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The impact of CEO compensation, analysts' characteristics, earnings management and country governability on analysts' earnings forecasts.

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SUMMARY

This thesis examines the impact of CEO compensation, analysts' characteristics, earnings management and country governability on the accuracy of analysts' earnings forecasts. In summary, the thesis includes the following chapters:

Firstly, Chapter 2 examines the interplay between CEO compensation and analysts' forecast errors over different forecasting horizons. A unique analyst-level sample for U.S. firms covering the period between 1992 and 2015 has been employed. Evidence obtained from this analysis suggests that CEO compensation, measured by various forms such as restricted stock holdings and stock ownership would correct for optimism in analysts' earnings forecasts, whereas CEO bonus and sensitivity to changes in firm's value would exacerbate analysts' optimism. Results also show that CEO compensation would augment the effect of earnings management on analysts' forecasts with CEO bonus being of importance. The findings of this chapter also indicate that analysts' characteristics and regulation can affect earnings forecasts.

Next, Chapter 3 investigates the effect of governance on analysts' earnings forecasts. By employing a comprehensive dataset of 911 U.S. firms for the period 2000 – 2014, this

chapter demonstrates a strong positive association between the government effectiveness and analysts' earnings forecasts. We extend this analysis employing corporate governance variables such as CEO equity incentives and CEO power, whilst a possible cross-term association between governability and the former has also been examined. This chapter explores further the effects of earnings management on analysts' forecasts accuracy documenting a negative impact of the former on the latter. Lastly, underlying causality strands and endogeneity issues are addressed opting for a flexible panel VAR model.

Finally, Chapter 4 presents evidence of the effects of corruption on the accuracy of analysts' forecasts. Using a global sample, this chapter reveals that analysts face greater difficulty in forecasting earnings in advanced and emerging countries due to the detrimental effect of corruption. Interestingly, findings suggest that for firms located in developing countries, corruption enhances analysts' accuracy. This chapter also shows that the effect of earnings manipulation on the accuracy of forecasts is aggravated in the presence of corruption, whilst greater country freedom would enhance analysts' accuracy when corruption is present.

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Chapter 1: Introduction

This thesis examines the impact of CEO compensation, analyst-specific characteristics, earnings management and country governability on financial analysts' earnings forecasts. Studying the underlying determinants of analysts' earnings forecast errors could not be far from defining an important, but rather a neglected research topic. It is only in recent years, partly because of noticeable analysts' forecast errors and partly due to strong voices to enhance regulation and safeguard the accuracy of earnings forecasts, that this topic started gathering momentum (Kanagaretnam et al. 2012; Chan et al. 2012; Mande and Son 2012; Dehaan et al. 2013).

The choice of developing and focusing this thesis on the determinants of analysts' earnings forecasts is thus of utmost importance. Earnings forecasts issued by financial analysts play an important role in capital markets as an instrument of interpreting public information concerning firms and industries and contribute to the reduction of information asymmetries between firms and investors (Loh and Mian 2006; Hall and Tacon 2010). Furthermore, early research (Fried and Givoly 1982; Brown 1987) demonstrates timing and informational advantages of analysts' earnings forecasts over past time series of earnings. It has been well documented that investors use analysts' forecasts as a significant source of information for their investment decisions (Brown 1987; Das et al. 1998).

Although analysts' forecasts exhibit some superiority over earnings time series models, there is evidence of bias in earnings forecasting (Brown et al. 1985; O'Brien 1988; Das et al. 1998; De Bondt and Thaler 1990; Easterwood and Nutt 1999; Kim 2001; Abarbanell and Lehavy 2003; Gu and Wu 2003; Eames and Glover 2003). The existing literature on

financial analysts defines forecast bias as the deviation of mean earnings forecasts from the actual value and/or the failure of them to accurately incorporate new information (Bondt and Thaler 1990; Easterwood and Nutt 1999). Bias in analysts' forecasts has been reported in many studies, arguing that analysts issue forecasts that are systematically optimistic meaning that the earnings forecasts are higher than the actual earnings (O'Brien 1988; Stickel 1990; O'Brien et al. 1994; Gu and Wu 2003; Loh and Mian 2006).[1] This thesis puts particular emphasis on the accuracy of analysts' earnings forecasts. The inaccuracy in analysts' forecasts could have serious consequences for investors who use these forecasts naively as a key determinant of expected returns (Richardson et al. 2004). Although there have been many studies demonstrating the importance of analysts' forecasts (Abarbanell and Lehavy 2003; Cohen and Lys 2003; Loh and Mian 2006; Kanagaretnam and Mathieu 2012; Mande and Son 2012), it remains an open question regarding the factors that induce inaccuracy in earnings forecasts. Empirical studies state that analysts' forecast decisions might be influenced by both incentives and behavioral biases (Bondt and Thaler 1990; Das et al. 1998; Lim 2001; Loh and Mian 2006).

Bondt and Thaler (1990), Das et al. (1998) and Lim (2001) argue that analysts may have incentives to issue inaccurate forecasts to enhance trading by customers and/or to improve the relationships with corporate management, safeguarding their access to private information. This strand of literature claims that it is harder for analysts to predict earnings forecasts for firms with higher informational uncertainty. Thereby, since the primary role of analysts is to provide market participants with information about firms –

[1] According to Bondt and Thaler (1990) and Loh and Mian (2003), the changes in analysts' earnings forecasts are larger in magnitude than the changes in actual earnings. Furthermore, there is evidence that U.S. analysts underreact to bad news and overreact to good news (Easterwood and Nutt 1999).

beyond that publicly available – one may expect that analysts strive to get access to non-public information (Das et al. 1988).[2]

Yu (2010) argues that the corporate structure is a significant determinant of analysts' forecasts and that information disclosure about corporate governance can lead to more accurate earnings forecasts. Furthermore, there is evidence (Karamanou and Vafeas 2005; Byard et al. 2006; García-Meca and Sánchez-Ballesta 2011) that the quality of analysts' information improves with the quality of corporate structure, and that in turn, benefits analysts' forecast accuracy. Along these lines, more effective boards enhance the quality and quantity of information disclosure (Ho and Wong 2001), contributing to lower analysts' forecast errors. The choice of developing and focusing this thesis on the CEO compensation is driven by prior evidence supporting the crucial role of CEOs in corporate governance. It has been well documented that CEOs are responsible for the firm performance and particularly, they are credited for the negative performance (Zemba et al. 2006; Crossland and Chen 2013). There is also evidence that powerful CEOs can increase the unity of the boards and form clear strategic positions fastening the decision-making procedures (Cannella and Monroe 1997; Adut et al. 2011). Therefore, CEOs with higher compensation and power might have greater accountability and career concerns, as they feel more responsible for firms' performance. Greater accountability could eliminate analysts' forecast errors due to the increased liability of the executives. Additionally, it is a well-documented fact that greater CEO ownership aligns CEO's interests with those of the shareholders' mitigating the conflict of interest between them

[2] Das et al. (1998) employing a sample of 241 U.S. firms over the period 1989 – 1993 show that analysts' bias is stronger for firms with less predictable earnings as measured by the historical earnings variability. Their findings indicate that for firms with more predictable earnings, analysts do not strive for non-public information and thus, do not need access to firms' management. Conversely, in case of firms whose earnings are less predictable, analysts might deliberately issue biased forecasts. Analysts might follow such practictices to establish a better relationship with the managers in order to get access to information that is not publicly available.

