The influence of firm performance on management earnings forecasts accuracy

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ABSTRACT

This thesis aims to find the effect of firm performance on management earnings forecasts accuracy. I use Compustat North America, IBES and Thomson Reuters databases to retrieve the data necessary for this thesis. The sample for the main analysis consists of 13,070 firm-years observations with 2,583 unique firms and is spread across 17 years from 2002 until 2018.

Following prior literature, I expect firm performance to have an effect on management earnings forecasts accuracy. However, the mixed evidence provided does not allow me to make a prediction about the sign of this effect.

The result of this study shows that firm performance has a negative impact on forecast error. This demonstrates that forecast accuracy is increased when firm performance is increasing. I find this result for both ROA and ROE as a proxy for firm performance. I also find the same result when I create a benchmark for firm performance. I find that when a company has a ROA (or ROE) lower than the yearly industry median, the forecast error is increasing. This implies that the accuracy of the forecasts is being reduced when a firm is performing below the benchmark. Thus, I can conclude that management earnings forecasts have lower level of accuracy in times of bad performance.

Keywords: Management earnings forecasts, forecasting, voluntary disclosures, firm performance

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1. Introduction

Corporate disclosures, mandatory or voluntary, are vital for an efficient capital market. Some companies decide to voluntarily disclose additional information in order to increase transparency and reduce information asymmetry, and ultimately reduce the firm's cost of financing (Fu et al., 2012; Brown et al., 2004). Prior research focuses on finding ways to reduce information asymmetry via the use of optimal contracts, or regulations (Healy and Palepu, 2001). However, research about the quality of those voluntary disclosures is not yet complete. One of the most common type of voluntary disclosures is the management earning forecast. Management earnings forecasts are voluntary disclosures that give key information about the future earnings of a firm. Managers disclose earnings forecasts to create or change market earnings expectations (Hirst et al., 2008). Management earnings forecasts are an important tool for analysts and investors, however it is possible that they are biased. Indeed, managers have incentives to bias (upward or downward) their forecasts in their advantage. However, if the forecast turn out to be unreliable, managers can face litigations and penalties. Koch (2002) argues that when firms are in financial distress, the managers are less frightened by those penalties as their position in the company might already be at risk. As far as I know, research about firm performance and forecast accuracy has been conducted only for extreme situations, like financial distress. A research about firms that are performing below the average of their industry would add new knowledge to researchers and investors. Indeed, investors usually prefer to invest in companies that are performing well. However, if a company is performing below the average of the industry, managers might want to provide accurate forecasts in order to attract new investors. It might then be interesting to check whether or not the results from Koch (2002) can be applied to a less extreme case of bad performance. This leads to the main research question of this thesis:

Are management earnings forecasts less accurate when a company is in a period of bad performance?

The answer to this question is important as analysts base or adjust their forecasts on those management earnings forecasts. Analysts' forecasts are then used by investors to decide

whether or not they will invest in the companies. Thus, it is important to extend the already existing literature about management earnings forecasts. Indeed, if analysts base their forecasts and recommendations on biased information, then their forecasts are not giving any relevant information to the investors.

In order to answer this research question, I collect data from the Wharton Research Data Service (WRDS) database. The data is collected from year 2002 until year 2018. After merging multiple datasets, and dropping duplicates and missing observations, the sample consists of 13,070 firm-year observations with 2,583 unique firms. The sample for the main regression comprises the last available management earnings forecast released by a company. Using panel-data, I then run a regression with two different proxies for firm performance (ROA and ROE) and with two different settings. The first setting is the use of a continuous variable for firm performance in order to see the forecast error change when the performance is increasing. The second setting is the use of an indicator variable for firm performance in order to see how the forecast error changes when a firm is below (or above) a defined benchmark for firm performance.

The result of this study shows that management earnings forecasts are less accurate in times of bad performance. This demonstrates that forecast accuracy increases when firm performance is increasing. I find this result for both ROA and ROE as a proxy for firm performance. I also find the same result when I create a benchmark for firm performance. I find that when a company has a ROA (or ROE) lower than the yearly industry median, the forecast error is increasing. This implies that the accuracy of the forecasts is being reduced when a firm is performing below the benchmark. I can then reject the null hypothesis stating that "*Management earnings forecasts have the same level of accuracy in times of bad performance ".* Thus, I can conclude that management earnings forecasts have lower level of accuracy in times of bad performance.

This thesis contributes to the literature on management earnings forecasts. I find a significant negative association between firm performance and forecast accuracy. Additionally, by comparing the descriptive statistics for the two annual samples (last forecasts released and first forecasts released of the same fiscal year), I highlight the fact that managers tend to forecast less accurately at the beginning of the fiscal year. This finding is important as it shows that managers tend to be optimistic at the beginning of the fiscal year, and revise their

judgment with time. Thus, this implies that management earnings forecasts could be less relevant to financial analysts and investors at the beginning of the fiscal year.

The reminder of the thesis is organized as follow: Chapter 2 summarizes the existing literature and includes the hypothesis development. Then, in chapter 3 I present the research design and the regression model used alongside with a presentation of the data used and the sample selection process. Chapter 4 presents the results and the conclusions drawn from them. Finally, chapter 5 concludes this thesis by providing a summary and the limitations of this study.

2. Theoretical background and hypotheses development

In this chapter, the literature review has been articulated around the research question that was stated in the previous chapter. I first present the previous literature regarding voluntary disclosures in general. Then, I discuss and refer to past research on management earnings forecasts and finally, I link management earnings forecasts to firm performance. At the end of the chapter, the hypothesis for this study is formulated.

2.1. Voluntary disclosures

In any business relationship, one of the best ways that leads to success is to have good communication between the investors and the owners. However, information asymmetry exists because there will always be a party that will have more information than the other one. In the accounting setting, the management of the company is the agent and the principals are the shareholders and/or owners of the same company.

Smith (1776) argues that there will be some conflict of interest between investors and managers. In his opinion, people are self-interested and this creates conflicts between the expectations from the investors and the managers. This problem comes from the fact that ownership and control of a company are divided.

In the agency theory, the principal appoints the agent to perform a service/task for him. By appointing the agent, the principal gives authority to the agent. Two main problems arise from there: first, the principal and agent have different interests and second, the agent knows more than the principal and information asymmetry appears (Eisenhardt, 1989). Indeed, Jensen and Meckling (1976) argue that if the two actors want to maximize their utility, it is probable that at some point the agent will not act in favor of the principal if another action is better for him.

Jensen and Meckling first introduced the principal-agent theory in 1976. They outline a theory around an ownership structure where there will be as little agency costs as possible. They also indicate that the principal-agent problems happen when the principal and the agent's incentives are not aligned. This then creates a situation of information asymmetry, as the agent will not act in the best interest of the principal.

Knowing that a company has multiple stakeholders, it is simple to see that, applying the principal-agent theory, information asymmetry exists (Schnader et al., 2015). One of the potential solutions to the problems arising from information asymmetry is the use of voluntary disclosures, as the management shares more information to its stakeholders

2.1.1. Theories explaining the need for voluntary disclosures

Managers need to get money from outside investors to be able to invest in new opportunities. Even though managers and investors want to do business together, some problems arise. Firstly, managers have more information about their company than the investors and they also tend to overstate the company's value to attract new investors. Secondly, when the investors invested their money, managers have personal incentives to engage in an opportunistic behavior with the money from the investor. Problems of misaligned interests and information asymmetry previously stated emerge. Theories around those problems have been developed, notably the agency theory that also explains the "lemons" problem that I will develop in the rest of this section. Voluntary disclosures are one way to reduce the existent information asymmetry and that is why, nowadays, voluntary disclosures have an important role in the capital markets. Another way to reduce information asymmetry is to have a high level of corporate governance, as highlighted by Kanagaretnam et al. in 2007.

Even with an efficient capital market, managers have more knowledge and information about their firms than investors. This "lemons" problem originates from information asymmetry and different incentives from managers and investors (Healy and Palepu, 2001).

The well-known economist George A. Akerlof first introduced this problem in 1970. He argues that the conflicting interests might lead to a non-functioning capital market and uses different examples to give a better understanding of this problem. One of them is the automobile market for used cars. He defines bad cars as the lemons. Defective cars are usually hard to distinguish from others. The seller has motivations to hide the defect to the buyer to get a higher price. If the buyer cannot differentiate the good cars from the lemons, he will not be willing to pay the higher price. Then, the buyer will be willing to pay a lower price for a car and the seller will not be willing to sell good cars. Consequently, this leads to market failure (Akerlof, 1970).

Some solutions to the “lemons” problem are already known. One of them would be optimal contracts where the seller would disclose more to reduce the information asymmetry that exists and this will additionally decrease the number of inaccurate valuation of the products. Another solution would be regulations and information intermediaries. Regulations would enforce more mandatory disclosures and information intermediaries would help buyers to get a better idea of the valuation of the products (Healy and Palepu, 2001).

In the context of this thesis, the principals are the shareholders of a company and the agent is the management of the same company. The management has more information than the shareholders, so we can say that information asymmetry exists. Additionally, Shapiro (2005) emphasizes on the fact that the principal knows that its goals are different than the agent’s goals. She also argues that the principal does not know the full activity of the agent and that this leads to unknown knowledge and unknown actions in the relationship between principal and agent.

