determine the (artificial) gain in the fundamental value due to the misrepresentation before the restatement was announced. Consequently, the first research question is the following:

**Question 1:** What is the (artificial) firm value gain (loss) due to a misrepresentation computed using fundamental information?

Prior research has shown that most restatements correct earnings downwards (Palmrose et al. 2004). Hence, the expectation for the outcome of the first research question is an increase in the fundamental value of the firm based on the suitable valuation models because of the misrepresentation. The amount of the gain however cannot be estimated ex ante. The amount is relevant since it can show to what extent the market participants were misled by the misrepresentation.

The efficient market hypothesis is a much-debated concept. On the one hand, researchers frequently stress and show that the hypothesis holds true (e.g. Fama 1970; Timmermann and Granger 2004; Borges 2010), while on the other hand, researchers show that in special circumstances the hypothesis does not hold true. Multiple reviews of these anomalies have been provided by prior literature. An early work originates from Jensen (1978) and I would refer for more recent reviews to Rossi (2015) or Naseer and bin Tariq (2015). There is to the best of my knowledge no study published about the efficient market hypothesis and misrepresentations. Therefore, I will in the following introduce some typical exemplary anomalies to provide an overview of different anomalies. The aim is to give an overview of what an anomaly could look like. I do not intend to provide an exhaustive list of anomalies.

An example of such an anomaly is the post announcement drift. Given the efficient market hypothesis, one may expect that the new information made public in an annual report will be included in the stock price quickly (Ball 1978). However, as Ball and Brown (1968) discovered, the stock prices requires a few days to include the new public information in the stock price. Foster et al. (1984) showed that it can even take up to 60 trading days for the stock prices to include the new information provided by an annual report.

A further group of anomalies are calendar anomalies. Following the efficient market hypothesis, each trading day is independent of the previous trading day. Thus, the returns on

each trading day should on average be equal. However, in reality there are deviations. Agrawal and Tandon (1994) tested previously found anomalies about the calendar effects on a sample of financial markets in 18 countries during the 1970s and 1980s. The authors found support across 18 different countries that the returns are significantly weaker on a Friday than on every other trading day. Moreover, the authors could confirm for 9 of the 18 countries that returns are unusually large around the turn-of-the-month. In 11 of the 18 countries, the returns were larger before and during the holiday period (e.g. Christmas). Lastly, the authors could confirm that returns are larger in January and lower in December for most countries.

A different direction within the field of anomalies are the fundamental value anomalies. These anomalies are closer to the anomalies studied in this paper than e.g. the calendar anomaly. I will introduce as an example the value investing anomaly. However, there are multiple further anomalies in the field. What is meant by value investing is investing in firms who seem to be undervalued compared to their book value of equity (Piotroski 2000). Following the efficient market hypothesis, since the financial information (the book value) is publicly known, it should not be possible to outperform the market. However, prior literature has shown that firms with a low book-to-market ratio can surprise with high returns (e.g. Fama and French 1992; Rosenberg et al. 1984; Lakonishok et al. 1994; Piotroski 2000). Ball et al. (2020) refined the measure and even showed that the retained earnings component of the book value of equity is the driver of the returns.

Once the misrepresentation is revealed, the market receives new information. I define revealed for the current paper as the restatement announcement, thus it is the first point in time when the market definitely knows about a potential misconduct by the firm. Following the efficient market hypothesis, markets revise the share price based on that new information. Consequently, the unwarranted gain in market value of equity based on the misrepresented fundamental information should then be reversed. Logically, this reverse should be higher for firms with a larger difference in the fundamental firm value. Moreover, the question arises whether a larger fundamental value difference hints at a more severe case of misrepresentation and consequently a larger market reaction once the misrepresentation is revealed. This leads to the second research question:

**Question 2:** Is there an association between the (artificial) value gain (loss) of a misrepresenting firm computed using fundamental information and the market reaction once the misrepresentation is revealed to the public?

Revealed as used here refers to the restatement announcement in Figure 1. It is the moment when the information about a potential misconduct was first made public e.g. through a 8-K filing to the SEC. The outcome of the second research question either confirms market efficiency or provides evidence of an anomaly.

### 3. Method

The research questions are approached by comparing the actual share price with an estimated share price in a case where the firm did not misrepresent in the first place. The results are then used as a proxy for the severity of the misrepresentation. The logic is that as more of the capital market is misled by the misrepresentation then the more severe the misrepresentation will be. The severity is compared with the actual market reaction of the misrepresenting firm around the date of the revelation of the misrepresentation. Thus, there are two different methods used in the paper: (1) The estimation of the firm value in the misrepresented state and (2) the comparison of the difference in the share price between the misrepresented case of the firm and the non-misrepresented with the actual market reaction after the revelation of the misrepresentation.

#### *3.1. Determining the Market Value Difference*

The share price (and hence the market value) of the firm in the misrepresented case is known. It originates from the price at the stock exchange (in this case: CRSP). Similar to Badertscher (2011), each time it is the average share price in June of the following year since at this date most (if not all) annual reports are published and consequently considered in the valuation but not so much new further information is published before this date which might have also influenced the capital market. The share price of the firm in the case of a firm that did not misrepresent in the first place is unknown. The firm's misrepresentation and the capital market's reaction cannot be undone. Hence, collecting the share price (and consequently the firm value) of a misrepresenting firm in case it would not have misrepresented is impossible. However, it is possible to estimate the firm value with similar, well-known, methods as those used by rational, representative shareholders.

Standard textbooks as well as prior literature provide a variety of different methods for making valuations of firms, such as, discounted free cash flow and other cash flow valuation methods, residual income valuation, economic value added, multiples (e.g. Imam et al. 2008; Lee 2013; Penman 2013; Palepu et al. 2019). When choosing the appropriate valuation method, I took into account that misrepresentations are concerned with altering financial figures disclosed in annual reports. In essence, there is an incorrect financial report on which the capital market based their valuation and there is a later corrected (restated) financial report. Both reports are observable ex post. Thus, I can take advantage of the corrected financial figures for

the firm's valuation. Consequently, the aim of the valuation method is to be customary and standard but also utilize the financial figures from the financial reports.

The residual income valuation (RIV) following Ohlson (1995) is based on the book value of equity and earnings. It therefore fulfils the criterium of being based on annual report data and was consequently chosen. Other common valuation methods -especially the cash flow related- lead to the same firm value since they all rely on the same reality and the same assumptions (Fernandez 2007). Thus, other common methods like the discounted cash flow are disregarded. The methods which are not based on the same assumptions and thus do not lead to the same results are multiples (Fernandez 2007). Valuation with multiples works simplify the way that a measure for the performance of value is chosen (e.g. earnings, sales, cash flow, book value of equity, book value of assets) and the measure is multiplied with a certain value (multiple) (Palepu et al. 2019). The multiple itself can come from various sources and is at the discretion of the user. The typical ones are e.g. the difference between the measure for the performance and the market value of the firm of other firm(s) in the same industry (Palepu et al. 2019). The result of the measurement of the performance times the multiple is the estimated firm value. Valuation via multiples is among the top-most often used valuation methods on/for the capital market (e.g. Imam et al. 2008; Demirakos at al. 2004; Gleason et al. 2013). Its greatest strength is probably that it is quick and easy to use.