(Johnson and Natarajan 2005; Lilienfeld-Toal and Ruenzi 2014). To this end, it is appropriate to examine whether disclosures over CEO compensation would provide analysts with valuable information enhancing the forecast accuracy of the latter.

However, the task of measuring CEO compensation does not come without challenges. Over the years, a plethora of CEO compensation forms, such as option grants, have been put forward (Bartov et al. 2002; Kasznik and McNichols 2002; Hall and Murphy 2003; Jensen 2005b; Efendi et al. 2007; Beaver et al. 2008). Existing literature documents some association between analysts' forecasts and CEO stock option holdings. This strand of research has been attracting significant interest as stock options are becoming an important part of CEO compensation. Firms may provide CEOs with options, restricted stocks, cash bonus and equity stocks. In such event, firms intent to enhance CEO compensation towards the direction of making decisions that would benefit shareholders. Kanagaretnam et al. (2012) suggest the *"incentive alignment"* effect. According to this effect, higher option holdings could align managers' interests with those of the shareholders', improving firms' information disclosure that can result in lower analysts' forecast errors. Furthermore, firms might use stock options as part of CEOs' compensation to reduce reported accounting expenses, to attract high skilled executives as well as to delay tax payments (Kanagaretnam et al. 2012; Mande and Son 2012).[3] This thesis places a particular attention on CEO compensation as a key determinant of analysts' forecast accuracy. We hypothesize that CEO compensation could serve as an important

[3] The Securities and Exchange Commission (SEC) has implemented executive compensation disclosure rules in August 2006. According to Donahue (2008), these rules intend to increase transparency and information disclosure to provide investors detailed information about board compensation. Furthermore, Sheu et al. (2010) argue that Taiwanese firms that voluntarily disclose information about executive compensation document a higher market valuation.

source of non-public information for analysts and that access to information about the former could mitigate analysts' earnings forecast errors.

There is also another issue concerning financial analysts that has not been adequately examined in the existing literature. Although prior research has recognized the important role of analysts' earnings forecasts for market participants, most of the extant literature has looked at firm-specific characteristics, also related to corporate governance as a key to delineate forecast errors (Chan et al. 2012; Kanagaretnam et al. 2012; Mande and Son 2012). This thesis emphasizes the role of analyst-specific characteristics as well. Analysts' characteristics may help explain why some analysts issue more accurate forecasts for some firms than others. Identifying those particular analysts' characteristics is a valuable exercise for all market participants that strive to increase the accuracy of forecasts. Alas, earlier research provides mixed results and is rather limited, in particular across forecast horizons. Some evidence suggests a link between analysts' accuracy and their career concerns and reputation (Scharfstein and Stein 1990; Trueman 1994). Other studies (Hong et al. 2000; Hong and Kubik 2003; Clement and Tse 2005; Clarke and Subramanian 2006) show that less experienced analysts are associated with lower forecast errors. Herein, we argue that these approaches would lead to defragmentation of evidence and loss of information, as it is the interaction between CEOs' and analysts' characteristics that is of prominence. The reason is that analysts' forecasts are not emerging in a vacuum, they are subject to influence from firm's corporate governance, as well as the economic environment, including the overall regulatory framework.

As analysts and CEOs operate in regulated market conditions, we shall take into account such conditions. This thesis focuses on the impact of Global Analyst Research Statement regulation and the Dodd-Frank Wall Street and Consumer Protection Act. Global Analyst

Research Statement is an enforcement provision between the Security Exchange Commission (SEC), National Association of Securities Dealers (NASD), New York Stock Exchange (NYSE) and twelve of the largest U.S. investment institutions. The provision aims to address issues related to possible conflict of interests regarding analysts, who release forecasts and recommendations for investing or not in selected firms. The Global Analyst Research Statement regulation was first introduced in 2002 and went into effect in 2003. The main motivation of this regulation was to prevent the engagement of the investment institutions (the brokers) in practices to influence analysts' forecasts to gain higher compensation fees. Accordingly, the main aim of the Dodd-Frank Act was to improve the regulation of the financial industry and to prevent the U.S. economy from experiencing a crisis like that of 2008. The Dodd-Frank Act is implemented by the SEC and includes provisions requiring detailed disclosure of executive compensation and corporate governance structure. According to the Dodd-Frank Act, firms should disclose information about CEO pay versus firm performance ratio and a compensation recovery policy for the excess incentive-based executive compensation in case of misreporting of the financial statements. Prior research provides evidence for a positive impact of the Dodd-Frank Act on information disclosure and transparency of the financial statements reported by the firms (Chan et al. 2012; Dehaan et al. 2013). Particularly, these studies find that the adoption of the Dodd-Frank provisions enhances the quality of firms' financial statements, decreases the number of financial report restatements and analysts' earnings forecast dispersion. Given that analysts use financial statements as their main source of information, greater quality and quantity of information disclosed through financial statements could decrease analysts' forecast errors (Byard et al. 2006).

There is also evidence that analysts' forecast ability varies with forecast horizons and that forecast errors tend to be greater for long-term than for short-term forecasts (Richardson

et al. 2004; Hovakimian and Saenyasiri 2010, 2014). Therefore, it is necessary not only to control for differences in the relationships between analysts' forecast errors and a plethora of characteristics but also to account for different forecasting horizons. To this end, this thesis bridges a gap in the literature by providing comprehensive evidence of the underlying determinants of analysts' earnings forecast errors in a unified way, where analysts and corporate governance interact over several forecast horizons, while the regulation also affects.