One of the main consequences of the agency theory is the presence of agency costs. Previous literature highlights three types of agency costs: monitoring expenditures (costs incurred by the principal to check if the agent is acting in his favor), bonding costs (cost incurred by the principal to be sure that the agent will not act in his disfavor), and residual loss (costs incurred by the principal because of the outstanding differences between the decisions that the agent takes and the decisions that the principal would take) (Jensen and Mecking, 1976).

There are multiple ways to mitigate the problems arising from the agency theory. Optimal contracts can be used to align the interests of the principal and the agent. Furthermore, the board of directors can be used to monitor the management of a company to have them act in the best interest of the investors. Also, the rise of information intermediaries such as analysts reduced the agency theory problem as they reveal misappropriation of resources from managers, ... (Healy and Palepu, 2001). Regulations also reduce the agency problem as companies have to disclose more information. However, it is important to know that full disclosure is impossible, once again because of the unaligned interests of the managers and the investors (Shehata, 2014). Finally, voluntary disclosure is similarly a way to reduce agency problems as it reduces the previously stated agency costs (Barako et al., 2006).

Voluntary disclosures are a perfect example to reflect agency theory: the company voluntary discloses information to the investors either because they have more information or, because

of their personal interests, make bad disclosures to cheat on the investors (Barako, 2007). It is then imperative to understand the possible motivations for managers to voluntary disclose.

2.1.2. Motivations for voluntary disclosures

In their research, Healy and Palepu (2001) summarize previous literature on the different motives for voluntary disclosures and order them into 6 different categories.

Capital market transactions hypothesis

The investors' perception of a firm before the issuance of public debt or equity is important to managers. Thus, they have motivations to release voluntary disclosures to give investors more information and decrease the cost of equity. Evidence is provided by different studies like Lang and Lundholm (1997) who find that there was a "significant increase in voluntary disclosures beginning six months before the offering".

Corporate control contest hypothesis

Investors think that managers are responsible for the firm's performance and also the stock performance. Brennan (1999) finds that when the company is subject to aggressive takeover bids, managers are more likely to meet the targets made in their earnings forecasts. Consequently, this probably means that when managers are scared to lose their position, they put more effort to give credible management earnings forecasts.

Stock compensation hypothesis

Managers are often compensated with stock plans and they, then, have different incentives to disclose more. They need to disclose more to meet restrictions about insider trading rules because they often want to trade their stocks. This reason can be seen as opportunistic (Cheng and Lo, 2006). Besides, disclosing more is also a way to reduce the cost of contracting, if the company uses stock compensation (Healy and Palepu, 2001).

Litigation cost hypothesis

The evidence is mixed for this hypothesis. Indeed, litigation can arise for two different reasons. The managers can increase voluntary disclosures because they fear lawsuits because of untimely or insufficient disclosures. Or, the managers can reduce voluntary disclosure because they fear lawsuits due to bad disclosure (especially for forward-looking disclosures like management earnings forecasts) (Healy and Palepu, 2001). With that in mind, it is interesting to ask ourselves if managers pay more attention to the numbers they release when the firm is performing badly. Indeed, in the case of bad firm performance, the fear of a

lawsuit is higher which may lead the managers to either stop releasing management earnings forecasts or to be more accurate in their forecasts.

Management talent signaling hypothesis

Some managers make voluntary earnings forecasts in order to prove that they have talent. In 1986, Trueman identifies the fact that managers have incentives to give accurate forecasts to reflect their ability. Moreover, Baik et al. (2011) find a positive relation between CEO ability and the likelihood and frequency of issuance of management earnings forecasts. However that does not mean that the forecasts are more accurate, it only tells us something about the quantity, not the quality.

Proprietary cost hypothesis

Some companies have incentives to not voluntary disclose more information as it might harm the company. Indeed, when a company has a competitive advantage, releasing more information to investors also means that they will allow their competitors to have access to this supplementary information (Healy and Palepu, 2001).

2.1.3. The credibility of voluntary disclosures

As said previously, managers have incentives to voluntary disclose and those incentives can be self-interested. With that in mind, it is really important for managers to give credibility to their voluntary disclosures otherwise they might not be useful.

Mercer (2004) defines disclosure credibility as "investors' perceptions of the believability of a particular disclosure". This means that credibility is not objective; it depends on the investor who assesses the credibility. Additionally, investors evaluate credibility to each individual disclosure and thus, credibility can vary within the firm.

In order to give credibility, managers have different options. The first one is the use of third-party intermediaries that can confirm that the disclosures issued are reliable and of quality (Healy and Palepu, 2001). The second one is the fact that managers build their reputation for credible forecasts. Williams (1996) finds that managers build their reputation based on previous earnings forecasts. If the actual financial statements validate their previous forecasts, then they have a reputation for issuing credible earnings forecasts.

Rogers and Stocken (2005) highlight the fact that managers can benefit from a misleading forecast. However, because financial statements are audited, investors have a way to know whether are not the forecasts are accurate later on. Thus, it means that investors know that the

forecasts were misleading and then the investors will not have confidence in the coming forecasts, which will be problematic for the managers. In general, laws, regulations, and rules are implemented to improve the quality of disclosures issued by managers (Farvaque et al., 2011).

2.2. Management earnings forecasts

In this thesis, I will only focus on one type of voluntary disclosure: management earnings forecasts. Management earnings forecasts are commonly used and prior literature already highlights their importance. Some researchers find that there is a relation between the information found in the management earnings forecasts and the stock price (Das et al., 2007). Other studies show that these management earnings forecasts are used by analysts and that they may revise their forecasts after looking at the management forecasts (Wang et al., 2015). Prior research has linked voluntary disclosures and firm performance as Miller in 2002. He finds evidence that companies increase their disclosure when their earnings increase. This shows a relation between the quantity of disclosures and firm performance. In this thesis, I want to research the relation between the quality of disclosures, i.e. the accuracy of management earnings forecasts and the firm performance.

2.2.1. Definition

Management earnings forecasts are also known as earnings guidance or management guidance but in this research, I will only use management earnings forecasts because there is a difference between forecasts and guidance. As a matter of fact, management earnings guidance contains information that managers give to help investors and/or analysts to assess the firm's expected earnings. Management earnings guidance contains earnings forecasts but also some additional information like comments from managers on future actions of the company, etc … (Miller, 2002).

Management earnings forecasts are voluntary disclosures that give key information about the future earnings of a firm. Managers voluntary disclose earnings forecasts to create or change market earnings expectations (Hirst et al., 2008).

The main objective of management earnings forecasts is to release information on future earnings to affect the expectation from the market and other related stakeholders. It is important to not confuse management earnings forecast with other voluntary disclosures that are also forward-looking (investment projects, sales target, expected cash flows, etc…), or with analysts' forecasts (Kiliç and Kuzey, 2018).

Different types of disclosures exist regarding earnings. Management earnings forecasts differ from earnings preannouncements because of the timing. Earnings preannouncement are released after the period end, which is not the case for management earnings forecasts (Hirst et al., 2008). One advantage of management earnings forecast is that they give better information about the firm's performance because they are issued during the period and not after the period end (Beyer et al., 2010).

2.2.2. Management earnings forecasts characteristics

As management earnings forecasts are voluntary, the content varies from one another. According to Hirst et al. (2008), management earnings forecasts have three main components: antecedents, characteristics, and consequences. Antecedents are defined as the influences that already exist before the manager decides to issue the forecast. Regarding the characteristics, the authors define them as the features that represent the forecast itself. Finally, forecasts consequences correspond to the outcomes that are created by the fact of issuing the forecast.

One of the first characteristics of those forecasts is the form. Management earnings forecasts can be classified into different categories: point, range, maximum, minimum, and qualitative. Skinner (1994) argues that management earnings forecasts are usually point or range estimates if they disseminate good news, and they are qualitative statements for the bad news. The main difference between those different forms of forecasts is what they include. According to Baginski et al. (2011), "minimum (maximum) management forecasts truncate the lower (upper) end of the distribution by revising a subset of analysts' earnings expectations upward (downward) regardless of whether the EPS number conveyed by the forecast implies unexpected earnings relative to consensus beliefs". Range forecasts exclude the two extremes (low and high) of the distribution. Point forecasts are commonly viewed as more precise than range forecasts (Highhouse, 1994). Qualitative forecasts are basically just

an expectation from the management about the future earnings in words and not in numbers (for example, "we expect earnings to decrease for next quarter due to …") (Hirst et al., 2008).

Another characteristic of the management earnings forecasts is the timeliness. Managers can decide when they release their forecasts and how often. Managers can issue forecasts regarding the quarterly earnings but also the annual earnings. Timeliness refers to how far the forecast is from the actual earnings. Waymire (1985) finds evidence that when companies' earnings are volatile, managers are likely to release their forecast at the end of the year.

Other than that, a characteristic of the forecast is whether or not it is biased. As already stated previously, managers have intentions to strategically manipulate the numbers released to get to a result that is favorable for them. However, managers also have incentives to provide accurate forecasts to reflect their ability and talent or in order to avoid litigations (Hirst et al., 2008; Healy and Palepu, 2001).