The residual income valuation model in its general format is based on the following equation (Frankel and Lee 1998):

$$(1) V_t = B_t + \sum_{i=1}^{\infty} \frac{(ROE_{t+i} - r_e) * B_{t+i-1}}{(1 + r_e)^i}$$

where

$V_t$  = Market value of equity of the firm in period t

$B_t$  = Book value of equity in period t adjusted by the dividend payed out

$r_e$  = cost of equity capital

$ROE_t$  = return on equity in period t

The future ROE (and hence the term behind the sigma) cannot be estimated until infinity as the equation suggests. Therefore, a simplification is needed. Following Frankel and Lee (1998) and similar to Badertscher (2011) and Dong et al. (2006) the equation used in this paper is:

$$(2) V_t = B_t + \frac{(ROE_{t+1} - r_e)}{(1 + r_e)} * B_t + \frac{(ROE_{t+2} - r_e)}{(1 + r_e)^2} * B_{t+1} + \frac{(ROE_{t+3} - r_e)}{(1 + r_e)^2 * r_e} * B_{t+2}$$

where

$V_t$  = Market value of equity of the firm in period t

$B_t$  = Book value of equity in period t adjusted by the dividend payed out

$r_e$  = cost of equity capital

$ROE_t$  = return on equity in period t

Like Badertscher (2011) and Dong et al. (2006), I limited the forecast period to three years since Lee et al. (1999) could show that the quality of the valuation is not sensitive for longer forecast horizons than three periods. I am assuming as Badertscher (2011) and Dong et al. (2006) constant future ROEs after the third period. Of all the parameters is the book value of equity in t ( $B_t$ ) is known since misrepresenting firms have to disclose this figure to the public in their restatement; the remaining parameters are unknown. These include the equity of future periods, the  $r_e$  and the ROE (for all future periods). For these parameters suitable values need to be found.

Prior literature about earnings forecasts showed that a good indicator for the next years earnings are the past years earnings (Collins 1976; Kinney 1971). Consequently, there are many prior studies using past years earnings to predict future earnings (e.g. Banker and Chen 2006; Yosra and Fawzia 2015; Dichev and Tang 2009). Collins (1976) tested the accuracy of a variety of methods which are all based on past earnings. I chose the mean-reversion method from Collins (1976) for several reasons. First, the model has a reasonably good accuracy in the predictive ability of future earnings. Second, the model is consistently independent of the misrepresented or the restated financial figures. Third, the model is independent of non-balance sheet items like GDP-growth rate predictions. Fourth, I am only predicting future ROE for 3 periods. Thus, it is a reasonably short period of time. The future ROE is estimated with the following formula:

$$(3) ROE_t = \frac{ROE_{t-1} + ROE_{t-2} + ROE_{t-3}}{3}$$

The future book value of equity (e.g. in period t+1) is the book value of equity in the previous period adjusted by the earnings of the previous period and by the remunerated dividend. The earnings of the previous period can be derived from the ROE. Thus, only the future dividends need to be estimated. For this, I choose a similar method as for the ROE. The assumption is that the dividends payed are equal to the average of the dividends of the last three periods. Mathematically, it bases on the following equation:

$$(4) \text{div}_t = \frac{\text{div}_{t-1} + \text{div}_{t-2} + \text{div}_{t-3}}{3}$$

where

$\text{div}_t$  = dividend paid in period t

Hence, the parameters known or possible to estimate are the book value of equity for all periods ( $B_t$ ) and the ROE for all periods. The one missing when applying the formula is the cost of equity ( $r_e$ ). I am therefore taking advantage of the knowledge of the misrepresented market value of the firm. In the misrepresented case, the market value of equity is known since the capital market valued the firm and gave its shares a price. The book value of equity and the ROE is estimated as described before. Thus, in this case, only the costs of equity ( $r_e$ ) are unknown. Since it is an equation with one unknown, it is solvable and consequently the costs of equity can be calculated. Written in equations, there is the following equation which is solved by  $r_e$ :

$$(5) V_t^{\text{misrepresent}} = B_t^{\text{misrepresent}} + \frac{(ROE_{t+1}^{\text{misrepresent}} - r_e)}{(1+r_e)} * B_t^{\text{misrepresent}} + \frac{(ROE_{t+2}^{\text{misrepresent}} - r_e)}{(1+r_e)^2} * B_{t+1}^{\text{misrepresent}} + \frac{(ROE_{t+2}^{\text{misrepresent}} - r_e)}{(1+r_e)^2 * r_e} * B_{t+2}^{\text{misrepresent}}$$

where

$V_t^{\text{misrepresent}}$  = Market value of equity of the firm in period t in the misrepresented case

$B_t^{\text{misrepresent}}$  = Book value of equity in period t adjusted by the dividend paid out in the misrepresented case

$r_e$  = cost of equity capital

$ROE_t^{\text{misrepresent}}$  = return on equity in period t in the misrepresented case

Everything beside the  $r_e$  is known. Hence, the equation can be solved and the  $r_e$  in the misrepresented case can be determined. The value is then inserted in the same formula with the non-misrepresented values and the market value of equity in the non-misrepresented case is estimated. The crucial assumption here is that the costs of equity ( $r_e$ ) would have been the same without the misrepresentation. One can challenge the assumption and argue that the riskiness in the non-misrepresenting case is higher. However, a greater  $r_e$  would result in a smaller firm value. Thus, choosing the smaller  $r_e$  would work against finding differences.<sup>2</sup> The market value

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<sup>2</sup> Tests with a greater  $r_e$  of e.g. +1% does not lead to qualitatively different results.

of the firm in the restated case (if there was no misrepresentation in the first place) is then derived with the following equation:

$$(6) V_t^{restated} = B_t^{restated} + \frac{(ROE_{t+1}^{restated} - r_e)}{(1+r_e)} * B_t^{restated} + \frac{(ROE_{t+2}^{restated} - r_e)}{(1+r_e)^2} * B_{t+1}^{restated} + \frac{(ROE_{t+3}^{restated} - r_e)}{(1+r_e)^2 * r_e} * B_{t+2}^{restated}$$

where

$V_t^{restated}$  = Market value of equity of the firm in period t in the non-misrepresented case based on restated data

$B_t^{restated}$  = Book value of equity in period t adjusted by the dividend payed out in the non-misrepresented case based on restated data

$r_e$  = cost of equity capital

$ROE_t^{restated}$  = return on equity in period t in the non-misrepresented case based on restated data

Hence, with the help of the formulas, I calculated the market value of equity for the hypothetical case where there has been no misrepresentation in the first place. Please note that the market value in the restated case  $V_t^{restated}$  can mathematically fall below 0. However, I intend to test market efficiency. Therefore, I am taking the market perspective. A negative firm value is for a shareholder equivalent to a value of precisely 0. Therefore, negative values for  $V_t^{restated}$  are set to 0. Since the market value of equity for the misrepresented case is known (share price times shares outstanding), I could calculate, based on these values, the gain in market value due to the misrepresentation. To be precise, I used the following formula to calculate the difference in market value:

$$(7) value\_difference = \frac{V_t^{misrepresent} - V_t^{restated}}{V_t^{misrepresent}}$$

where

$V_t^{misrepresent}$  = Market value of equity in the misrepresented case

$V_t^{restated}$  = Market value of equity in the non-misrepresented (restated) case

$value\_difference$  = percentage gain of a firm through the misrepresentation

The values for  $V_t^{restated}$  are defined in the previous paragraph strictly positive. Thus, they cannot fall below 0 but they can become 0. Therefore, to avoid a division by 0,  $V_t^{restated}$  is not



chosen as reference point for the value difference and thus not in the denominator. Instead,  $V_t^{misrepresent}$  is chosen as the denominator.