There is another angle of financial analysts' literature that has not been sufficiently examined yet. This thesis investigates whether CEO compensation can augment the effects of firm's engagement in earnings management on analysts' forecast accuracy. Following Leuz et al. (2003), we define earnings management as the intentional misreporting of firms' performance and/or misapplication of accounting standards by insiders to deceive and mislead market participants. We put emphasis on earnings management as analysts' earnings forecasts might be more complex for firms that engage in earnings manipulation than for those that do not. Firms' engagement in earnings manipulation come through various channels, i.e. through the use of discretionary accruals that increases analysts' forecast errors (Bradshaw et al. 2001; Abarbanell and Lehavy 2003; Ahmed et al. 2005). CEO incentives might exist encouraging managers to involve in accruals manipulation and that, in turn, could result in impediments on information disclosure regarding earnings (Leuz et al. 2003). Prior research claims that markets reward/penalize firms that consistently achieve/miss analysts' earnings forecasts in short-term (Bartov et al. 2002; Kasznik and McNichols 2002; Skinner and Sloan 2002). History has shown that there is a higher probability of firings or forced resignations for powerful CEOs when the latter do not achieve analysts' forecasts (Farrell 2007; Laura 2011; Wiersema and Zhang 2011). According to this strand of literature, there is a strong

link between boards' decision about CEOs' dismissal and analysts' recommendations. The main reason for this association is that investors, whom the board intends to please, use analysts' forecasts as a proxy for the future firm valuation. Thus, it could be the case that CEOs with higher compensation and power driven by managerial and career concerns will engage in earnings management to affect analysts' forecasts. Along with these lines, Graham (2005) argues that firms engage in earnings management to meet analysts' forecasts and that 73.5% of chief executive managers consider achieving analysts' forecasts as an important managerial target. In line with this note, Brown and Caylor (2005) show that during the period between 1996 and 2001, the main aim of firm's managers was to eliminate negative earnings surprises rather than mitigate losses. Furthermore, there is a support that in U.S. small earnings forecast errors are regarded as a form of managerial opportunism (Cheng and Warfield 2005; Kanagaretnam et al. 2012; Mande and Son 2012). Evidence also exists showing that market places a higher value to firms that achieve analysts' forecasts on a continuous basis than to those firms that meet analysts' expectations occasionally (Bartov et al. 2002; Lopez and Rees 2002). Recently, De Jong et al. (2014) in an interview-based survey of 306 analysts employed by 11 of the world's largest investment banks conclude that 88.2% of the analysts believe that firms achieving their forecasts built credibility with capital markets. Moreover, 87.5% of the analysts state that meeting earnings forecasts enhances firm's future growth prospects to investors. Finally, there is evidence to suggest a negative impact of earnings management on analysts' accuracy (Bradshaw et al. 2001; Cohen and Lys 2003; Ahmed et al. 2005). According to this research, firms' involvement in earnings management increases the complexity of analysts' forecasts resulting in less accurate earnings forecasts. Karpoff et al. (2008) examine the market reaction to financial misbehaviour and find that on average firms lose 38% of their market value when their engagement in

financial misreporting is uncovered. The 24.5% of these loses is due to market adjustment to more accurate presentation of firms' financial statements.

There is some evidence arguing that CEO compensation affects firms' engagement in earnings management through financial misreporting (Greenspan 2002; Cheng and Warfield 2005; Bergstresser and Philippon 2006; Efendi et al. 2007). Greenspan (2002), Bergstresser and Philippon (2006) and Efendi et al. (2007) suggest that the likelihood of earnings misstatement is positively related to the CEO option portfolio. Cheng and Warfield (2005) show that CEOs with high stock and stock option portfolios engage in earnings management to avoid future earnings disappointments. Despite the plethora of studies that report a significant relationship between CEO characteristics and earnings management (Xie et al. 2003; Cheng and Warfield 2005; Rahman and Ali 2006; Ebrahim 2007; Cornett et al. 2008; Sáenz González and García-Meca, 2014), the empirical evidence concerning the interplay between analysts' earnings forecasts, earnings management and CEO compensation is limited. Therefore, motivated by the evidence that CEO compensation could encourage earnings management (Xie et al. 2003; Bergstresser and Philippon 2006; Rahman and Ali 2006; Ebrahim 2007; Efendi et al. 2007; Cornett et al. 2008; McAnally et al. 2008; Jiang et al. 2010; Sáenz González and García-Meca 2014) and that earnings management can affect analysts' forecasts, this thesis examines whether the impact of earnings management on analysts' forecasts varies with CEO compensation.

Finally, this thesis investigates a critical, but rather neglected area of the extant literature of financial analysts, the country governability. Particular attention has been placed on the way that government effectiveness and corruption affect the accuracy of analysts' forecasts. Some studies investigate the impact of institutional settings, on analysts'

accuracy (Hope 2003; Hope and Kang 2005; Bhat et al. 2006; Chen 2010). There is evidence for a significant positive relationship between the degree of legal enforcement and forecast accuracy, indicating that stronger country governance could enhance analysts' accuracy. Although previous research on analysts' forecasts (Brown 1993; Duru and Reeb 2002; Clarke and Subramanian 2006; Hall and Tacon 2010) has emphasized that institutional settings should not be ignored, little is known about the direct impact of corruption, as well as its interaction with other factors of importance, on the accuracy of financial analysts.

This thesis puts a special emphasis on corruption, as it has far-reaching adverse repercussions on the effective functioning of an economy at an aggregate level, but it also affects the performance of a firm and an economic agent. But what is corruption? The World Bank defines corruption as '*the abuse of public office for private gain'* (World Bank 1997).[4] Macrae (1982) argues that corruption is '*an arrangement that involves a private exchange between two parties which can influence the allocations of sources and might involve the abuse of public or collective responsibility for private gain*'. Regarding the private exchange between parties, and in particular in relation to the exchange of information, we examine the association between corruption and analysts' forecasts. This area has rarely been investigated, yet the importance of analysts' forecasts in providing valuable information that enhances market efficiency is unequivocal. It could be the case that corruption increases the injustice and decreases the information transparency (DiRienzo et al. 2007). As information transparency drops, analysts could face difficulties in forecasting earnings accurately. However, a positive relationship between accuracy

[4] The World Bank defines corruption as '*the abuse of public office for private gain'*(World Bank 1997). It exists in both private and public sectors and involves arrangements that provide benefits for others closely related to the perpetrator. Other international organizations such as International Monetary Fund (IMF), the Organization for Economic Co-operation and Development (OECD) and Transparency International have conducted many surveys regarding the level of corruption internationally, aiming to combat corruption.

and corruption might also exist as higher corruption could help firms smooth their earnings and therefore, make them more predictable (Chen et al. 2010). This thesis bridges a gap in the literature by directly measuring the impact of corruption on analysts' earnings forecasts and indirectly through the interaction of corruption with analysts' characteristics and practices, as well as through the interaction of corruption with institutional settings. We show that the impact of corruption on the accuracy of analysts' earnings forecasts varies across countries and thus, such research is warranted.