2.2.3. Management earnings forecasts accuracy

As said previously, voluntary disclosures need to be credible in order to be useful. Managers can be self-interested and might want to bias their forecasts. They have different incentives to bias their forecasts like obtaining a performance bonus if they reach an earnings target. Most of the time, managers bias their forecasts in an optimistic way (upward bias) in order to give a "better look" of the company to the investors. However, it is possible that managers downwardly bias their forecasts because they fear litigations if they cannot reach their forecasts later on. Nevertheless, one step to give credible forecasts is to be accurate. If a disclosure is accurate, investors will have more trust in the disclosures that will be disclosed later on.

In order to give accurate forecasts, managers need to have high-quality data. Even though managers have a lot of information, it is impossible for them to be updated about all the activities of their company on a daily basis. Hence, managers have to rely on information produced by their employees when preparing earnings forecasts. This is the reason why high-quality data is essential for accurate management earnings forecasts (Muramiya and Takada, 2017).

Prior research studies the factors that have an influence on the accuracy of management earnings forecasts. Rogers and Stocken (2005) focus on the opportunistic incentives that

managers have to release earnings forecasts. They emphasis on the fact that when, for example, managers have stock compensation they may disclose too optimistic forecasts in order to benefit from the market reaction. Management earnings forecasts might be biased. Indeed, managers precisely choose what they want to disclose and how they want to disclose it. It is common to observe a good news bias for those forecasts but also optimistic forecasts.

Additionally, Baik et al. (2011) study the relation between managers' ability and management earnings forecasts. They find that forecasts are useful to determine the manager's ability. This is in line with the management talent-signaling hypothesis from Healy and Palepu (2001) discussed previously.

In conclusion, it is important to study management earnings forecasts because they can affect the information in two ways: they can reduce the information quality or they can increase it. Sometimes managers have bad and/or self-interested intentions to mislead investors with the forecasts, which in the end decreases the quality of the information. However, managers can use those forecasts to signal their talent and ability and then the information is of good quality.

2.2.4. Voluntary disclosures and firm performance

The effect of firm performance on disclosure is an important topic in the voluntary disclosure literature. Indeed, performance is included in most of the disclosures that a company can release like future earnings in the management earnings forecasts (Miller, 2002).

Voluntary disclosures of competitors can help increasing firm performance. Indeed, when companies share more about their activities, productivity, etc … it enhances the overall productivity of the market and leads to economic growth (Sadka, 2004). The more transparent the market, the better it is, as it increases competition between firms. Companies can compare themselves to their competitors and then adapt their strategies, their investment strategies, etc …

Financial ratios are widely used in accounting and can be calculated from the financial statements but also other third-party sources. The main objective of calculating ratios is to assess the performance of the firm. It is important to understand that financial ratios are helpful to assess prior firm performance but not future performance as they mostly rely on the financial statements (historical data) (Masa'deh et al., 2015).

Prior research studies the relation between voluntary disclosures and firm performance. Indeed, Hamrouni et al. (2015) find an association between the level of corporate voluntary disclosures and firm performance proxies. This means that voluntary disclosures provide relevant information that explains firm performance. Prior research has shown that voluntary disclosures (including management earnings forecasts) is a good way to signal firm performance and/or firm value.

It is also known that voluntary disclosures help to reduce the cost of equity of a firm because they decrease adverse selection and assessment risks. Prior studies like Fu, Kraft, and Zhang in 2012 find a negative relation between voluntary disclosures and cost of equity. This decrease in the cost of equity directly relates to a higher balance in the retained earnings account.

One stream of literature about voluntary disclosures is about the motivations of managers to release the extra information to the stakeholders of the firm. As mentioned previously in the litigation cost hypothesis, managers can fear lawsuits for forecasts that would not be accurate (Healy and Palepu, 2001). Then, it is possible that managers would spend more time, or would be more careful with the information they provide in the forecasts, and thereby they would provide more accurate forecasts. Another reaction that managers could have is that they decide to stop forecasting. Additionally, it is known that when managers issue inaccurate forecasts they face penalties. These penalties are quite broad, going from a loss of reputation or job, to potential legal actions from the shareholders (Koch, 2002). Old studies find evidence that those penalties are sufficient to prevent managers from bias their forecasts (Frankel et al., 1995; McNichols, 1989). However, Koch (2002) notices that when the company is in financial distress, those penalties are less effective. He argues that if a company is in financial troubles, the manager's position is also at risk as the company might go bankrupt. In this case, managers would have incentives to overestimate their forecasts because they would not face the consequences of releasing an inaccurate earnings forecast. As far as I know, research about firm performance and forecast accuracy has been conducted only in extreme situations, like financial distress. A research about firms that are performing below the average of their industry would add new knowledge to researchers and investors. Indeed, investors usually prefer to invest in companies that are performing well. However, if a company is performing below the average of the industry, managers might want to provide accurate forecasts in order to attract new investors. It might then be interesting to check

whether or not the results from Koch (2002) can be applied to a less extreme case of bad performance.

In conclusion, there could be two possibilities: either managers will release more accurate forecasts in case of bad performance or they will upwardly bias their forecasts. This leads to the following main hypothesis:

H_1: *Management earnings forecasts have the same level of accuracy in times of bad performance.*

3. Research design

This chapter relates to the research design of the study. The Libby boxes (see Appendix 1) represent the conceptual relation between the variables used in this study. I first present the sample selection process and the data used for this study. Then, I introduce the regression model that is tested later on and I discuss the accuracy of the management earnings forecasts, which is the dependent variable. I then continue with the independent variable: firm performance and end by discussing the control variables included in the model.

3.1 Data and sample selection

This study examines the management earnings forecasts accuracy of American companies for the years 2002 until 2018. I start with the year 2002 to start directly after the technology bubble. I collect data from the Wharton Research Data Service (WRDS) database.

From I/B/E/S Guidance, I obtain the quarterly and annual earnings forecast released by management before the annual earnings announcement date. The quarterly data is only used for the additional analyses. I merge this data set with the data set from I/B/E/S summary, where I obtain the actual earnings numbers for the same years and the number of analysts following the company. From Compustat North America, I retrieve the data that is necessary to calculate firm performance and the control variables. In order to get the variables ROA, ROE, and Size, I winsorize the total assets and total liabilities, meaning that I exclude the 1% extreme values to reduce the effect of possible outliers. Finally, for the control variable institutional ownership, I retrieve the data from the Thomson Reuters database. Finally, I winsorize all the continuous variables, i.e. Forecast error, ROE, ROA, Forecasts news, and Institutional ownership, to reduce the effect of possible outliers.

Using Stata, I drop all the observations with missing data from all the datasets and I also check for duplicates in order to avoid any potential bias. The sample selection process results in a sample of 13,070 firm-years from 2,583 unique firms (see Appendix 2).

3.2 Regression model

In this study, I use a panel data regression model. The dataset is two-dimensional: it has cross-sectional information (firm) and time-series information (year) (or quarter-year for the additional analysis). To examine the effect of firm performance on management earnings forecasts accuracy, I use the following regression equation:

$$\boldsymbol{Forecast\ Error = \beta_0 + \beta_1 * Firm\ performance + \beta_2 * Control\ Variables + \varepsilon} \quad (1)$$

This model is used with three different samples and with different proxies for firm performance. The main analysis includes a sample of the last annual management earnings forecasts released by the company during the fiscal year. The additional analyses use first a sample with the last quarterly management earnings forecasts released during the fiscal year and second, the first annual management earnings forecasts released during the fiscal year.

As this study focuses on the managers' perceptions of the firm performance, I will only include accounting-based measures of firm performance and not market-based measures. Precisely, firm performance is measured by either ROA or ROE and is a continuous variable. Additionally, I create a yearly benchmark per industry (based on the 2-digit SIC (Standard Industrial Classification) codes). I take the median of the ROA (or ROE) of all the companies from an industry and if a company's ROA (or ROE) is below this median then it is considered as performing badly. Firm performance is then a dummy variable that takes 1 if the company is performing badly, 0 otherwise.

All variables are defined in the following sections and in Appendix 3.

Additionally, I perform the Hausman test to see which model will fit the best between fixed effect and random effect. The result shows that the p-value is 0.000, which means that I can reject the null hypothesis and that the best model for my research is the fixed effect model. I then add industry and year fixed effects to the regression to control for the different time trends and time-invariant industry characteristics. Firm performance and accuracy of management earnings forecasts are both related to the same fiscal year t.

3.3 Dependent variable

The dependent variable is the forecast error of the management earnings forecasts.

I measure the forecast error as the absolute difference between the number showed in the forecast and the actual earnings (Rogers and Stocken, 2005).

$$\text{Forecast error} = [\,|\,\text{Management forecast EPS number} - \text{Actual EPS number}\,|\,] \;/\; \text{Stock Price}$$

In the case that the data provides multiple earnings forecasts for the same actual earnings number, I will use only the most recent forecast. Indeed, Hirst et al. (2008) highlight the fact that when releasing the first forecasts, managers tend to be more optimistic than when the fiscal year end is close. In order to not include pre-earnings announcements, I will not include the forecasts that are released after the fiscal year end (Rogers and Stocken, 2005).
As previously stated, managers can release quarterly forecasts or annual forecasts. In this thesis, I only include the annual forecasts. Hirst et al. (2008) find that annual forecasts are more optimistic and quarterly forecasts tend to be more pessimistic. Later on in this thesis, I will check if my results differ if I only include quarterly forecasts.