The *value\_difference* can be challenged since it is only as good as the valuation of the firm in the restated case. Therefore, to validate the results of the *value\_difference* variable, I also estimated its value based on the different valuation method “multiples”. The choice for multiples is mainly based on the following three reasons: First, prior literature identified multiples as one of the most often used valuation methods by the capital market (e.g. Imam et al. 2008; Demirakos et al. 2004; Gleason et al. 2013). Second, with the given information, multiples are applicable to a wide range of misrepresenting firms. There are e.g. no forecasts for the future needed. Third, many common valuation methods result in the same firm value since they rely on the same assumptions and realities (Fernandez 2007). Multiples are an exception. Among the multiples, I use the price-earnings multiples (earnings multiple) and price to book value (equity multiple) since they are both commonly used and cover a different part of the financial figures (Imam et al. 2008; Demirakos et al. 2004). Furthermore, to overcome problems with loss-making firms, I included revenue-multiples as well. The firm values by using multiples are calculated according to the following formulas:

$$(8) V_t^{misrepresent} = figure_t^{misrepresent} * multiple$$

$$(9) V_t^{restated} = figure_t^{restated} * multiple$$

where

$V_t^{misrepresent}$  = Market value of equity in the misrepresented case

$V_t^{restated}$  = Market value of equity in the non-misrepresented (restated) case

$figure_t^{misrepresent}$  = the underlying financial figure (earning, book value of equity, or revenue) in the misrepresented case

$figure_t^{restated}$  = the underlying financial figure (earning, book value of equity, or revenue) in the non-misrepresented (restated) case

*multiple* = the factor by which the financial figures is multiplied (earnings multiple, equity multiple, revenue multiple)

The aim is to determine the firm value in the restated case,  $V_t^{restated}$ . Therefore, following equation 9, the underlying financial figure (earnings or book value of equity) and the multiplying factor are needed. The underlying financial figure is known from the restated annual reports. The multiplying factor is unknown and cannot be observed since the firm misrepresented in the first place. I therefore approximate the factor similarly to the  $r_e$  in the

RIV-model. In equation 8, the market value of equity ( $V_t^{misrepresent}$ ) is known as is the underlying financial figure. Only the multiplying factor *multiple* is unknown. Hence, the equation can be solved, and the factor can be determined. This factor is then inserted in equation 9. Since the financial figures in the non-misrepresented case are known (from the restatement),  $V_t^{restated}$  can be calculated.  $V_t^{restated}$  and is then inserted into equation 7 to calculate an alternative value difference.

### 3.2. Determining the Market Reaction

Following the second research question, the aim is to compare the *value\_difference* with the market reaction once the misrepresentation is revealed publicly. The *value\_difference* here serves as a proxy for the severity of the misrepresentation. To capture the market reaction, I calculated the cumulative abnormal returns (CAR) around the days of the restatement announcement (see Figure 1 for a detailed explanation of the restatement announcement). As Hennes et al. (2008) point out, it is rather difficult to determine exactly when the capital market will start to anticipate that there are issues with prior annual reports and hence it is difficult to determine the exact date of the event window. Hennes et al. (2008) solved the problem by using multiple event windows. Following these authors, I will also use several windows around the event day (day 0) where the longest is -90 days to +90 days and the shortest -1 day to +1 day.

Identifying the exact event day is crucial for an event study (Boehmer et al. 1991; Brown and Warner 1980 and 1985; Kothari and Warner 2007). The aim of determining the market reaction in this paper is to compare it with the value difference due to the misrepresentation. The question is at what date did the market have the information available to react and consequently reacted. Prior literature typically uses the restatement date (e.g. Palmrose et al. 2004; Hennes et al. 2008). I am deviating slightly from this by choosing the date when the first doubts were raised publicly e.g. in a newspaper article. The impact of the deviation in timing is minor since in the entire sample, the restatement announcement is a maximum of 1 day behind the doubts previously raised publicly. This difference is covered by the event window. One benefit of the approach was that I could fairly accurately determine the date when the public first had access to a potential misrepresentation. The drawback of the date is that the extent of the misrepresentation remains unclear. The extent is disclosed by the firm typically months if not years later and attached to a quarterly or annual report.

Thus, it would be interesting to observe the market reaction at the point in time when the misrepresentation including its extent becomes public knowledge. In reality, this is not a

point in time, it is a time span. It starts with the revelation, typically by the firm itself, that something has gone wrong with past financial reports. The whole extent of the problems in financial terms becomes known to the public once the firm restates (Palmrose et al. 2004). However, the restatement can be months if not years after the revelation. Moreover, the restatement is typically included in a quarterly or annual report and consequently not an isolated event. It is rather one event which is accompanied by multiple further information. Hence, choosing the whole restatement period from the announcement until the disclosure of the corrected financial figures would result in a long event window and would consequently be very hard to measure reliably. Moreover, the effects of the disclosure of the restated financial figures is hard to measure since it is done jointly with the disclosure of non-restated financial figures. Therefore, my focus has relied solely on the restatement announcement as the event day.

Normal returns are calculated based on the returns of the S&P 500 and the firm's individual risk (beta) factor. The abnormal returns are the difference between the observed returns and the calculated normal returns. The abnormal returns summed up over the event window results in the cumulative abnormal returns (CAR). For a more in-depth explanation of an event-study design, I would refer to Kothari and Warner (2007). Mathematically written, the following equations determine the CAR:

$$(10) AR_{i,t} = ret_{i,t} - E(ret_{i,t})$$

$$(11) CAR_{(t1,t2)} = \sum_{t1}^{t2} \frac{1}{N} \sum_{i=1}^N AR_{i,t}$$

where

$AR_{i,t}$  = abnormal returns of firm i on trading day t.

$ret_{i,t}$  = observed returns of firm i on trading day t.

$E(ret_{i,t})$  = expected returns for firm i given the development of the S&P 500 on trading day t.

$CAR_{(t1,t2)}$  = cumulative abnormal returns around the day event day. t1 and t2 are the beginning and the ending day for the event window (e.g. t1 = -90 days, t2 = +90 days).

N = number of firm-years in the sample

### *3.3. Relationship Between the Market Value Difference and the Market Reaction*

The market value difference is used in this paper as a proxy for the severity of a misrepresentation. This difference is then compared with the market reaction around the time when the misrepresentation was revealed. The underlying question is this whether a more severe

misrepresentation causes a greater market reaction. The analysis is performed with the following OLS-regression:

$$(12) CAR_{(t1,t2)} = \alpha + \beta_1 value\_difference_i + \epsilon$$

where

$CAR_{(t1,t2)}$  = cumulative abnormal returns around the day where the issues with prior financial figures were disclosed. t1 and t2 signal the upper and lower end of the event window (e.g. t1 = -90 days, t2 = +90 days).

$value\_difference_i$  = percentage gain of a firm through the misrepresentation.  $i$  represents the method (RIV-method, Multiples) with which the percentage gain (and consequently the value difference) is calculated

According to the semi-strong form of market efficiency, the shareholder would react more strongly to an increasing severity in the misrepresentation. Hence, the expected result for the  $\beta_1$ -coefficient would be positive and significant.

#### 4. Data

In the U.S. government there is an agency whose task is (among others) to investigate and detect potential misrepresentations. This government agency is the U.S. Securities and Exchange Commission (SEC). The process of how the SEC determines misrepresentations is described by Cunningham and Leidner (2020) and by Stice-Lawrence (2020). According to the authors, such an investigation typically starts by reviewing the periodic filings of firms such as annual reports. Moreover, the SEC uses further public sources (e.g. earnings calls) and non-public sources (e.g. whistle-blower information). If the SEC has concerns after the initial investigation, it contacts the particular firm and asks for clarification. If the answers from the firm do not satisfy the SEC, a full investigation is launched. In cases where violations are found, the SEC makes them public in their Accounting and Auditing Enforcement Releases (AAER). Moreover, a team of SEC prosecutors takes the case further.