Another issue that this thesis explores is the interaction of corruption with earnings management and whether the above affect the accuracy of financial analysts. In countries where corruption is present, firms' managers might engage in earnings manipulation to deceive market participants by publishing financial statements that do not reflect the real financial position of a company, increasing the difficulty in earnings forecasts for analysts. For this reason, this thesis investigates whether the effect of corruption on analysts' forecast accuracy is more pronounced in countries where firms' engage in earnings manipulation practices related to discretionary accruals. Furthermore, the institutional settings literature (Sandholtz and Koetzle 2000) has highlighted the role of democracy in relation to corruption, as the former could deter the latter. Sandholtz and Koetzle (2000) demonstrate that country freedom subdues the level of corruption through democratic freedoms, such as political rights and civil liberties. Montimola and Jackman (2002) and Sung (2004) suggest that democratization through stronger political rights affects the level of corruption positively, albeit this effect is nonlinear. Given this evidence, the current study also explores whether country freedom would lessen the effect of corruption on analysts' forecast accuracy.

This thesis is structured into five chapters. The following chapter (Chapter 2), investigates the interplay between CEO compensation and analysts' forecast errors over different forecasting horizons. A unique analyst-level sample for U.S. firms covering the period between 1992 and 2015 has been assembled. Empirical evidence suggests that CEO compensation, measured by various forms, such as restricted stock holdings and stock ownership, would correct for optimism in analysts' earnings forecasts, whereas CEO bonus and sensitivity to changes in firm's value would exacerbate analysts' optimism. Results also show that CEO compensation would augment the effect of earnings management on analysts' forecasts with CEO bonus being of importance. The findings of this chapter also indicate that analysts' characteristics would affect earnings forecasts. It is warranted not only to control for differences in the underlying relationships between analysts' forecast errors and a plethora of characteristics but also to account for different forecasting horizons. Such characteristics are analyst and firm-specific, for example, analyst's experience and brokerage size. In terms of forecasting horizon, we employ forecasts of the current year, one year-ahead and two years ahead, while we also consider for the frequency of forecasts. Estimation results suggest different impact of CEO compensation and analysts' characteristics on the accuracy of the latter across different forecast horizons. Since analysts and CEOs operate in regulated market conditions, Chapter 2 takes into account such conditions as well. The impact of the Global Statement Regulation and Dodd-Frank Act on the underlying relationships has been examined. Results show that while these regulations can reduce analysts' optimism, they do not affect the relationship between forecasts errors and analysts' characteristics/CEO compensation in the same way. Variability exists both across firms with different CEO compensation and across analysts' characteristics.

Next, Chapter 3 investigates the effect of country-level governance on analysts' earnings forecasts. By employing a comprehensive dataset for 911 U.S. firms for the period 2000 – 2014, our evidence reports that governance variables, such as government effectiveness and quality of government regulations, positively affect analysts' accuracy. CEO characteristics such as CEO equity incentives, on the other hand, assert a negative impact on accuracy. Our results further provide evidence for a positive association between CEO power and accuracy, whilst there exists evidence of cross term relationship between the government effectiveness and the latter. This chapter also provides evidence for a significant negative impact of discretionary accruals on analysts' accuracy, suggesting that analysts' forecast accuracy reduces as firms engage in earnings manipulation by using discretionary accruals. Finally, the panel VAR modeling enriches previous findings, as it sheds new light regarding the underlying causality of the main covariates of earnings forecasting accuracy, whilst also tackling issues related to endogeneity.

Chapter 4 explores the effects of corruption on the accuracy of analysts' forecasts. Employing a global sample, the results of this chapter show that corruption negatively affects analysts' accuracy across the world, with some variability though. We derive a comprehensive measure of corruption from the Transparency International's Corruption Perception Index and the Control for Corruption Index obtained from the World Bank. As corruption could vary from country to country, and thereby its impact on analysts' accuracy could also vary, we assemble a global sample. There are also methodological advantages of employing a global sample, as it provides appropriate variability across a plethora of countries. Such variability comes from the heterogeneity across countries that we adequately deal with within a panel regression setting that also takes into account possible issues related to endogeneity. Analysts' forecast accuracy appears higher for firms located in less corrupt advanced and emerging countries, whereas for firms located

in developing countries, results show that corruption could enhance analysts' accuracy. The findings of this chapter also show that earnings manipulation can exacerbate analysts' accuracy for firms in emerging and developing countries with corruption present. Additionally, we use data from World Freedom Index and Press Freedom Index obtained from the Freedom House as proxies of country freedom to examine the interaction between country freedom and corruption in relation to the impact of the latter on accuracy. Chapter 4 reveals the plethora of complexities involved in the relationship between corruption and analysts' forecasts, suggesting that country freedom in parallel with corruption would improve forecast accuracy. Lastly, Chapter 5 presents a summary of the contributions of this thesis and discusses some policy implications.

Chapter 2: What affects analysts' earnings forecasts? The role of CEO compensation, analyst-specific characteristics and regulation

2.1. Introduction

The purpose of this chapter is to investigate the interplay between CEO compensation and analysts' forecast errors. Financial analysts are sophisticated intermediaries between the firms and markets, who use all available information to form their earnings forecasts (Barvin et al. 2009). Given that CEOs are responsible for the strategic decision making of the firms (Zemba et al. 2006; Crossland and Chen 2013), CEO compensation could affect the quality and quantity of the information disclosure that analysts, in turn, would employ to come forward with earnings forecasts (Aboody and Kasznik 2000; Nanda et al. 2003; Hermalin and Weisbach 2012).

However, to measure CEO compensation is not without its challenges. Over the years a plethora of CEO compensation forms, such as option grants, have been put forward (Hall and Murphy 2003; Jensen 2005b; Efendi et al. 2007). Firms grant CEOs equity options, restricted stocks, cash bonus and increase the stock ownership of the latter. In such event, firms intent to enhance CEO compensation towards the direction of making decisions that would benefit shareholders. Kanagaretnam et al. (2012) suggest the *"incentive alignment"* effect. According to this effect, higher option holdings could align managers' interests with those of the shareholders', improving firms' information disclosure that can result in lower analysts' forecast errors.