3.4 Independent variable

Researchers measure firm financial performance in two ways: the first one is by using accounting-based measures and the second one is by using market-based measures. In their study, Gentry and Shen (2010) emphasize on the fact that it is important to differentiate between these two types of performance measures. They argue that when researchers study market performance, they have to be aware that this only reflects the investors' perceptions of the company's performance. Moreover, when researchers study profitability (accounting-based performance), they should be aware that it reflects the operational efficiency and effectiveness.

In this study, I investigate whether or not the management earnings forecasts are more accurate when the company performs badly. In other words, this study focuses on the managers' perceptions of the firm performance so I will only include accounting-based

measures of firm performance and not market-based measures. Precisely, I will use Return on Assets (ROA) and Return on Equity (ROE) as proxies for firm financial performance.

Return on Assets (ROA)

I measure ROA is as the ratio of net income to total assets. This measure represents the ability of the company to generate profit for each unit of asset invested (Palepu et al., 2013). ROA is a valid measure for firm performance because it analyses the long-term profitability and it avoids the potential distortions created by financial strategies (Hagel, Brown Seely & Davinson, 2010). One drawback of using ROA as a measure for firm performance is that the management can manipulate it. Here again, managers have incentives to show a higher ratio to the investors.

Return on Equity (ROE)

I measure ROE as the ratio of net income to total equity. Researchers when studying firm performance use ROE extensively. Indeed, ROE gives investors an easy way to know what they will get in return for their investment (Michaud and Gal, 2009).

3.5 Control variables

It is well known that there is a common problem of endogeneity with research on voluntary disclosures. In order to reduce it and based on prior research, I include several control variables that affect the management earnings forecasts.

Auditor (Big4)

Auditor is a dummy variable that takes the value 1 if the firm's auditor is one of the Big4, 0 otherwise. I include this as a control variable following prior studies like Ajinkya et al. (2005) and Wang et al. (2015). They argue that auditor reputation can influence the firm's decisions to disclose. Moreover, Clarkson (2000) find evidence that auditors from the Big6 (now Big4) are associated with a lower absolute forecast error, meaning that management earnings forecasts are more accurate when their auditor is one of the Big4. As my sample starts at the beginning of 2002, I also include Arthur Andersen as one of the Big4.

Forecast news (News)

As mentioned previously, managers have different incentives to bias their forecasts by increasing or decreasing the earnings numbers. McNichols (1989) finds that because of those incentives, forecasts news and forecasts error are positively correlated. Following Rogers and Stocken (2005), I define forecast news (News) as the difference between the forecast number and the consensus analysts' forecasts, divided by the stock price. I consider the forecast to communicate good news if News is positive or equal to 0. Thus, News is a dummy variable that is equal to 1 if the forecast communicates good news, 0 otherwise.

News = [Management earnings forecast – Analysts' consensus forecast] / Stock Price

Firm size (Size)

I include firm size as a control variable as prior research finds that it exists a positive relation between the size of the firm and management earnings forecasts. Indeed, the larger the firm, the more the demand for information from shareholders and/or outside investors (Ajinkya et al., 2005; Rogers and Stocken, 2005; Baik et al., 2011; Wang et al., 2015). Following Wang et al. (2015), I use the natural logarithm of the company's total assets as a proxy for firm size.

Leverage

Following Pagach and Warr (2010), I include financial leverage as a control variable. Indeed, companies with a high leverage are more inclined to encounter financial distress. Financial leverage as an impact on firm performance in general as a high level of leverage reduces the possibilities to get new investment projects that would be profitable for the company. I define financial leverage as the ratio of the company's debts to the company's assets.

Institutional Ownership (InstOwn%)

Ajinkya et al. (2005) find evidence that the forecasts issued by companies that have a high level of institutional ownership are usually more specific and more accurate. This is in line with the fact that institutional owners are usually more eager to have additional information than individual investors. Following Baik et al. (2011), I use the percentage of institutional ownership in the fiscal year as a control variable.

Number of analysts following (#Analysts)

Following Ajinkya et al. (2005) and Baik et al. (2011), I also include the number of analysts following the company as a control variable. There is evidence that there is a positive relation between the quality of the disclosures and the number of analysts following a company. Lang and Lundholm (1997) find that companies that tend to disclose more have a larger number of analysts that follow them.

4. Empirical results and analysis

This chapter presents the empirical results of this study. I present the results based on the research methodology presented in the previous chapter. I first depict the descriptive statistics and correlation matrix. Then, I explain the results from the main regression and I finish by introducing the results from the additional tests performed to check the robustness of the previous results.

4.1. Descriptive statistics and correlation table

Table 1 reports the descriptive statistics of the variables used in the regression. All the variables are based on the sample of 13 070 firm-year observations, containing the last forecasts released by management during the fiscal year. The mean for forecast error is 0.0123 and the median is 0.0033, which means that the data appears to be skewed to the right. The skewness to the right makes sense here as Forecast error is defined as the absolute value of the forecast error, and normally managers try to get their forecasts as accurate as possible (so close to 0). D_ROA and D_ROE are skewed to the left, which means that in the sample, they are more bad performance firms than good performance firms.

Table 1
Descriptive statistics for the annual sample

	N	Mean	Std. Dev.	Min	p25	Median	p75	Max
Forecast error	13 070	0.0123	0.0326	0	0.0013	0.0033	0.0086	0.25
ROA	13 070	0.0470	0.0880	-0.3883	0.0233	0.0522	0.0884	0.2625
ROE	13 070	0.1067	0.3510	-1.7892	0.0550	0.1153	0.1847	1.7433
D_ROA	13 070	0.5216	0.4996	0	0	1	1	1
D_ROE	13 070	0.5217	0.4995	0	0	1	1	1
Big4	13 070	0.9150	0.2789	0	1	1	1	1
News	13 070	0.2889	0.4533	0	0	0	1	1
Size	13 070	7.4573	1.7491	1.7982	6.1684	7.4097	8.6101	11.7421
Leverage	13 070	0.5391	0.2181	0.0968	0.3858	0.5447	0.6853	1.1728
InstOwn%	13 070	0.7543	0.2266	0.0750	0.6362	0.7987	0.9108	1.2134
#Analysts	13 070	10.1636	7.2711	1	5	8	14	48

This table presents the descriptive statistics for the variables used in the regression. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *D_ROA* is a dummy variable that takes the value 1 if the ROA of the company is lower than the yearly median ROA of the industry. *D_ROE* is a dummy variable that takes the value 1 if the ROE of the company is lower than the yearly median ROE of the industry.

All other variables are defined as per appendix 2.

The mean for both firm performance proxies (0.0470 and 0.1067 respectively) are below the upper quartile (0.0884 and 0.1847 respectively), which indicate that both ROA and ROE are fairly well distributed.

Among the control variables, 91,50% of the firms have an auditor that is one of the Big4. This can be explained by the fact that the data is composed by listed firms and listed companies tend to prefer to hire a Big4 auditor as it looks better to investors. Indeed, big firms auditors usually provide higher audit quality as found by Lee and Lee in 2013.

Table 2
Descriptive statistics of the forecast error for each fiscal year for the annual sample

Fiscal Year	N	Mean	Sd	Min	p25	Median	p75	Max
2002	535	0.0131	0.0367	0	0.0007	0.0024	0.0075	0.25
2003	915	0.0141	0.0370	0	0.0009	0.0029	0.0093	0.25
2004	1 008	0.0128	0.0329	0	0.0012	0.0031	0.0090	0.25
2005	904	0.0129	0.0326	0	0.0013	0.0035	0.0092	0.25
2006	901	0.0117	0.0281	0	0.0013	0.0036	0.0094	0.25
2007	877	0.0171	0.0426	0	0.0015	0.0040	0.0106	0.25
2008	833	0.0277	0.0575	0	0.0020	0.0060	0.0202	0.25
2009	691	0.0138	0.0311	0	0.0018	0.0047	0.0112	0.25
2010	689	0.0099	0.0235	0	0.0018	0.0041	0.0090	0.25
2011	702	0.0103	0.0219	0	0.0017	0.0038	0.0093	0.25
2012	757	0.0104	0.0286	0	0.0015	0.0034	0.0076	0.25
2013	762	0.0071	0.0175	0	0.0011	0.0028	0.0066	0.25
2014	789	0.0076	0.0197	0	0.0012	0.0027	0.0060	0.22
2015	746	0.0089	0.0245	0	0.0011	0.0029	0.0065	0.25
2016	731	0.0089	0.0252	0	0.0010	0.0026	0.0066	0.25
2017	765	0.0104	0.0329	0	0.0012	0.0026	0.0062	0.25
2018	465	0.0087	0.0222	0	0.0013	0.0030	0.0068	0.25
TOTAL	13 070	0.0123	0.0326	0	0.0013	0.0033	0.0086	0.25

This table presents the descriptive statistics for the variable *Forecast error* per fiscal year from 2002 until 2018. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings, divided by the share price.

Table 2 shows the descriptive statistics of Accuracy for each fiscal year (2002 to 2018). The sample is relatively well distributed amongst the different fiscal year. Year 2004 has the most observations (1 008) whereas year 2018 has the least observations (465). The distribution is skewed to the right for all the years. The forecast error is the smallest in 2013 with a mean of 0.0071 and the forecast error is the biggest in 2008 with a mean of 0.0277. This result can be

explained by the financial crisis of 2007, as managers would most likely have their focus on something else than voluntary disclosures.