The SEC does not check every disclosure of the firm due to a lack of resources. However, they check around 30% of the annual reports filed with the SEC (Dechow et al. 2011). The choice of which firm to investigate lies solely in the hands of the SEC. Nevertheless, it is known that the SEC starts investigations following certain indicators like a voluntary restatement (Dechow et al. 2011). Thus, the firms are not chosen randomly by the SEC but according to certain criteria.

A violation of Section 13(b) of the 1934 Securities and Exchange Act would be an outcome of an investigation which the SEC would report in an AAER. Since this is also the definition of a misrepresentation in this paper, I collected the data similarly to Dechow et al. (2011) from AAER reports. It is also the same dataset as in Kloppenburg (2021).

Moreover, I took advantage of firms restating their annual reports after a misrepresentation. I collected from these restatement equity and earnings figures for cases where the firm would not have initially restated. Therefore, the problem is that such a restatement is typically disclosed as part of a quarterly (10-Q) or annual report (10-K). Hence, the firm needs to be listed when the restatement needs to be published. This excludes several firms from the dataset who delisted e.g. as part of bankruptcy procedures. The restated data is hand-collected from EDGAR. Non-restated (as disclosed) data originates from COMPUSTAT. Capital market information was collected from the CRSP. Since filings to the SEC are available on EDGAR for most firms from 1996 onwards, the dataset is limited to firms who restated after 1996. It should be noted that these firms could have misrepresented before 1996 but if these

firms published their restated financial figures during or after 1996, they are included in the dataset.

In total 463 firms could be identified from the AAERs. An overview of the selection process can be found in *Appendix A* (which originates from Kloppenborg (2021) Appendix B). Collecting, especially the restated financial figures, as well as calculating the firms' values is time-consuming work. Therefore, I restricted the dataset to 100 randomly selected firms. I am therefore using the same dataset as Kloppenborg (2021). The author used the following identification strategy for the 100 randomly selected firms:

- 1) Each of the 463 firms was assigned a random number.
- 2) The firms were sorted according to the randomly assigned number from the smallest to the highest.
- 3) Starting with the first firm, the data from COMPUSTAT was confirmed if available by the filings to the SEC disclosed on EDGAR. In cases where there was no overlap between the COMPUSTAT and the filings, the firm was excluded.
- 4) Starting with the first remaining firm, the relevant restated data was collected from the filings to the SEC from EDGAR. In cases where no restated data was available, the firm was excluded from the sample.
- 5) The collected restated numbers were checked for plausibility by comparing the numbers with newspaper articles and AAERs. Firms whose restated figures did not coincide with the findings published by the SEC or the media were excluded from the sample. (Kloppenborg 2021, pp. 18-19)

Finally, the 100 firms assigned with the lowest numbers and with sufficient plausible data were selected. The 100 firms misrepresented 245 firm-years between 1993 and 2009. An overview of the firms can be found in *Table 1 Panel A*. The distribution is to the extent that it is possible comparable with the distribution of the total sample.

The majority of the misrepresented firm-years are between the years 2000 and 2005. The data was collected from the AAERs. The AAERs are the result of SEC-investigations. Such investigations normally take around 2-3 years. An investigation typically starts once the misrepresentation period is over. Such a period can take up to 7 years. Hence, a misrepresentation can take over 10 years before it enters the dataset. The last AAER on which the dataset is based is from 2015. Consequently, there is a decline from 2006 onwards.

As *Table 1 Panel B* shows, not all of the 100 randomly selected firms and the 245 firm-years could be used in the analysis. For 37 firms, the restated earnings figures could not be found in EDGAR. Therefore, these firms were excluded from the analysis resulting in 63 firms (142 firm-years) being used to calculate the firm value with earnings multiples. Restated equity values were missing in 42 cases. This led to a sample of 58 firms (129 firm-years) used to calculate the firm value with the equity multiple. Restated revenue values were missing in 41 cases. Thus, the sample to calculate the revenue multiple consists of 59 firms (132 firm-years).

For the RIV-model, restated earnings and restated equity figures for multiple past periods were also needed. Hence, 48 firms were excluded because of missing restated data. Moreover, I calculated the  $r_e$  following equation (5). For 5 firms, this  $r_e$  was negative for all the firm-years. I considered a negative discount rate as unreasonable and consequently excluded the firms. Thus, the total sample consists of 47 distinct misrepresenting firms representing 89 firm-years.

An important event date in this study is the date when the misrepresentation was first revealed to the public. I collected these dates from the restatement announcements of the firm itself, the firm's press releases, from newspaper articles, or analyst reports. I primarily relied on the database of FACTIVE<sup>3</sup>. I took the firm name as the major search term. I limited the search to the time after the misrepresentation period. Then I went through the outcome of the search for each firm and identified the event date based on the media sources (most often the restatement date). I also read the articles to identify whether the articles referred to other sources e.g. analyst reports. In the case of a referral to other sources, I searched for the other source and identified the event date there. Moreover, I went through the search results prior the event date in case there had been any clues indicating a misrepresentation. However, no clues were found. If necessary, I verified the event dates with the 8K filings to the SEC collected from EDGAR. In cases where there was a hint of an analyst report discussing a potential misrepresentation, I collected the particular analyst report and identified from the report the specific date. In these cases, the date was not determined by the restatement announcement, the date differed from the restatement announcement by a maximum one day. It should be pointed out that typically the full extent of the misrepresentation is unknown. Only the first information is presented that was provided to the public indicating that prior financial figures should not be trusted.

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<sup>3</sup> FACTIVE is a database which contains products of thousands of media sources like newspaper articles. Among others, they cover all major newspapers in the USA. (<https://professional.dowjones.com/factiva/>)

## 5. Results

The results section is structured in line with the method section. It starts with the valuation of the firm for the cases where there has not been a misrepresentation in the first place. Thereafter, the CAR is determined. In the final section, the CAR and the difference in the market value between the misrepresented and the non-misrepresented cases are shown and discussed.

### 5.1. Market Value Difference

The first main aim of the research was to identify how much unwarranted market value of equity was created by a misrepresenting firm because of the misrepresentation. In other words, the aim was to measure the difference between the observed market value of the misrepresenting firm and a hypothetical market value at the same point in time if the firm had not originally not misrepresented. In principle, the aim was achieved by comparing the market value of the firm as it was observed with an estimated market value for the case of no-misrepresentation. I am therefore taking advantage of the firm's own restated financial figures and calculations based on the fundamental value. This fundamental value for the non-misrepresented case is estimated with the RIV-model and as a validity check with multiples. A detailed explanation of the calculation steps can be found in the method section.

Table 2 provides an overview of the most relevant descriptive statistics for the valuation of the firms. The table contains the earnings, book value of equity, return on equity, and the market value of equity both in the misrepresented case and in the non-misrepresented to the extent that it is observable. Hence, the market value of the equity in the non-misrepresented case is not shown. A more in-depth analysis of the accounting characteristics of misrepresenting firms can be found in Kloppenburg (2021).

The descriptive values disclosed in Table 2 show, first and foremost, that misrepresenting firms typically misrepresent to increase their earnings figures, their book value of equity figures, their revenue figures, and the *ROE*. As the t-test for mean difference and the sign-rank test for the difference in the distribution show, the increase in the figures is significant with the exception of the mean-difference in the revenue and the *ROE*. Moreover, the sample of misrepresenting firms covers a variety of different sized firms. Whether seen from the perspective of the book value of equity or the market value of equity, the mean is at least two times larger than the median. Since the mean is more prone to outliers, this gap between the mean and median reflects the presence of a few large firms in the dataset. Because the values are not scaled, this state of affairs is quite normal.