In particular, the current chapter examines whether CEO compensation would affect analysts' forecasts. Previous studies provide some evidence that such an association is highly likely. Kanagaretnam et al. (2012) argue that CEO option holdings could affect analysts' forecasts. According to the authors, managers with higher stock option

compensation might undertake higher risk, exert greater effort to improve firm performance and show opportunistic disclosure behaviour. This thesis takes the above evidence a step further examining whether such CEO behaviour could enhance the complexity of analysts' forecasts that, in turn, could lead to higher forecast errors.

Another strand of literature links analysts' forecasts with firms' engagement in earnings management. Prior research documents both positive (Matsumoto 2002; Brown and Caylor 2005; Burgstahler and Eames 2006; Mande and Son 2012) and negative (Bradshaw et al. 2001; Cohen and Lys 2003; Ahmed et al. 2005) impact of earnings management that come through different channels, i.e. through the use of discretionary accruals, on analysts' forecasts. There is also evidence that CEO compensation encourages executives to engage in earnings management. The evidence, to date, argues that executives with high option compensation would opportunistically manage earnings to affect stock price and achieve higher gains from their equity portfolios (Aboody and Kasznik 2000; Chauvin and Shenoy 2001; Greenspan 2002; Bergstresser and Philippon 2006; Burns and Kedia 2006; Efendi et al. 2007; McAnally et al. 2008). Motivated by prior findings of a positive relationship between CEO compensation and the likelihood of earnings misreporting, we expect that CEO compensation could affect analysts' earnings forecasts through earnings management.

In addition, we model analyst-specific characteristics. There is evidence that analysts' characteristics help explain why some analysts issue more accurate forecasts for some firms than others (Hong et al. 2000; Hong and Kubik 2003; Clement and Tse 2005; Clarke and Subramanian 2006). Identifying those particular analysts' characteristics is a valuable exercise for all market participants that strive to increase the accuracy of forecasts. Herein, we argue that these approaches would lead to defragmentation of evidence and loss of information, as it is the interaction between CEO compensation and analysts'

characteristics that is of prominence. It could be the case that, the impact of analysts' characteristics on forecast errors would vary with differences in CEO compensation across the firms.

Finally, although it is warranted to control for differences in the underlying relationships between analysts' forecast errors and a plethora of characteristics, we also need to control for different forecasting horizons. There is evidence that analysts' forecast ability varies with the forecast horizon and that forecast errors tend to be greater for long-term than for short-term forecasts (Richardson et al. 2004; Hovakimian and Saenyasiri 2010, 2014). Richardson et al. (2004) argue that initially analysts issue earnings forecasts that deviate more from the actual reported earnings and later, as time converges to the forecast period end, they revise (walk-down) their forecasts closer to the actual earnings. The authors refer to this as the *"walk-down"* phenomenon suggesting a positive relationship between forecast horizon and analysts' forecast errors. Additionally, Hovakimian and Saenyasiri (2014, 2010) find that analysts' forecast bias is higher for long-term forecast horizons than for short-term. For this reason, we employ forecasts of the current year, 1-year and 2-years ahead.

This chapter contributes to the growing literature of analysts' forecasts in several ways. First, we extend Kanagaretnam et al. (2012) and employ forecast errors issued by individual analysts, rather than the consensus forecasts over 20 years. By doing so, we correct for aggregation bias in analysts' forecasts that could emerge from consensus forecast. This is the first time in the recent literature that analyst-specific forecasts are the main focus. Second, we extend the analysis beyond the impact of CEO stock options on analysts' forecasts to cover also other forms of compensation such as total compensation, cash bonus, restricted stock holdings and stock ownership. We also account for the

impact of analysts' characteristics. Employing a panel regression analysis, this study reveals the impact of such characteristics on forecasts over multiple forecasting horizons.

Third, since prior research shows that CEO option grants increase the likelihood for financial misreporting, we consider the effect of earnings management on analysts' forecasts and investigate whether this effect varies with CEO compensation. We show that earnings management increases analysts' forecast errors and that CEO compensation, such as CEO restricted stock holdings, sensitivity to changes in firm's value and ownership can mitigate this effect. Conversely, CEOs who enjoy high cash bonus can augment the above relationship. Fourth, we consider that analysts' forecasts are not the outcome of a process in a vacuum and argue that the interaction between their characteristics and CEO compensation could be of high importance. Therefore, we employ the interactions between analysts' characteristics and CEO compensation. Estimation results indeed provide evidence for channels of interaction between CEOs and analysts with analysts' experience being the leading indicator that corrects optimism for firms where CEOs enjoy high compensation, cash bonus, have greater sensitivity to changes in firm's value and greater stock ownership.

Finally, we also examine the impact of the Global Statement Regulation (GS thereafter) and Dodd-Frank Act (DF thereafter) on the above relationships. We show that while these regulations can reduce analysts' optimism, they do not affect the relationship between forecasts errors and analysts' characteristics/CEO compensation in the same way. Variability exists both across firms with different CEO compensation and across analysts' characteristics.

The remainder of this chapter is organized as follows: Section 2.2. presents the hypotheses to be tested. Section 2.3. discusses the data and offers some statistical description, while

section 2.4. presents the methodology and the estimated results. Finally, section 2.5. concludes and provides the policy implication of this study.

2.2. Hypotheses to be tested

2.2.1. The interplay between CEO compensation and analysts' forecast errors

Kanagaretnam et al. (2012) show that stock option compensation results in higher analysts' forecast errors due to the higher level of forecasting complexity. The increase in forecasting complexity can be because of the compensation for higher risk projects and better managerial efforts. When firms use stock options as a part of CEO compensation, they aim to motivate executives to exert a greater effort for better firm performance and this, in turn, might encourage managers to undertake riskier strategies. These managerial activities increase the difficulty for analysts' forecasting. Overall, one reason that high compensation could increase analysts' forecast errors is the forecast complexity induced by option compensation. In this case, analysts need greater access to management's information resulting in less accurate earnings forecasts. Arguably, the *"interest alignment"* effect can be present. It could be the case that high CEO compensation aligns the interests of managers with those of the shareholders', enhancing the information disclosure and thus, resulting in lower forecast errors.