In order to increase the reliability of the results, I check the data for correlation. Table 3 presents the pairwise correlation between the variables listed in Appendix 2. Forecast error is negatively correlated with ROA, ROE, Big4, Forecast news and number of analysts following.

In general, the correlation coefficients are significant but weak. The highest coefficient is between the two independent dummy variables D_ROA and D_ROE (0.6619). This coefficient is high and significant at the 1% significance level, which mean that it is probable to have multicollinearity. However, as I test every independent variable separately in different regressions, this problem can be ignored. Same goes for the other high coefficients between ROA/ROE, and ROA/D_ROA.

Table 3
Pairwise correlation table for the annual sample

	Forecast error	ROA	ROE	D_ROA	D_ROE	Big4	News	Size	Leverage	InstOwn%
ROA										
Coef	-0.4109	1.0000								
p-value	*0.0000***									
ROE										
Coef	-0.2698	0.5162	1.0000							
p-value	*0.0000***	*0.0000***								
D_ROA										
Coef	0.1885	-0.5531	-0.2781	1.0000						
p-value	*0.0000***	*0.0000***	*0.0000***							
D_ROE										
Coef	0.1660	-0.4566	-0.4384	0.6619	1.0000					
p-value	*0.0000***	*0.0000***	*0.0000***	*0.0000***						
Big4										
Coef	-0.0817	0.0120	0.0442	-0.0195	-0.0590	1.0000				
p-value	*0.0000***	*0.1719*	*0.0000***	*0.0261*	*0.0000***					
News										
Coef	0.0225	0.0246	0.0055	-0.0388	-0.0423	-0.0297	1.0000			
p-value	*0.0101***	*0.0048****	*0.5272*	*0.0000****	*0.0000****	*0.0007****				
Size										
Coef	0.0843	0.1469	0.1677	-0.0470	-0.1571	0.2946	-0.0944	1.0000		
p-value	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****			
Leverage										
Coef	0.0657	-0.1245	0.0425	0.1244	-0.0753	0.1853	-0.0401	0.4536	1.0000	
p-value	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****		
InstOwn%										
Coef	-0.1227	0.0829	0.0609	-0.0283	-0.0335	0.1639	-0.0620	0.1620	0.0414	1.0000
p-value	*0.0000****	*0.0000****	*0.0000****	*0.0012****	*0.0001****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	
#Analysts										
Coef	-0.1727	0.1824	0.1364	-0.1554	-0.1825	0.1871	-0.0605	0.5975	0.1170	0.1971
p-value	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****	*0.0000****

Table 3 depicts the correlation matrix of the variables included in this research. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *D_ROA* is a dummy variable that takes the value 1 if the ROA of the company is lower than the yearly median ROA of the industry. *D_ROE* is a dummy variable that takes the value 1 if the ROE of the company is lower than the yearly median ROE of the industry. All other variables are defined as per appendix 2.

***, **, * denotes statistical significance at the 1%, 5% and 10% levels, respectively.

4.2. Univariate analysis of the difference between the two performance groups

I run an independent t-test on the annual sample of the last forecasts released by management in the fiscal year. The sample consists of 13 070 observations and this t-test is used to determine if there is a difference in forecast error based on firm performance. The sample is divided in two groups: the control group includes companies that are performing above the median average of the industry and the treatment group is composed of companies that are performing below the benchmark. In panel A, ROA is used as a proxy for firm performance, the control group consists of 6 252 companies and the treatment group of 6 818 companies. In panel B, ROE is used as a proxy for firm performance, the control group consists of 6 251 companies and the treatment group of 6 819 companies.

Table 4 presents the results of the t-test. The results for panel A show that companies that are performing below the industry median have statistically significantly higher forecast error (0.0182 ± 0.0005) compared to the companies that are performing better (0.0059 ± 0.0002). The t-statistic is equal to t (13 068) = -21.95, and the p-value is 0.0000.

The results for panel B show similar results: companies that are performing below the industry median have a statistically higher forecast error (0.0175 ± 0.0005) compared to the companies that are performing better (0.0067 ± 0.0005).

This results show that there is a statistically significant difference between the forecast accuracy of the two different performance groups. Thus, I can conclude that managers report less accurately in term of bad performance (compared to the industry).

Table 4
Univariate analysis of the difference between the two performance groups

Panel A: ROA as a proxy for firm performance

Performance	Observations	Mean	Std. Err.	Std. Dev.	t statistic
Above benchmark	6 252	0.0059	0.0002	0.0144	
Below benchmark	6 818	0.0182	0.0005	0.0421	
Difference		-0.0123	0.0006		-21.95***

Panel B: ROE as a proxy for firm performance

Performance	Observations	Mean	Std. Err.	Std. Dev.	t statistic
Above benchmark	6 251	0.0067	0.0002	0.0182	
Below benchmark	6 819	0.0175	0.0005	0.0409	
Difference		-0.0108	0.0006		-19.24***

Table 4 represents the results of the univariate analysis of the difference between the two performance groups. Panel A presents the results with *ROA* as a proxy for firm performance, and panel B presents the results with *ROE*. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. All other variables are defined as per appendix 2.

***, **, * denotes statistical significance at the 1%, 5% and 10% levels, respectively.

4.3. Effect of firm performance on management forecasts accuracy

The regression analysis aims at examining the impact of financial performance on management earnings forecast accuracy, while controlling for some other variables that might have an influence on forecast accuracy.

Table 5 presents the results for the annual sample based on the last management earnings forecast released by management, with ROA as a proxy for firm performance. While running the regression, seven industries and year 2018 are omitted because of collinearity.

Table 5
Regression with ROA as a proxy for firm performance (annual sample)

	Continuous variable			Dummy variable		
	Coefficient	t-statistic	p-value	Coefficient	t-statistic	p-value
Intercept	0.0880	3.02	0.002**	0.0782	3.21	0.001**
ROA	-0.1401	-20.02	0.000***	---	---	---
D_ROA	---	---	---	0.0100	21.00	0.000***
Big4	-0.0042	-3.31	0.001***	-0.0023	-1.65	0.099
News	0.0009	1.52	0.127	0.0004	0.66	0.511
Size	-0.0017	-6.69	0.000***	-0.0033	-11.45	0.000***
Leverage	0.0121	6.68	0.000***	0.0207	10.01	0.000***
InstOwn%	-0.0130	-8.12	0.000***	-0.0153	-8.75	0.000***
#Analysts	-0.0002	-3.64	0.000***	-0.0002	-2.12	0.000***
Industry FE	Included			Included		
Year FE	Included			Included		
N	13 070			13 070		
R^2	0.2364			0.1316		

Table 5 represents the results for the main regression (annual sample) with ROA as a proxy for firm performance. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *ROA* is a continuous variable that is defined as the net income divided by the total assets of the company. *D_ROA* is a dummy variable that takes the value 1 if the ROA of the company is lower than the yearly median ROA of the industry. All other variables are defined as per appendix 2.

***, **, * denotes statistical significance at the 1%, 5% and 10% levels, respectively.

When ROA is a continuous variable, the coefficient for ROA is negative and significant at the 1% level. This means that when the ROA of a company increases by one unit, the forecast error decreases by 0.1401. This implies that when the firm performance is increasing, managers forecast more accurately.

Regarding the control variables, News is the only one that is not statistically significant. The number of analysts following, Big4 and Size are all negative and significant at the 1% level. For Institutional ownership, the negative relationship implies that companies with a high level of institutional ownership tend to forecast more accurately. This finding is in line with the previous finding from Ajinkya et al. (2005). Indeed, their main result is that companies with higher level of institutional ownership tend to forecast more frequently and accurately.

The statistics indicators show that Prob > F is equal to 0.0000 which means that the independent variable can reliably predict the dependent variable. Moreover, the root MSE is equal to 0.02857, which is relatively low. This indicates that the model can predict accurately the response.

When looking at ROA as an indicator variable, the coefficient for ROA is positive and significant at the 1% significance level. This result is consistent with the previous one. Indeed, when the firm performance is below the yearly median of the industry, the forecast error is increasing by 0.01. This means that when the firm is performing badly, managers tend to forecast less accurately.

Regarding the control variables and the statistics indicators, the results are similar to the ones obtained with ROA as a continuous variable. The only difference is with the variable Big4, which is not significant anymore but the sign stays the same.

Table 6 presents the results for the annual sample based on the last management earnings forecast released by management during the fiscal year, with ROE as a proxy for firm performance. Here again, while running the regression, seven industries and year 2018 are omitted because of collinearity.

I obtain the same results as with ROA as a proxy for firm performance. ROE has a coefficient that is negative and significant at the 1% level, meaning that a one-unit increase in ROE corresponds to a 0.0218 decrease in forecast error. Similarly, when using a dummy variable for ROE, I obtain a positive and significant coefficient at the 1% level. This implies that when a firm is performing below the benchmark, the forecast error is increasing by 0.0091, meaning that the managers forecast less accurately.

Additionally, ROE as a proxy for firm performance can also reliably predict forecast error (Prob > F = 0.0000), and the root MSE is equal to 0.03053.