The valuation of the firms relies on identifying the cost of equity ( $r_e$ ) or on the multiplying factor(s). Hence, one part of my calculations aimed to identify these values using valuation models commonly used in the capital market (e.g. Imam et al. 2008; Demirakos et al. 2004; Gleason et al. 2013). The results are displayed in Table 3. The difference in the sample size is due to the limitations in the available data. In addition, costs of equity below 0 are considered as unreasonable and consequently neglected. Moreover, please note/ it should be noted that earnings can be negative (firms making losses). The market value of equity can by definition not fall below 0. Thus, a negative multiple is needed for negative earnings to result in a positive market value. The same logic applies to the book value of equity although these cases are much rarer.

The median for the cost of equity ( $r_e$ ) with 2.6% suggests that investors expect only a return of 2.6% on their invested capital. In addition, the 75<sup>th</sup> percentile is only 4.4% moderately higher. However, the 10-year US treasury bond yields in the respective years went down to 2.42%<sup>4</sup> in December 2008. The 2-year US treasury bond yields are in the November of 2008 down to 0.8%. Hence, the costs of equity of 2.6% and below are feasible<sup>5</sup>.

The results of the valuation are shown in Table 4. Please note/ It should be noted that firm values below zero are set to zero since this is the minimum value of a firm from an investor's perspective. In Panel A, the firm value is estimated with the RIV-model. In the first column of this panel, the firm value in the misrepresented firm-years are shown as they occurred on the capital market, in the second column, the estimated firm value of the non-misrepresented case is disclosed, and in the third column, the result of the difference between the misrepresented and the non-misrepresented firm value is in percentages. The remaining columns contain the t-test for mean difference and the sign-rank test for differences in the distribution. The results suggest that firms typically gain in the market value of their equity due to the misrepresentation. The gain in firm value can be seen to be on average 29.6% . When comparing the 25<sup>th</sup> percentiles of the misrepresented and non-misrepresented cases, the firm value more than doubled due to the misrepresentation. The increase in firm value is thereby significantly independent whether seen from the mean difference (t-test) or the difference in the distribution (sign-rank test).

The results of the firm valuation using earnings-multiples is shown in Table 4 Panel B. Earnings can switch/alter the algebraic sign due to the misrepresentation. Hence, a firm making

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<sup>4</sup> Data originating from FRED, the economic research database of the Federal Reserve Bank of St. Louis.

<sup>5</sup> Excluding firm-years e.g. with cost of equity below 1% does not influence the results meaningfully.

a profit (loss) in the misrepresented case might make a loss (profit) in the non-misrepresented case. Such firms would then be multiplied with a positive (negative) multiple. The firm value would consequently become negative. To check whether the results are affected by this phenomenon, I made two modifications: First, I excluded all firm-years where a profit became a loss or a loss became a profit due to the misrepresentation. Second, I changed the algebraic sign of the multiple. A negative multiple which was used for a loss in the misrepresented case became positive for a profit in the non-misrepresented case and vice versa. The results of both modifications do not differ qualitatively from the results without modification. The algebraic signs especially in Table 4 Panel B as well as the significances remain the same. Thus, with these data, firm values are robust towards the phenomenon of changes in the algebraic sign of earnings between the misrepresented and non-misrepresented case.

When analyzing the results of Table 4 Panel B, the question about significances first needs to be addressed. Seen from the mean difference, there is no significance. Hence, when observing the means only, the firm value of misrepresenting firms does not differ from the firm value of the non-misrepresented case. However, seen from the difference in the distribution (the sign-rank test), a clear difference is notable. Firms have higher valuations in the misrepresented cases compared to the non-misrepresented ones. When looking at the firm values themselves, the value in the misrepresented cases seems to be consistently above the value in the non-misrepresented cases. When comparing the firm values of the mean, the 25<sup>th</sup> percentile, the median, or the 75<sup>th</sup> percentile, the value is higher each time in the misrepresented cases than in the non-misrepresented. Nevertheless, the 25<sup>th</sup> percentile of the percentage difference is negative. Thus, although not visible in the nominal values there is a sizeable number of cases where the firm value decreases due to the misrepresentation. These are cases where firms misrepresented the financial figures downwards e.g. as part of earnings smoothing. In the majority of the cases, however, as the median and the 75<sup>th</sup> percentile signal, the firm value increases due to the misrepresentation.

The amount of the increase in firm value varies. Seen from the mean perspective, the firm value increases by 76%. Since the 75<sup>th</sup> percentile is at 14.8% clearly lower, few outliers must influence the result upwards. If I exclude all firm value gains above 100% and all firm value losses below -100%, the mean falls to 4.15%. The median value is at 2.6% comparatively low. Nevertheless, 2.6% of the firm values are e.g. for a firm with median firm value a difference of almost USD 15 million. Thus, I would argue that it is sufficient to be not only of statistical significance but also of economic relevance.

The results of the firm valuation using equity multiples is shown in Table 4 Panel C. Unlike the earnings multiple, the results seem to be smoother probably because the equity is less volatile compared to the earnings. The mean value of the difference in firm value between the misrepresented and non-misrepresented case is 7.7% below the 75<sup>th</sup> percentile at 9.3%. Moreover, the value difference is not negative at the 25<sup>th</sup> percentile. The value is precisely 0. It reflects the fact that there are cases with a value difference below 0 (meaning a value decrease due to the misrepresentation). However, these cases are rarer than in the earnings multiple cases. Consequently, the positive mean and distribution difference are both statistically significant. It can hence be concluded that misrepresenting firms increase their firm value in general with the misrepresentation.

The results of the valuations of the firms using revenue multiples is shown in Table 4 Panel D. A major difference between the revenue on the one side and earnings as well as equity on the other side is that there are numerous cases where the revenue is not misrepresented. This could occur e.g. if only expenses are misrepresented. Hence, the calculated firm value using the revenue multiple does not differ and consequently the 25<sup>th</sup> percentile of the value difference is 0. However, despite the no-change bias, the results indicate a statistically significant difference between the misrepresented and the non-misrepresented firm value. The question about the economic relevance is difficult to answer. Of course, the mean value difference of 14.1% signals a clear impact of the misrepresentation on the fundamental firm value. However, the median difference of 0.5% is questionable. If I nevertheless exclude cases where the revenue was not misrepresented and thus where the firm value does not differ, the median increases to 1.6%. Whether 1.6% are economically significant is a question for each individual investor. However, let me point out that a difference in firm value of 1.6% is for a firm with a median firm value a difference of around USD 11 million.

The first research question was about the amount by which the fundamental firm value differs. The results can be found in Table 4 and in the paragraphs above. The mean gain in values ranges from 7.7% to 29.6% and the median gain in values ranges from 1.6% to 17.6%. The differences in the values are explained by the different valuation methods used. However, the direction is in all cases the same. Independent of the method, the results consistently indicate that there is an economically substantial increase in the fundamental firm value due to the misrepresentation.

## 5.2. Market Reaction to the Restatement Announcement

Table 5 contains the results of the CAR around the date when the misrepresentation was first revealed to the public. The date itself can vary depending on the source from which the date is collected. However, this variation is in this paper a maximum of one day. Moreover, typically on the event day itself the full extent of the misrepresentation is not known. Normally, some information is disclosed to the public indicating that prior financial statements are likely to be incorrect. Further information is then provided in the days, months or even years following.