There is also evidence that links analysts' forecasts with firms' engagement in earnings management. Both positive and negative association between earnings management and analysts' forecasts has been documented. Regarding the positive, literature (Matsumoto 2002; Brown and Caylor 2005; Burgstahler and Eames 2006; Mande and Son 2012) argues that firms manage their earnings to meet analysts' earnings forecasts using earnings smoothing practices. Conversely, there is evidence to suggest a negative impact of earnings management on analysts' accuracy (Bradshaw et al. 2001; Cohen and Lys 2003; Ahmed et al. 2005). According to this research, firms' involvement in earnings

management increases the complexity of analysts' forecasts resulting in less accurate earnings forecasts.

Prior literature also provides strong evidence of the impact of CEO compensation on earnings management through financial misreporting (Greenspan 2002; Cheng and Warfield 2005; Bergstresser and Philippon 2006; Efendi et al. 2007). Greenspan (2002), Bergstresser and Philippon (2006) and Efendi et al. (2007) argue that the likelihood of earnings misstatement is positively related to the CEO option portfolio. Cheng and Warfield (2005) show that CEOs with high stock and stock option portfolios engage in earnings management to avoid future earnings disappointments. However, the existing research does not document any significant association between other measures of CEO compensation, such as bonus and restricted stock holdings and the likelihood of earnings misreporting.

Motivated by the evidence that CEO compensation could encourage earnings management (Bergstresser and Philippon 2006; Cornett et al. 2008; Jiang et al. 2010; McAnally et al. 2008; Ebrahim 2007; Efendi et al. 2007; Rahman and Ali 2006; Sáenz González and García-Meca 2014; Xie et al. 2003), and that earnings management can affect analysts' forecasts, we examine whether the impact of earnings management on analysts' forecasts varies with CEO compensation. We proxy CEO compensation employing CEO total compensation, cash bonus, the sensitivity of CEO compensation to one percentage point increase in the value of firm's equity (Bergstresser and Philippon 2004), CEO in-the-money option holdings, restricted stock holdings and stock ownership.

Table 1 presents the predicted impact of the compensation variables on analysts' forecast errors. We classify the impact of the compensation variables by *"interest alignment"* and *"forecast complexity"* effect. Concerning the *"interest alignment",* CEOs with high total

compensation driven by career concerns might have fewer incentives to mislead analysts and thus, leading to lower forecast errors for the latter.[5] We also predict a negative sign for CEO stock ownership. It is well documented that greater CEO stock ownership enhances the *"interest alignment"* effect, mitigating the conflict of interest between managers and shareholders (Johnson and Natarajan 2005; Lilienfeld-Toal and Ruenzi 2014). Johnson and Natarajan (2005) using a sample of 149 firms over the period between 1984 and 1988 show that CEOs with greater stock holdings disclose more information to analysts than other CEOs. For these reasons, we hypothesize that CEO restricted stock holdings and stock ownership could increase the information disclosure to analysts and decrease CEO incentives for earnings management. This, in turn, could mitigate analysts' forecast errors.

The difference between restricted stocks and other stocks is that the CEO has to meet some conditions before the actual grant of the stocks. These conditions can be either time-based or performance-based or combination of both (Bettis et al. 2010). Due to regulatory changes, the number of restricted stock grants has increased dramatically in relation to the option compensation (Carter et al. 2007; Lord and Saito 2015).[6] The question is how the increasing use of restricted stocks as an executive compensation form affects analysts' forecasts.

In contrast to CEO option compensation, there is a symmetric relation between the wealth from restricted stock holdings/stock ownership and stock price (Burns and Kedia 2006).

[5] It is more likely that CEOs will be fired by the board if the former miss analysts' earnings forecasts (Farrell and Whidbee 2003; Wiersema and Zhang 2011). Particularly, Wiersema and Zhang (2011) using a panel data on the S&P 500 firms during the period 2000 – 2005, show that analysts play an important role in boards evaluation of the CEOs' efficacy. The authors suggest that boards' decision about CEOs' dismissal is strongly associated with analysts' recommendations, as the latter influence investors whom the board intends to please.

[6] Accounting Standards (FAS 148) requires firms to expense stock options by their fair value and not the intrinsic value.

These findings suggest that restricted stocks and stock ownership expose CEO to wealth losses when the stock price drops and therefore, they may not increase CEO incentives for earnings manipulation. In line with this argument, Efendi et al. (2007) did not find a significant relationship between restricted stock holdings and earnings misreporting. Since restricted stocks can be conditional on performance-related targets, literature has documented a positive relationship between restricted stock grants and firm performance (Ryan and Wiggins 2002; Bettis et al. 2010). Therefore, it could be the case that higher amount of CEO restricted stock holdings can enhance firm performance and this might improve analysts' forecasts. However, one might argue that the restrictions applied to restricted stocks might increase CEO's incentives to meet specific targets, motivating them to engage in earnings manipulation and financial misreporting leading to higher forecast errors. Therefore, a positive or a negative relationship between restricted stock holdings and analysts' forecast errors is equally likely.

Conversely, under the *"forecast complexity"* hypothesis we expect a positive impact of compensation variables on analysts' forecast errors. Particularly, cash bonus compensation directly links executives' compensation to earnings, and thus, CEOs with greater bonus compensation could have higher incentives to engage in financial misreporting (Efendi et al. 2007). Hence, we hypothesize that higher cash bonus may lead to greater analysts' forecast errors.

Bergstresser and Philippon (2006) find that CEOs engage in earning manipulation when their compensation is tied to the value of their stock and option holdings. For this reason, we expect that the sensitivity of CEO stock and option compensation to one percentage point increase in the value of the equity of the company would increase analysts' forecast errors.

Kanagaretnam et al. (2012) state that managers with higher stock option compensation might undertake higher risk, exert greater effort to improve firm performance and show opportunistic disclosure behaviour increasing the complexity of analysts' forecasts and leading to higher forecast errors. Burns and Kedia (2006) argue that CEO option compensation renders CEO wealth a convex function of the stock price. Although there is a limited loss to CEO wealth from a stock price decline, executives are rewarded when stock prices surge. For this reason, managers with high option compensation tend to inflate reported earnings to maintain high stock prices. Therefore, if forecasting complexity increases with high option compensation (Kanagaretnam et al. 2012) and the latter can motivate earnings management (Burns and Kedia 2006; Efendi et al. 2007), then one might expect that option compensation can increase analysts' forecasts errors. Alternatively, it could be the case that greater option compensation enhances the alignment of managers' interests with those of the shareholders' providing evidence for the *"interest alignment"* effect. This, in turn, can increase management disclosure and lower forecast errors.