Table 6
Regression with ROE as a proxy for firm performance (annual sample)

	Continuous variable			Dummy variable		
	Coefficient	t-statistic	p-value	Coefficient	t-statistic	p-value
Intercept	0.0833	3.20	0.001**	0.0744	3.05	0.002**
ROE	-0.0218	-11.82	0.000***	---	---	---
D_ROE	---	---	---	0.0091	17.84	0.000***
Big4	-0.0029	-2.15	0.031*	-0.0024	-1.75	0.080
News	0.0003	0.47	0.638	0.0004	0.67	0.505
Size	-0.0025	-9.01	0.000***	-0.003	-10.42	0.000***
Leverage	0.0232	10.47	0.000***	0.0258	11.93	0.000***
InstOwn%	-0.0145	-8.43	0.000***	-0.0155	-8.86	0.000***
#Analysts	-0.0003	-5.96	0.000***	-0.0002	-4.80	0.000***
Industry FE	Included			Included		
Year FE	Included			Included		
N	13 070			13 070		
R^2	0.1616			0.1280		

Table 6 represents the results for the main regression (annual sample) with ROE as a proxy for firm performance. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *ROE* is a continuous variable that is defined as the net income divided by the total equity of the company. *D_ROE* is a dummy variable that takes the value 1 if the ROE of the company is lower than the yearly median ROE of the industry. All other variables are defined as per appendix 2.

***, **, * denotes statistical significance at the 1%, 5% and 10% levels, respectively.

In conclusion, I obtain similar significant results for both firm performance proxies. Using firm performance as a continuous variable or as an indicator does not change the results, and they are all significant at the 1% level. Management earnings forecasts are less accurate when the firm is performing badly, which is in line with the findings of Koch (2002). He argues that because a firm is performing badly, the managers will most likely not face the penalties for biasing their forecasts, as the company might not exists long enough.

4.4. Additional analyses

I perform two additional analyses to check if my results are robust to other settings. Firstly, I use a sample with quarterly management earnings forecasts, following Ng et al. (2012). I then check the robustness of my results by using an annual sample with, this time, the first management earnings forecasts that was released during the fiscal year.

Quarterly data

Following Ng et al. (2012), I examine if the previous results are robust while using a sample of quarterly management earnings forecasts.

To gather the data, I use the same data sets but instead of using Compustat North America fundamentals annual I use Compustat North America fundamentals quarterly. The sample selection process is very similar to the one performed for the annual sample (see Appendix 3).

Table 7 shows the descriptive statistics for the quarterly sample. The sample consists of 11 386 firm year observations (with 2 619 unique firms), which is slightly less than for the annual sample. The mean of Forecast error is lower than the one from the annual sample (0.0093 and 0.0123, respectively). This suggests that management forecasts are in general more accurate when they are issued quarterly. The mean for both firm performance proxies (0.0084 and 0.0147 respectively) are below the upper quartile (0.0235 and 0.0460 respectively), which indicate that both ROA and ROE are fairly well distributed, consistent with the annual sample.

Table 8 displays the results of the regression for model 2 with ROA as a proxy for firm performance. While running the regression, seven industries and the second quarter of 2002 are omitted because of collinearity. The R^2 for this regression is equal to 0.1930, which is lower than the R^2 obtained during the regression for the annual sample. This means that the model explains less when using quarterly data. The coefficient for ROA (continuous variable) is negative and significant, which is also in line with the results previously obtained. When ROA is increasing by one unit, forecast error is reduced by 0.1315. A difference with the annual sample results is for the control variable Big4. The sign of the coefficient here is positive and not negative as for the annual sample. However, the coefficient is not significant, so the difference is not a problem.

Table 7
Descriptive statistics for the quarterly sample

	N	Mean	Std. Dev.	Min	p25	Median	p75	Max
Forecast error	11 383	0.0093	0.0181	0	0.0012	0.0034	0.0088	0.1255
ROA	11 383	0.0084	0.0361	-0.1886	0.0021	0.0125	0.0235	0.0928
ROE	11 383	0.0147	0.1036	-0.5920	0.0046	0.0261	0.0460	0.3313
D_ROA	11 383	0.5552	0.4969	0	0	1	1	1
D_ROE	11 383	0.5551	0.4970	0	0	1	1	1
Big4	11 383	0.9002	0.2997	0	1	1	1	1
News	11 383	0.2591	0.4882	0	0	0	1	1
Size	11 383	7.1227	1.7125	1.7982	5.8642	7.0031	8.6207	12.0285
Leverage	11 383	0.4890	0.2244	0.0844	0.3161	0.4849	0.6376	1.1092
InstOwn%	11 383	0.7450	0.2312	0.0768	0.6167	0.7948	0.9089	1.1888
#Analysts	11 383	9.0120	6.5893	1	4	7	12	44

Table 7 presents the descriptive statistics for the variables that are used in the regression for the quarterly sample. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *D_ROA* is a dummy variable that takes the value 1 if the ROA of the company is lower than the yearly median ROA of the industry. *D_ROE* is a dummy variable that takes the value 1 if the ROE of the company is lower than the yearly median ROE of the industry.

All other variables are defined as per appendix 2.

When ROA is an indicator variable, I obtain the same result as before. The R^2 is higher than the one obtained previously (0.1482 instead of 0.1316). The coefficient for ROA is positive, which means an increase in forecast error when the firm has a ROA lower than the median of the industry.

As a conclusion, if I look at the R^2, the model is a better fit for the annual data. Additionally, with both samples, the results are almost all significant at the highest significance level. When looking at the significant results for ROA as a continuous variable, I can draw the same conclusion that forecast accuracy is increasing when the ROA is increasing by one unit.

Table 8
Regression with ROA as a proxy for firm performance (quarterly sample)

	Continuous variable			Dummy variable		
	Coefficient	t-statistic	p-value	Coefficient	t-statistic	p-value
Intercept	0.0138	2.88	0.004**	0.0087	1.76	0.078
ROA	-0.1315	-14.45	0.000***	---	---	---
D_ROA	---	---	---	0.0046	15.44	0.000***
Big4	0.0001	0.17	0.864	0.0003	0.50	0.616
News	-0.0003	-0.96	0.338	-0.0008	-2.14	0.032*
Size	-0.0011	-6.98	0.000***	-0.0016	-10.11	0.000***
Leverage	0.0091	9.04	0.000***	0.0119	11.25	0.000***
InstOwn%	-0.0079	-8.82	0.000***	-0.0088	-9.55	0.000***
#Analysts	-0.0001	-4.46	0.000***	-0.0001	-3.16	0.002**
Industry FE	Included			Included		
Year FE	Included			Included		
N	13 383			13 383		
R^2	0.1930			0.1482		

Table 8 represents the results for the regression with the quarterly sample with ROA as a proxy for firm performance. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *ROA* is a continuous variable that is defined as the net income divided by the total assets of the company. *D_ROA* is a dummy variable that takes the value 1 if the ROA of the company is lower than the yearly median ROA of the industry. All other variables are defined as per appendix 2.

***, **, * denotes statistical significance at the 1%, 5% and 10% levels, respectively.

Table 9 presents the results obtained for the quarterly sample with ROE as a proxy for firm performance. The R^2 for this regression is equal to 0.1794, which is higher than the R^2 obtained during the regression for the annual sample. This means that the model explains more when using quarterly data. The coefficient for ROE (continuous variable) is negative and significant, which is in line with the results previously obtained. When ROE is increasing by one unit, forecast error is reduced by 0.0392. This coefficient is significant at the 1%

significance level. The coefficient for the control variables are similar to the one obtained for the annual sample.

Table 9
Regression with ROE as a proxy for firm performance (quarterly sample)

	Continuous variable			Dummy variable		
	Coefficient	t-statistic	p-value	Coefficient	t-statistic	p-value
Intercept	0.0136	2.82	0.005**	0.0076	1.55	0.120
ROE	-0.0392	-11.80	0.000***	---	---	---
D_ROE	---	---	---	0.0045	9.09	0.000***
Big4	0.0001	0.15	0.880	0.0004	0.59	0.552
News	-0.0007	-1.87	0.062	-0.0008	-2.10	0.036*
Size	-0.0012	-7.55	0.000***	-0.0015	-9.60	0.000***
Leverage	0.0112	10.30	0.000***	0.0140	12.96	0.000***
InstOwn%	-0.0083	-9.04	0.000***	-0.0089	-9.60	0.000***
#Analysts	-0.0001	-4.65	0.000***	-0.0001	-3.38	0.001***
Industry FE	Included			Included		
Year FE	Included			Included		
N	13 383			13 383		
R^2	0.1794			0.1340		

Table 9 represents the results for the main regression with the quarterly sample with ROE as a proxy for firm performance. *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *ROE* is a continuous variable that is defined as the net income divided by the total equity of the company. *D_ROE* is a dummy variable that takes the value 1 if the ROE of the company is lower than the yearly median ROE of the industry. All other variables are defined as per appendix 2.

***, **, * denotes statistical significance at the 1%, 5% and 10% levels, respectively.

When ROE is an indicator variable, the R^2 is also higher than the one obtained previously (0.1794 instead of 0.1616). The coefficient for ROE is positive, which means that there is an increase in the forecast error when the firm has a ROE that is lower than the median of the industry.