The results are provided for the market reactions in the window -1 day to +1 day around the first revelation, -3/+3, -5/+5, -15/+15, and -90/+90.<sup>6</sup> The results indicate first and foremost a decline in the market value due to the revelation of the misrepresentation. This decline is larger as the window becomes wider. Thus, while the mean drop in market value is in the -1/+1 window “only” -8.6%, it is -38% in the case of a -90/+90 window. The median market drop is in general lower than the mean drop. It ranges from -3.5% for the -1/+1 window to -33.4% in the -90/+90 window.

Prior literature determined the market reaction on the announcement of a restatement as a consequence of a previous misrepresentation (e.g. Palmrose et al. 2004, Hennes et al. 2008). The results suggest that the market reaction around the event day ranges from approximately -13% (Hennes et al. 2008) to -20% (Palmrose et al. 2004). My results are for the same window (-1/+1) with a mean of -8.6% less negative compared to prior literature. For the window -90/+90, prior literature identifies a mean drop in market value of -26.6% (Hennes et al. 2008). My results are at -38% even more negative. A potential explanation for the differing results are differences in the underlying datasets. For example, Palmrose et al. (2004) used a dataset from 1995 until 1999. While my dataset covers these years, its main weight is after 2000 (as seen in Table 1). Hence, differences in the market perception or in the legal framework e.g. as a result of the Enron scandal and the introduction of SOX may have an impact on the market reaction. Another potential explanation for the differences in the market reaction is the requirement of my dataset for restated financial figures. To calculate the firm value, I rely on restated financial figures. However, not every misrepresenting firm also restates. Most notably, firms which disappear from the market e.g. because of a bankruptcy are not in my dataset. Thus, the

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<sup>6</sup> Other windows (e.g. -3/+15, -5/+90) have been tested as well without any qualitatively different results (but naturally quantitatively different results).

comparability of my results with prior literature is limited. However, since the direction and the general magnitude is similar, I would consider my results as being in line with prior literature.

### *5.3. Market Value Difference and Market Reaction*

The second aim of the research was to identify whether there is an association between the gain (loss) in the fundamental value of the misrepresenting firm and the market reaction once the misrepresentation is revealed to the public. The corresponding results to the aim are disclosed in Table 6. The Table contains the results of an OLS-regression where the CAR is the dependent variable and the fundamental value difference is the independent variable. There is one regression for each CAR-window (-1/+1, -3/+3, -5/+5, -15/+15, and -90/+90) and for each of the different valuation methods (RIV-model, earnings multiple, equity multiple, revenue multiples). It needs to be noted that the earnings multiple does not cover cases where the earnings have been positive in the misrepresented cases and negative in the restated cases. Therefore, the number of observations is lower for the cases of the earnings multiple than for the equity multiple and would otherwise be equal. Moreover, please note that the numbers of observations decreased compared to previous tables because of a lack of data. The CRSP has at least 180 trading days before and 90 trading days after the restatement announcement – but not for all firms.

All the results, with one exception, are insignificant meaning that there is no linkage between the value gain due to the misrepresentation and the value loss once the misrepresentation is revealed. The one exception is the result for the equity multiple and the 181-day window (-90/+90). Here, however, it needs to be noted that during a 181-day window many more events could have occurred which could influence the firm value but are unrelated to the misrepresentation. Moreover, the variable is only significant on a 10% level as well as the only significant variable among all remaining variables including the two other cases with the 181 day window. Therefore, this result is neglected.

The second research question inquired about the association between the (artificial) value gain (loss) of the misrepresenting firm and the market reaction once the misrepresentation was revealed. Given the lack of significances (with the one exception), the interpretation is that the market reaction is independent of the value gain due to the misrepresentation. Thus, I could not identify any association between the difference in the fundamental value and the market reaction around the day the misrepresentation was revealed. This is to a certain extent unforeseen since the adjustment of the share price once the misrepresentation is revealed should

logically include at least the amount gained due to the misrepresentation. However, the adjustment seems to be unaffected by the value difference due to the misrepresentation. One explanation for this finding could be the phenomenon that the revelation of the misrepresentation (typically a restatement announcement) normally contains only scant information beside the announcement that the prior annual report(s) should not be trusted. Nevertheless, the lack of significance also exists in the case of -15/+15 and even -90/+90 meaning that 90 trading days after the announcement when the capital market actors had the opportunity to check the prior annual reports with the knowledge that something is incorrect. The number of days is therefore the days when the stock is traded on the market. Since the stock is not traded e.g. on a public holiday, the number of calendar days exceeds 90. Due to the number of days in which the capital market actors had time to reassess the prior financial figures, the lack of information does not seem to be the explanation of the phenomenon.

If the market value of equity was too high by a certain percentage due to the misrepresentation, one might assume that the market value should decrease at least by a certain percentage once the misrepresentation is revealed. However, the results do not support this train of thought. In fact, there seems to be no relation between gain in market value due to the misrepresentation and the loss in market value once the misrepresentation is revealed. One way to interpret the results is that the investors were aware of the misrepresentation before it was revealed publicly. Nevertheless, the SEC has to be unaware of the misrepresentation since the SEC did not initiate an investigation before the event. The consequence would be that the investors were aware of the misrepresentation while the SEC was not. Whether this combination is feasible can be doubted. Hence, I do not see any support for investors being aware of the misrepresentation before it was revealed to the public.

Furthermore, the results can be interpreted as a failure of the market to take the fundamental value difference into account when revaluing the firm once the misrepresentation had been revealed. Given the value relevance of earnings shown in prior literature (e.g. Bae and Jeong 2007; Collins et al. 1997; Clarkson et al. 2011), this interpretation would be unpredictable. Moreover, I cannot imagine any scenario in which the capital market can be considered as rational and efficient when it disregards the fundamental value of a firm. Consequently, the results would support the conclusion of an anomaly in the efficient market hypothesis.

Research question 2 asked whether there is an association between the artificial gain in firm value due to the misrepresentation and the market reaction once the misrepresentation

becomes public knowledge. The evidences suggest that there is no such association. It seems as if the market reaction does not take into account by how much the firm value was previously increased as a consequence of the misrepresentation.

## **6. Conclusion**

This paper analyses whether the capital market perceives financial misrepresentations and how it reacts when misrepresentations are revealed . It thereby aims to contribute to the efficient market hypothesis (semi-strong form). A major novelty of the paper is that it combines misrepresentations and the market efficiency hypothesis. To the best of my knowledge, this has not yet been done previously. Misrepresentations are rather uncommon events. However, according to the prior literature, when misrepresentations occur, they have a drastically negative impact on share prices (e.g. Palmrose et al. 2004; Hennes et al. 2008). Testing the market efficiency hypothesis in this surrounding may not only help to improve our knowledge about misrepresentations, it also helps to improve our knowledge about the market efficiency hypothesis when it meets an uncommon event with drastic effects on the market.

The efficient market hypothesis in the semi-strong form says that all publicly available information is included in the share price of a company. In the context of this paper, it means that the new information of a misrepresentation should be reflected in the share price once the misrepresentation becomes publicly available. This is also occurs as a drop in share price after the announcement of a restatement is announced. However, I went further. I calculated the fundamental value for cases where the firm disclosed the non-misrepresented financial statements in the first place based on restated financial figures and with the help of two common valuation methods (RIV-model and multiples). The results indicated that the market reaction is independent of the difference in the fundamental firm value. There seems to be no linkage between the difference in the fundamental firm value due to the misrepresentation and the market reaction once the misrepresentation becomes public at least on a horizon of up to 90 trading days. It is at least questionable whether such a behavior is covered by the efficient market hypothesis. It rather hints towards an anomaly and the conclusion that the capital market is in the rare case of a misrepresentation not entirely efficient.