To examine whether other CEO characteristics drive the association between CEO compensation and analysts' forecast errors, we further account for CEO power. As stated in Table 1, we would equally expect either a positive or a negative sign for the CEO power variables. There is evidence that CEOs can increase the unity of the boards and form clear strategic positions fastening the decision-making procedures (Cannella and Monroe 1997; Adut et al. 2011). Therefore, CEOs with greater power might have greater accountability and career concerns, as they feel more responsible for firm performance. Greater accountability could eliminate analysts' forecast errors due to the increased liability of the executives. In this case, powerful CEOs can improve analysts' forecast accuracy. Arguably, there is evidence that firms with boards where CEOs are dominant disclose

less information to market participants, whilst powerful CEOs can overpower all other members of the board eliminating board effectiveness (Eisenhardt and Bourgeois 1988; Haleblian and Finkelstein 1993). Thus, it could also be the case that CEO power increases analysts' forecast errors.

Furthermore, CEOs who occupy dual roles on the board might have greater power. The duality in the role of the CEO and Director or Chairman could have a positive impact on analysts' accuracy due to the greater accountability of the powerful executive. However, the CEO – Director/CEO – Chair duality could reduce the board independence and impair the monitoring of the CEO. This, in turn, could allow the CEO to serve self-interests, such as short-term compensation, rather than in favour of the shareholders (Frankforter et al. 2000; Dunn 2004; Combs et al. 2007). CEOs driven by self-interests could lean towards practices of financial misreporting and conceal bad news from market participants (Graham et al. 2005; Ball 2009; Kothari et al. 2009). Such practices could impede the information disclosure to analysts and thus, increase forecast errors (Lustgarten and Mande 1995).

Moreover, CEO ranking as the best-payed executive in a firm could be an indicator for higher power (Rijsenbilt and Commandeur 2013). Thus, CEOs with a higher ranking are more likely to dominate over the other executives, follow self-serving practices and impede information disclosure leading to higher forecast errors for the analysts.

Therefore, to examine the above associations, we test the following hypothesis:

H1: CEO compensation could affect analysts' forecast errors.

2.2.2. CEO compensation, earnings management and analysts' forecasts

Although, CEO compensation could be associated with firms' engagement in earnings management and earnings management can affect analysts' forecasts, up till now, there

is no evidence examining whether CEO compensation can amplify the impact of earnings management on analysts' forecasts. To cover this gap in the literature, this chapter examines whether the impact of discretionary accruals (DA thereafter) on forecast errors varies with CEO compensation.[7] We predict a negative sign for the DA variable supporting the increasing forecast complexity for analysts due to earnings manipulation (see Table 1). We opt for the interaction terms between discretionary accruals and indicators of CEO compensation. It could be the case that behind earnings management lays CEOs with specific compensations (Frankforter et al. 2000; Dunn 2004; Combs et al. 2007) who would undermine analysts' forecasts. However, the impact might vary across different forms of compensation. Therefore, a positive or a negative coefficient is equally likely for the interaction between DA and CEO compensation variables. Thus, the following hypothesis is examined:

H2: CEO compensation could affect the relationship between earnings management and analysts' forecasts errors.

2.2.3. Analysts' characteristics, CEO compensation and earnings forecast errors

Unlike Kanagaretnam et al. (2012), we assume that analysts' forecast errors vary with analysts' forecast characteristics and that the interaction between these characteristics and CEO compensation could explain part of the variability in forecast errors. A plethora of previous research reports systematic differences in forecast accuracy (Scharfstein and Stein 1990; Trueman 1994; Mikhail et al. 1997; Clement 1999; Hong et al. 2000; Hong and Kubik 2003). Earlier research provides mixed results and is rather limited, in particular across forecast horizons. Some evidence suggests a link between analysts' accuracy and their career concerns and reputation (Scharfstein and Stein 1990; Trueman

[7] Discretionary or abnormal accruals are defined as the difference between the total accruals and normal accruals. Normal accruals are estimated employing Jones (1991) model.

1994; Hong and Kubik 2003). Scharfstein and Stein (1990) and Trueman (1994) first investigate the relation between analysts' forecasts and career concerns concluding that financial analysts try to enhance their reputation mimicking other analysts as a safe forecast strategy. According to the authors, analysts tend to issue forecasts similar to those released by other analysts previously, even if they are not accurate. Furthermore, Hong and Kubik (2003) find that more accurate earnings forecasts increase the probability for favourable career outcomes for the analysts.

Other studies (Hong et al. 2000; Clement and Tse 2005; Clarke and Subramanian 2006) show that inexperienced analysts may be more likely to be fired for inaccurate earnings forecasts compared to more experienced analysts. The authors suggest that less experienced analysts put greater effort in forecasting and thus, are associated with lower forecast errors and greater earnings revision frequency. Clement and Tse (2005) employing a variety of analysts' characteristics such as analyst prior accuracy, experience and employer size, demonstrate that analysts with higher previous accuracy and experience are more likely to release bold forecasts.[8] Furthermore, they show that the likelihood of an analysts' forecast revision to be bold increases with the forecast horizon, forecast frequency and employer size. Clarke and Subramanian (2006) provide evidence that analysts with very good or very poor forecasting ability issue bold forecasts, while analysts experience enhances forecasting boldness in a non-linear way. The authors also document a negative association between the probability of an analyst to be fired by the broker house and analyst forecasting ability.

[8] Forecast boldness is measured as the deviation of analyst *i* forecast for firm *j* from the consensus forecast for the specific firm.

Therefore, as presented in Table 1, we would equally expect a positive or a negative impact of analysts' characterises on forecast errors. To examine whether the impact of CEO compensation on analysts' forecasts varies with different analyst-specific characteristics, we test the following hypothesis:

H3: Analysts' characteristics could affect the relationship between CEO compensation and analysts' forecasts errors.

2.2.4. The impact of Global Analyst Research Statement and Dodd-Frank Act regulations on analysts' forecast errors

As analysts and CEOs operate in regulated markets, we shall take into account such conditions. For this reason, we focus on the impact of Global Analyst Research Statement regulation (GS) and the Dodd-Frank Wall Street and Consumer Protection Act (DF). GS is an enforcement provision between the Security Exchange Commission (SEC), National Association of Securities Dealers (NASD), New York Stock Exchange (NYSE) and twelve of the largest US investment institutions. The provision aims to address issues related to possible conflict of interests regarding analysts, who release forecasts and recommendations for investing or not in selected firms. GS was first introduced in 2002 and went into effect in 2003. The main motivation of GS regulation was to prevent the engagement of the investment institutions (the brokers) in practices to influence analysts' forecasts to gain higher compensation fees from their investment banking services.