The conclusion that can be drawn from table 8 is that forecast error is reduced when the ROE of the firm is increasing by one unit. This result is in line with the result obtained during the regression with the annual sample.

First forecasts of the fiscal year

When managers create their forecasts a long time ahead, they have less information about future earnings and the uncertainty is higher. It is then possible that the accuracy of the forecasts would be lower at the beginning of the fiscal year than at the end of the fiscal year. For this additional test, I only keep the first forecast released, instead of using the last management earnings forecast released. I can then compare the descriptive statistics to the one obtained for the sample with the last management earnings forecasts released.

Table 10 presents the descriptive statistics for the annual sample containing the first forecasts released in the fiscal year. The forecast error mean is 0.0154, which is higher than the one obtained for the other sample (0.0123). This confirms that the forecast error is bigger for the forecasts that are released at the early stage of the fiscal year. In addition, the table indicates that the sample of the firms selected are skewed towards large firms as demonstrated by the large mean value of the control variable Size. However, this result is not a surprise as the sample consists of only listed firms which are in general larger due to listing restrictions in most stock exchanges (Doidge et al, 2004). Also not a surprise, the number of analysts following the firm has a mean of 10.26, meaning that, on average, the companies from the sample are followed by 10 analysts.

The other descriptive statistics are consistent with the one obtained previously.

Table 10
Descriptive statistics for the annual sample (first forecast released)

	N	Mean	Std. Dev.	Min	p25	Median	p75	Max
Forecast error	12 670	0.0154	0.0368	0	0.0020	0.0049	0.0122	0.2766
ROA	12 670	0.0472	0.0875	-0.3825	0.0236	0.0522	0.0884	0.2577
ROE	12 670	0.1077	0.3460	-1.7630	0.0560	0.1153	0.1851	1.7270
D_ROA	12 670	0.5215	0.4996	0	0	1	1	1
D_ROE	12 670	0.5216	0.4995	0	0	1	1	1
Big4	12 670	0.9151	0.2788	0	1	1	1	1
News	12 670	0.2544	0.4356	0	0	0	1	1
Size	12 670	7.4769	1.7428	1.7982	6.1900	7.4255	8.6298	11.7524
Leverage	12 670	0.5391	0.2167	0.0975	0.3874	0.5448	0.6843	1.1611
InstOwn%	12 670	0.7591	0.2227	0.0846	0.6436	0.8020	0.9128	1.2153
#Analysts	12 670	10.2660	7.2305	1	5	8	14	48

Table 10 presents the descriptive statistics for the variables that are used in the regression for the annual sample (first forecast released). *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *D_ROA* is a dummy variable that takes the value 1 if the ROA of the company is lower than the yearly median ROA of the industry. *D_ROE* is a dummy variable that takes the value 1 if the ROE of the company is lower than the yearly median ROE of the industry.

All other variables are defined as per appendix 2.

Table 11 presents the regression results for the annual sample including the first management earnings forecasts issued during the fiscal year. The coefficient for ROA as a continuous variable is negative and significant at the 1% level. This implies that when ROA is increasing by one unit, the forecast error is reduced by 0.1667. This result is consistent with the results obtained during the main analysis. Furthermore, when ROA is an indicator variable, ROA has a positive and significant effect on forecast error. This indicates that when a company is performing badly (below the yearly median per industry) the forecast error is bigger, implying that the management earnings forecasts are less accurate. It does not matter whether ROA is a continuous variable or an indicator variable, the results are both significant at the 1% level and point to the same direction: firms that are better in terms of performance, forecast more accurately.

Table 11
Regression with ROA as a proxy for firm performance (first forecasts released)

	Continuous variable			Dummy variable		
	Coefficient	t-statistic	p-value	Coefficient	t-statistic	p-value
Intercept	0.0484	5.49	0.000***	0.0345	3.24	0.001**
ROA	-0.1667	-21.21	0.000***	---	---	---
D_ROA	---	---	---	0.0126	22.54	0.000***
Big4	-0.0039	-2.69	0.007**	-0.0015	-0.96	0.337
News	0.0023	3.29	0.001**	0.0011	1.43	0.152
Size	-0.0024	-11.22	0.000***	-0.0055	-15.46	0.000***
Leverage	0.0155	7.49	0.000***	0.0262	10.80	0.000***
InstOwn%	-0.0132	-7.29	0.000***	-0.0164	-8.24	0.000***
#Analysts	0.0001	2.67	0.008**	0.0002	4.20	0.000***
Industry FE	Included			Included		
Year FE	Included			Included		
N	12 670			12 670		
R^2	0.2582			0.1481		

Table 11 represents the results for the regression with the annual sample with ROA as a proxy for firm performance (first forecast released). *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *ROA* is a continuous variable that is defined as the net income divided by the total assets of the company. *D_ROA* is a dummy variable that takes the value 1 if the ROA of the company is lower than the yearly median ROA of the industry. All other variables are defined as per appendix 2.

***, **, * denotes statistical significance at the 1%, 5% and 10% levels, respectively.

Table 12 presents the results for the annual sample based on the first management earnings forecast released by management, with ROE as a proxy for firm performance. The R^2 are equal to 0.1770 and 0.1433, for ROE as a continuous variable and a dummy variable, respectively. Those two numbers are slightly higher than for the annual sample with the last forecast included.

I obtain the same results as with ROA as a proxy for firm performance. ROE as a coefficient that is negative and significant at the 1% level, meaning that a one-unit increase in in ROE

corresponds to a 0.0261 decrease in forecast error. Similarly, when using a dummy variable for ROE, I obtain a positive and significant coefficient at the 1% level. This implies that when a firm is performing below the benchmark, the forecast error is increasing by 0.0114, meaning that the managers forecast less accurately.

The coefficients for the control variables are similar for both proxies. The only difference is for the variable Number of analysts following the firm. The sign of the coefficient is the same for both proxies, however it is significant only when using ROE as a dummy variable.

The conclusion that can be drawn from table 11 is that forecast error is reduced when the ROE of the firm is increasing by one unit. This result is in line with the results obtained during the regression with the annual sample with the first forecast issued and with the quarterly sample.

Table 12
Regression with ROE as a proxy for firm performance (first forecasts released)

	Continuous variable			Dummy variable		
	Coefficient	t-statistic	p-value	Coefficient	t-statistic	p-value
Intercept	0.0437	4.21	0.000***	0.0305	2.86	0.004**
ROE	-0.0261	-12.11	0.000***	---	---	---
D_ROE	---	---	---	0.0114	19.21	0.000***
Big4	-0.0022	-1.46	0.144	-0.0016	-1.04	0.300
News	0.0009	1.21	0.224	0.0010	1.38	0.167
Size	-0.0044	-13.25	0.000***	-0.0051	-14.47	0.000***
Leverage	0.0295	11.36	0.000***	0.0327	12.85	0.000***
InstOwn%	-0.0154	-7.94	0.000***	-0.0168	-8.39	0.000***
#Analysts	0.0001	1.65	0.098	0.0002	3.32	0.001***
Industry FE	Included			Included		
Year FE	Included			Included		
N	12 670			12 670		
R^2	0.1770			0.1433		

Table 12 represents the results for the regression with the annual sample with ROE as a proxy for firm performance (first forecast released). *Forecast error* is the absolute value of the management earnings forecasts less the actual earnings. *ROE* is a continuous variable that is defined as the net income divided by the total equity of the company. *D_ROE* is a dummy variable that takes the value 1 if the ROE of the company is lower than the yearly median ROE of the industry. All other variables are defined as per appendix 2.

***, **, * denotes statistical significance at the 1%, 5% and 10% levels, respectively..

5. Conclusion

This chapter summarizes the research and the findings of this thesis. I also draw the main conclusions and their implications for the community, and finally, I discuss the potential limitations of this thesis.

This master thesis examines the relation between firm performance and the accuracy of management earnings forecasts. Prior research on voluntary disclosures usually focuses on disclosure quantity (Ruland et al., 1990; Marquardt and Wiedman, 1998; Baik et al., 2011). In addition, past studies also find mixed evidence relating to this relation. Healy and Palepu (2001) highlight the fact that managers can face litigation when issuing forecasts. Managers can be reprimanded for earnings forecasts that are not accurate and this can lead to either an extra incentive to report accurately or an incentive to cease releasing those forecasts as they do not have to do so. As stated by Rogers and Stocken (2005), even though managers have motivations to forecast in a self-interested way, they are restrained by the fear of lawsuits or penalties that can occur when biased forecasts are detected.

The objective of this thesis is to extend the body of literature regarding management earnings forecasts. This thesis aims to find the effect of firm performance on management forecasts accuracy. I use Compustat North America, IBES and Thomson Reuters databases to retrieve the data necessary for this thesis. The sample for the main analysis consists of 13,070 firm-years observations with 2,583 unique firms and is spread across 17 years from 2002 until 2018.

The result of this study shows that firm performance has a negative impact on forecast error. This demonstrates that forecast accuracy is improved when firm performance is increasing. I find this result for both ROA and ROE as a proxy for firm performance. I also find the same result when I create a benchmark for firm performance. I find that when a company has a ROA (or ROE) lower than the yearly industry median, the forecast error is increasing. This implies that the accuracy of the forecasts is being reduced when a firm is performing below the benchmark. I can then reject the null hypothesis "*Management earnings forecasts have the same level of accuracy in times of bad performance ".* Consequently, I can conclude that management earnings forecasts have a lower level of accuracy in times of bad performance.