A further aim of the paper was to identify the amount of the firm value which the misrepresenting firm gains due to the misrepresentation. Depending on the method used to determine the firm value for the firm in the non-misrepresented cases, the average firm value gains of up to 29.6% could be shown. The median value, which is less influenced by the few

extreme observations, ranges depending on the method between 1.6% (after adjustments) and 17.6%. In all cases, the median difference is statistically and economically significant. Hence, the unwarranted value gain through a misrepresentation is substantial. Summarized, the research questions can be answered in the following way: There is a substantial (artificial) gain in the firm's value as a consequence of the misrepresentation and there is no association between the (artificial) gain in the firm's value and the market reaction once the misrepresentation is revealed to the public.

The results are based on a random sample of misrepresenting firms. Hence, these firms were all detected as deliberately altering financial figures by the SEC. Consequently, the quality of the sample and the transferability to other firms or other countries depends on the quality of the SEC's work. Moreover, the requirement for misrepresenting firms in the sample is that the firm had to provide reliable restated financial figures. Thus, firms not restating e.g. because they went bankrupt are not included in the sample. What impact this requirement has on the results cannot be estimated due to a lack of data. However, when taking these two points into consideration, the tests are constructed in a way that the results are valid and reliable.

As many other studies, this study also faces a few limitations. Most notably, the firm's value of the misrepresenting firm for the cases where the firm did not misrepresent is unobservable. The calculation of the fundamental firm value is based on the valuation methods. Thus, although these valuation methods are standard methods, their outcome is only an approximation of what the true value would have been. A further limitation arises from the choice of the event window. The longer the chosen event window is the more likely the other events around the event will be included in that event window. This can, in the case of this paper, be beneficial such as some information leakage before the restatement announcement; it can also be unfavorable if an unrelated event happens. This paper tries to address the problem by choosing different event windows. However, the effect of such unfavorable events cannot be eliminated.

A normal question following the uncovering of an anomaly in the efficient market theory is whether the anomaly can be exploited. It is especially interesting for shareholders since exploiting a market-inefficiency can mean earning money for them. Moreover, the question arises why the capital market is in this particular case inefficient. In addition, the question can be approached as to whether the artificial gain in the market value can one day be reversed in the way that the efficient market hypothesis suggests. All these three questions should be addressed in future research.



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FIGURE 1

Typical Sequence of a Misrepresentation

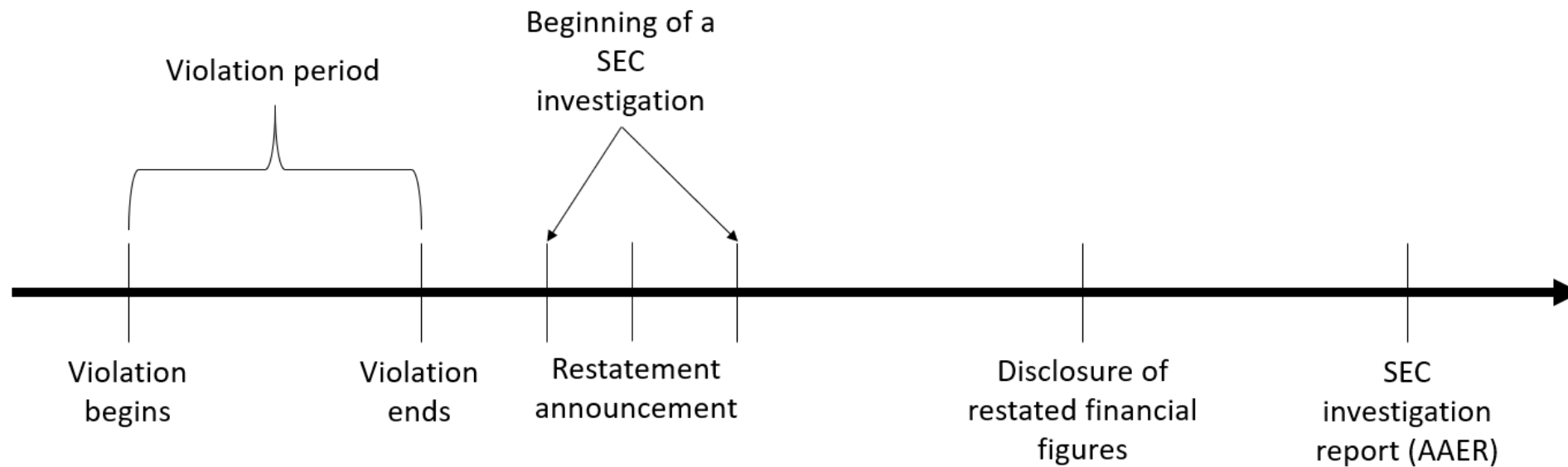


TABLE 1

## Overview of the Data

Panel A: Frequency of Misrepresenting Firm-years by Fiscal Year of the Sample of 100 randomly selected firms

Fiscal Year	Number of Misrepresenting Firms in the Year	Percentage	Fiscal Year	Number of Misrepresenting Firms in the Year	Percentage
1993	1	0.41	2002	28	11.42
1994	5	2.04	2003	32	13.06
1995	6	2.45	2004	24	9.80
1996	14	5.71	2005	18	7.35
1997	10	4.08	2006	10	4.08
1998	11	4.49	2007	10	4.08
1999	16	6.53	2008	6	2.45
2000	24	9.80	2009	2	0.82
2001	28	11.42	<b>Total</b>	<b>245</b>	<b>100</b>

Overview of misrepresented firm-years by fiscal year for 100 randomly selected misrepresenting firms in the dataset. The table follows Kloppenburg (2021) Table 2.

Panel B: Overview of the Reduction in Sample Size

	Number of firms	Number of firm-years
<b>RIV-Model</b>		
Number of firms randomly selected	100	
Number of firms excluded because of missing equity and earnings data	48	
Number of firms excluded because of an $r_e$ below 0	5	
<b>Number of firms included for the RIV-method</b>	<b>47</b>	<b>89</b>
<b>Earnings Multiple</b>		
Number of firms randomly selected	100	
Number of firms excluded because of insufficient earnings data	37	
<b>Number of firms included for the earnings multiple</b>	<b>63</b>	<b>142</b>
<b>Equity Multiple</b>		
Number of firms randomly selected	100	
Number of firms excluded because of missing equity data	42	
<b>Number of firms included for the equity multiple</b>	<b>58</b>	<b>129</b>
<b>Revenue Multiple</b>		
Number of firms randomly selected	100	
Number of firms excluded because of missing revenue data	41	

**Number of firms included for the revenue  
multiple**

**59**

**132**

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TABLE 2

## Descriptive Statistics

		misrepresented			non-misrepresented			t-test		sign-rank test	
	N	mean	median	st. dev.	mean	median	st. dev.	t-value	p-value (two-sided)	z-value	p-value (two-sided)
earnings	89	115.678	28.017	530.525	99.639	20.223	510.061	2.272**	0.026	5.999***	0.000
book value of equity	89	827.245	315.844	1895.559	735.068	281.053	1720.564	2.400**	0.019	6.645***	0.000
revenue	89	1956.243	605.817	5074.128	1883.345	558.164	5006.544	1.561	0.122	4.064***	0.000
ROE	89	0.074	0.098	0.275	0.060	0.074	0.264	1.467	0.146	4.370***	0.000
market value of equity	89	3408.008	737.775	11948.940							

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

TABLE 3

## Underlying Valuation Variable - Costs of Capital and Multiples

	N	mean	std. dev.	0.25- percentile	median	0.75- percentile
r_equity	89	0.035	0.034	0.013	0.026	0.044
Earnings-multiple	142	26.333	120.254	-1.407	19.398	33.283
Equity-multiple	129	3.430	4.231	1.424	2.407	4.160
Revenue-multiple	132	2.528	4.280	0.638	1.185	2.693

TABLE 4

## Value Difference Misrepresented Firm-Year vs. Non-Misrepresented Firm-Year

PANEL A: fundamental value RIV-model						
				significance tests		
	misrepresented	non-misrepresented	value_difference	t-value	z-value	p-value (two-sided)
N	89	89	89			
mean	3408.008	2992.755	0.296	2.209**		0.030
st. dev.	11948.940	11792.410	0.355			
0.25-percentile	299.947	114.282	0.060			
median	737.775	424.859	0.176		6.556***	0.000
0.75-percentile	1698.325	1464.162	0.536			
PANEL B: fundamental value earnings-multiple						
				significance tests		
	misrepresented	non-misrepresented	value_difference	t-value	z-value	p-value (two-sided)
N	142	142	142			
mean	3178.573	2743.826	0.760	0.657		0.512
st. dev.	10746.190	12575.590	8.445			
0.25-percentile	260.058	124.024	-0.118			
median	758.696	551.327	0.026		4.470***	0.000
0.75-percentile	1698.325	1473.990	0.148			
PANEL C: fundamental value equity-multiple						
				significance tests		
	misrepresented	non-misrepresented	value_difference	t-value	z-value	p-value (two-sided)
N	129	129	129			
mean	3412.310	2926.698	0.077	2.447**		0.016
st. dev.	11250.900	10365.640	0.478			
0.25-percentile	257.483	175.570	0.000			
median	753.036	646.679	0.028		7.180***	0.000
0.75-percentile	2011.990	1677.979	0.093			
Panel D: fundamental value revenue multiple						
				significance tests		
	misrepresented	non-misrepresented	value_difference	t-value	z-value	p-value (two-sided)
N	132	132	132			
mean	3352.212	3161.575	0.141	2.031**		0.044

st. dev.	11128.970	10853.000	0.704			
0.25- percentile	248.107	228.746	0.000			
median	747.206	708.923	0.005		4.686***	0.000
0.75- percentile	1990.668	1981.425	0.041			

The table contains the market value of the equity, first for the misrepresented sample as it was shown on the capital market. Second, the non-misrepresented fundamental value as it was calculated with the RIV-model (Panel A), earnings multiple (Panel B), equity multiple (Panel C), and the revenue multiple (Panel D). The difference between the two valuations measured in percentages follows in the next column. Furthermore, the differences between the misrepresented and non-misrepresented firm value is measured with a t-test for mean difference and a sign-rank test for the median difference (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ).

TABLE 5

## Market Reaction Enveloping the Revelation of a Misrepresentation (Restatement)

Day range		+90/-90	-15/+15	-5/+5	-3/+3	-1/+1
CAR	mean	-0.3797772	-0.10234	-0.1055622	-0.1066621	-0.0859171
	median	-0.3340052	-0.087352	-0.0432224	-0.0356499	-0.0354575

The table contains the mean and median value for the misrepresenting firms once the misrepresentation is revealed to the public (typically a restatement announcement) for the day range around the announcement: -90/+90, -15/+15, -5/+5, -3/+3, -1/+1.

TABLE 6

Comparison of the Cumulative Abnormal Returns and the Fundamental Value Difference

Valuation Method	3-day window (-1; +1)				7-day window (-3; +3)				11-day window (-5; +5)			
	CAR	CAR	CAR	CAR	CAR	CAR	CAR	CAR	CAR	CAR	CAR	CAR
RIV-model	0.0135				0.0208				-0.058			
	(-0.108)				(-0.172)				(-0.432)			
Earnings multiple		0.0142				0.0187				0.0255		
		(-0.607)				(-0.676)				(-0.822)		
Equity multiple			0.0208				-0.0151				0.00748	
			(-0.284)				(-0.205)				(-0.093)	
Revenue multiple				0.0238				0.0101				0.0169
				(-0.546)				(-0.232)				(-0.355)
Constant	-0.104*	-0.101***	-0.111***	-0.112***	-0.0985*	-0.109***	-0.112***	-0.115***	-0.101	-0.136***	-0.137***	-0.138***
	(-1.825)	(-3.462)	(-3.023)	(-3.128)	(-1.786)	(-3.161)	(-3.075)	(-3.213)	(-1.659)	(-3.505)	(-3.424)	(-3.517)
Observations	30	35	40	41	30	35	40	41	30	35	40	41
R-squared	0	0.011	0.002	0.008	0.001	0.014	0.001	0.001	0.007	0.02	0	0.003
t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1												

TABLE 6 (Continued)

Valuation Method	31-day window (-15; +15)				181-day window (-90; +90)			
	CAR	CAR	CAR	CAR	CAR	CAR	CAR	CAR
RIV-model	-0.128 (-0.842)				0.161 (-0.484)			
earnings multiple		-0.00452 (-0.142)				-0.0453 (-0.263)		
equity multiple			0.064 (-0.718)				0.423* (-1.911)	
Revenue multiple				-0.0222 (-0.415)				-0.0526 (-0.409)
Constant	-0.144** (-2.091)	-0.149*** (-3.715)	-0.180*** (-4.017)	-0.173*** (-3.885)	-0.448*** (-2.919)	-0.390*** (-3.407)	-0.464*** (-4.247)	-0.348*** (-3.326)
Observations	29	34	39	40	22	29	31	40
R-squared	0.026	0.001	0.014	0.005	0.012	0.003	0.112	0.004
t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1								

The table contains an OLS-regression with the cumulative abnormal returns (CAR) in the respective day window as dependent variable and the fundamental value difference as independent variable.

## APPENDIX A

Sample selection of the firms' subject of Accounting and Auditing Enforcement Releases (AAERs) between 1993-2013 as in Kloppenburg (2021)

<b>Number of distinct firms</b>	<b>Number</b>
Firms with at least one annual AAER case	585
Less: firms with missing CIK-code	(102)
Less: missing COMPUSTAT data	(20)
Total number of misrepresenting firms between 1993 and 2013	463
<b>Number of firm-years</b>	<b>1123</b>

The data is mainly limited, by the collectability from EDGAR. EDGAR data is typically available since 1996 onwards. Hence, restated figures for previous incorrect annual reports cannot be collected from publications before 1996. An SEC-investigation normally takes around 3 years. Thus, a restatement from the year 1996 normally becomes part of an AAER published in 1999. Therefore, there is no firm included in the dataset whose misrepresentation was published in an AAER before 1999. Hence, the dataset consists of AAERs published between 1999 and 2015. Since the AAERs are published at the end of a long investigation process, the dataset covers the years 1993-2013. In total, 585 distinct firms could be identified. Out of these 585 firms, 122 firms had to be excluded due to a missing CIK-code<sup>7</sup> or no data at all on COMPUSTAT. Hence, the remaining dataset consist of 463 firms misrepresenting 1123 firm-years or 2.43 misrepresented firm-years per misrepresenting firm. The results of the selection process are disclosed in the table above.

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<sup>7</sup> A firm without a cik code is likely not in EDGAR. Hence, I did not do any attempts for further identifiers.