These two results are also applicable when the sample consists of the first management earnings forecasts released in the fiscal year, instead of the last ones. This implies that no matter how far in the fiscal year the forecasts are released, the forecasts are less accurate in times of bad performance. Moreover, these results are also obtained when using a sample including the last quarterly management earnings forecasts released in the fiscal year.

This thesis contributes to the literature on management earnings forecasts. I found a negative association between firm performance and forecast accuracy. Additionally, by comparing the descriptive statistics for the two annual samples (last forecasts released and first forecasts released in the same fiscal year), I highlight the fact that managers tend to forecast less accurately at the beginning of the fiscal year. This finding is important as it shows that managers tend to be optimistic at the beginning of the fiscal year, and revise their judgment with time. Thus, this implies that management earnings forecasts could be less relevant to financial analysts and investors at the beginning of the fiscal year.

This thesis has some limitations. The sample used only consists of American firms, which causes this study to have a low external validity. Indeed, voluntary disclosures in general can be affected by regulations at the country level, which means that the U.S. settings might not be the best one for a study in Europe or in Asia, for example. Another limitation is towards the control variables used during this thesis. Indeed, I only include six different control variables that are known to have an influence on the forecasting behavior of managers. However, it is more than likely that some other variables could be added in order to enrich the model used. Another limitation to this thesis is related to the different forms of management earnings forecasts. Indeed, as stated in Chapter 2, management earnings forecasts can be issued in different forms (Baginski et al., 2011). In this thesis, I only used point forecasts and it is possible that different conclusions might be drawn with a sample including the other forms of forecasts (range forecasts, etc …). Lastly, it is possible that the model used in this study is not the best fit possible. By adding six control variables, I try to reduce the possibility of omitted correlated variables. However it is probably not enough to rule out the problem of endogeneity that is characteristic to studies about voluntary disclosures.

6. References

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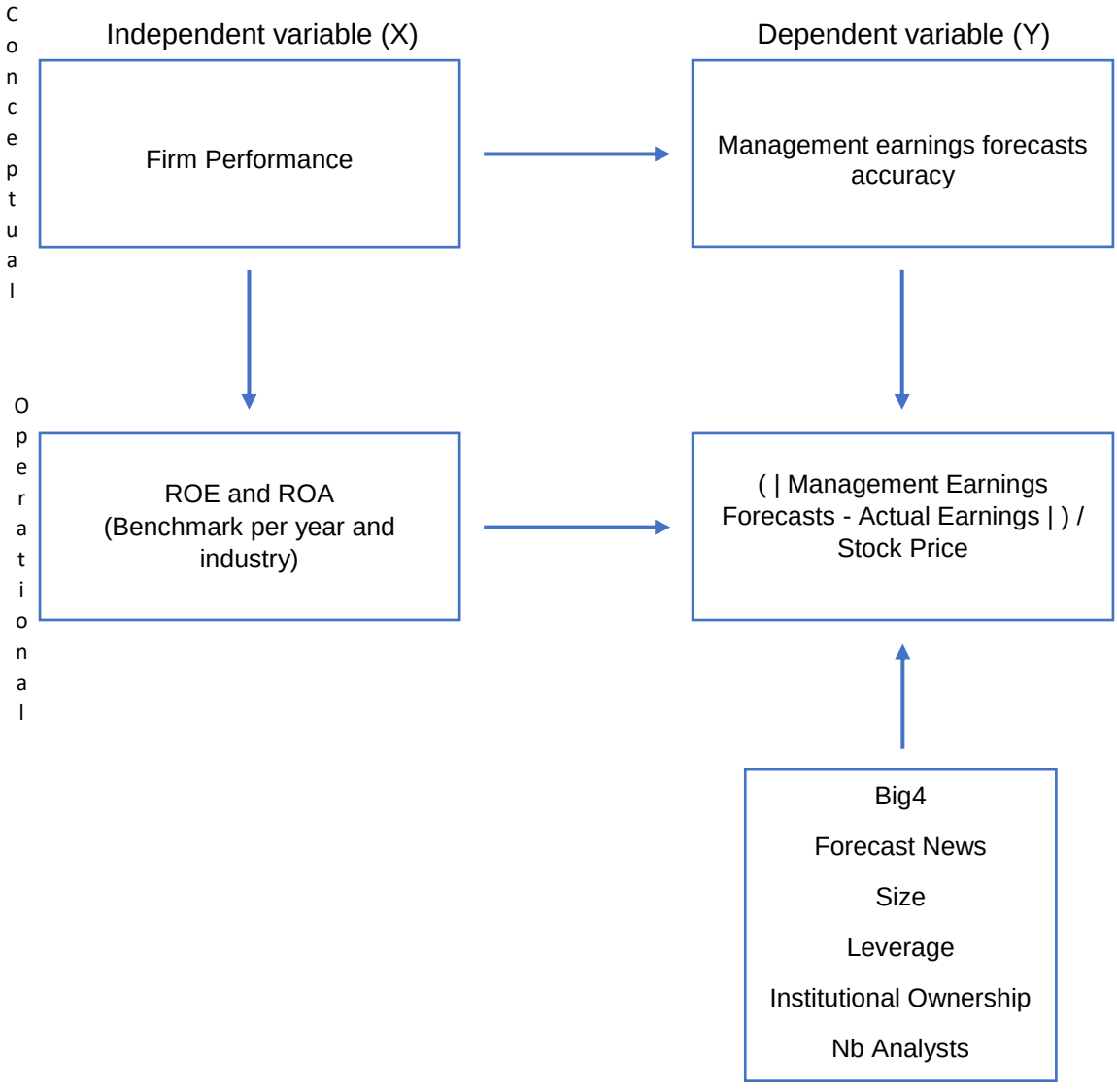
7. Appendix

Appendix 1: Predictive framework



Appendix 2: Variable definitions

Variables	Definitions	Reference
Dependent variable		
Forecast error	It is calculated as the absolute value of the difference between the means of the forecasted and actual earnings, divided by the market value at the beginning of the fiscal year.	Wang et al. (2015)
Independent variable		
Firm performance	*ROA* is a continuous variable that is defined as the net income divided by the total assets of the company.	Gentry and Shen (2010)
	ROE is a continuous variable that is defined as the net income divided by the total equity of the company	
	D_ROA is a dummy variable that takes the value 1 if the ROA of the company is lower than the yearly median ROA of the industry. *D_ROE* is a dummy variable that takes the value 1 if the ROE of the company is lower than the yearly median ROE of the industry	
Control variables		
Auditor	Dummy variable that takes 1 if the firm's auditor is one of the Big 4, and 0 otherwise.	Ajinkya et al. (2005) & Wang et al. (2015)
Forecast news	Dummy variable that equals 1 when the forecast communicates good news, 0 otherwise.	Rogers and Stocken (2005)
Firm size	Natural logarithm of the firm's total assets.	Ajinkya et al. (2005)
Leverage	The ratio of total debts to total assets	Pagach and Warr (2010)
Institutional ownership	Percentage of managerial ownership in the current year.	Baik et al. (2011)
Number of analysts	Log of number of analysts following the firm during the current fiscal year	Baik et al. (2011)

Appendix 3: Sample Selection Process for annual data

IBES Guidance		**570 181**
Drop observations not needed	548 017	
Drop missing data	2 781	
Total observations after data manipulation		19 383
IBES Summary		**4 011 680**
Drop observations not needed	3 858 905	
Drop missing data	78 543	
Total observations after data manipulation		74 232
Merge IBES Guidance with IBES Summary		
Observations not matched	60 375	
Total observations left		16 620
Compustat North America		**210 637**
Drop observations not needed	22 377	
Drop missing data	49 869	
Total observations after data manipulation		138 391
Merge IBES with Compustat North America		
Observations not matched	128 487	
Total observations left		13 262
Thomson Reuters		**705 589**
Drop observations not needed	428 081	
Drop missing data	101 429	
Total observations after data manipulation		176 079
Merge all the datasets		
Observations not matched	163 157	
Final data set		**13 092**
Drop missing data	22	
Total number of observations left		**13 070**

Appendix 4: Sample Selection process for quarterly data

IBES Guidance		**570 181**
Drop observations not needed	552 800	
Drop missing data	2 270	
Total observations after data manipulation		15 111
IBES Summary		**4 011 680**
Drop observations not needed	3 736 331	
Total observations after data manipulation		275 349
Merge IBES Guidance with IBES Summary		
Observations not matched	262 284	
Total observations left		14 088
Compustat quarterly data		761 467
Drop observations not needed	2 650	
Drop missing data	150 504	
Drop duplicates	782	
Total observations left		607 531
Compustat North America		**210 637**
Drop observations not needed	20 964	
Total observations after data manipulation		189 673
Merge Compustat Q with Compustat NA		
Observations not matched	497 340	
Total observations left		149 932
Merge IBES and Compustat		
Observations not matched	141 034	
Total observations left		11 493
Thomson Reuters		**705 589**
Drop observations not needed	428 081	
Drop missing data	101 432	
Total observations after data manipulation		176 076
Merge all the datasets		
Observations not matched	164 800	
Total number of observations left		**11 383**