An example of such a case can be the crash in technology stocks during 2000 and 2002. Analysts' optimistic research reports were considered to enhance the stock price surge in the late 90s when less than 1% of analysts provided "sell" recommendations (Bogle 2002). Apparently, brokers' incentives to maintain their investment banking businesses with firms induced a conflict of interest between the brokers and analysts. We predict a

negative sign for the GS variable in Table 1. The rationale is that if the GS regulation eliminates the influence of brokers on analysts, then we expect that GS will enhance analysts' independence and this, in turn, will lower their incentives for optimistic forecasts. Since the GS enforcement focuses on analysts, this research examines the effect of GS on analysts' forecast errors and whether the efficacy of the GS provisions varies with analysts' characteristics. Concerning the interaction terms between the GS regulation and analysts' characteristics, we would equally expect either a positive or a negative sign as this effect could vary with different analysts' characteristics and across forecast horizons.

Concerning the DF Act, the main aim was to improve the regulation of the financial industry to prevent the U.S. economy from experiencing a crisis like that of 2008. The DF Act is implemented by the SEC and includes provisions requiring detailed disclosure of executive compensation and corporate governance structure. According to the DF Act, firms should disclose information about CEO pay versus firm performance ratio and a compensation recovery policy for the excess incentive-based executive compensation in case of financial misreporting. It could be the case that, prior DF analysts would issue biased forecasts to establish good relations with firms and gain access to inside managerial information. As reported in Table 1, we expect a negative sign for the DF variable. The rationale is that if the DF Act eliminates the need for inside information, then analysts' forecasts should be less biased post-DF. We extend our analysis by investigating the impact of the DF Act on analysts' forecast errors and whether the efficacy of the DF provisions varies with CEO compensation. We cannot predict the sign of the interaction between the DF regulation and compensation measures as the impact of DF could vary with different CEO compensation forms and across different forecast horizons.

Prior research shows that both Global Analyst Research Statement and Dodd-Frank Act can affect analysts' forecasts (Kadan et al. 2006; Ertimur et al. 2007; Ke and Yu 2007; Chan et al. 2012; Dehaan et al. 2013; Hovakimian and Saenyasiri 2014). Kadan et al. (2006) argue that the implementation of such regulations has decreased analysts' optimism by 40% for stocks that have recently undergone an IPO. In line with this finding, Ertimur et al. (2007) and Ke and Yu (2007) report an improvement in analysts' recommendations after GS regulation. Moreover, Chan et al. (2012) and Dehaan et al. (2013) find that the adoption of DF provisions enhances the quality of firms' financial statements, decreases the number of financial report restatements and analysts' earnings forecast dispersion. Given that analysts use financial statements as their main source of information, greater quality and quantity of information disclosed through financial statements could decrease analysts' forecast errors (Byard et al. 2006). In a cross-country analysis, Hovakimian and Saenyasiri (2014) examine the impact of the GS on analysts' forecasts for 40 countries in developing and emerging regions over the period 1991 – 2010, revealing that before the GS, analysts issued more optimistic forecasts, whereas this bias is greater for longer-term forecasts. Therefore, we test the following hypothesis:

H4: The Global Analyst Research Statement regulation (GS) and Dodd-Frank Act (DF) could affect analysts' forecast errors.

Table 1: Predicted sign of the variables

Variable	Predicted sign		
	Current year forecasts	1-year ahead forecasts	2-years ahead forecasts
CEO Compensation			
Interest alignment effect			
TOTAL_PAY	-	-	-
STOCK_OWNERSHIP	-	-	-
RESTRICTED STOCKS	+/-	+/-	+/-
Forecast complexity effect			
BONUS	+	+	+
CEO_SENSITIVITY	+	+	+
IN_THE_MONEY_OPTIONS	+/-	+/-	+/-
Other variables			
CEO_DIR	+/-	+/-	+/-
CEO_RANK	+/-	+/-	+/-
DA	+	+	+
DA×CEO Compensation	+/-	+/-	+/-
Analysts' Characteristics	+/-	+/-	+/-
Analysts' Characteristics ×CEO compensation	+/-	+/-	+/-
GS/DF Regulation	-	-	-
GS×Analysts' Characteristics	+/-	+/-	+/-
DF×CEO compensation	+/-	+/-	+/-

Notes: the table reports the predicted sign of the variables. A negative (positive) predicted sign corresponds to a decrease (increase) in analysts' forecast errors. Finally, when either a positive or a negative relationship is equally likely, both signs are reported.

2.3. Data selection and research design

2.3.1. Analysts' earnings forecasts

We construct a unique individual analyst-level sample of U.S. firms covering the period between 1992 and 2015 assembled from three different databases. First, we derive analysts' earnings forecasts from I/B/E/S data source over three different horizons: current year, 1-year ahead and 2-years ahead. These earnings forecasts, say $FE_{i,j,t}$, are identified by analyst *i* for the firm *j* and referring to year *t*. For each of these forecasts, we obtain information about the broker and the analyst in question as they are individually identified by a code, whilst we also observe the forecast period and forecast revision dates.

This information is crucial in defining forecast errors. We include forecast issued no later than the end of forecast period.[9]

We also obtain information about the firm. In some detail, information about firms' balance sheet items is drawn from COMPUSTAT. The challenge has been to match the two samples. We achieve a match using CUSIP identifier that allows merging I/B/E/S Detail file with COMPUSTAT. A further challenge we faced is the use of CEO-specific data. Such data comes from EXECUCOMP, which provides detailed information regarding firms' executives. To extract data for the CEOs, we filter for executives that serve as CEOs in *j* firm of analysts *i* over the sample period *t*. In the third step, we match data from I/B/E/S, COMPUSTAT with EXECUCOMP. Given that our analysis accounts for different forecast horizons, we follow the same procedure to construct the dataset for each forecast horizon. Table 2 presents the distribution of analysts, brokers and firms for the different forecast horizons over the years 1992 – 2015. Note that both the number of analysts issuing earnings forecasts and the number of firms followed by analysts decline as the forecast horizon increases (see Panels A, B and C in Table 2). This trend might be due to the greater difficulty and complexity of earnings forecasts for longer horizons and reveals analysts' preferences to provide forecasts for shorter horizons. This fact raises the significance of examining various horizons.

[9] As in the empirical section we are interesting on multiple analysts' forecasts on firm *j*, we exclude firms followed by only one analyst.

Table 2: Analysts, brokers and firms over the years.

	Panel A: Current year forecast			Panel B: 1-year ahead forecast			Panel C: 2-years ahead forecast		
Year	Analysts	Brokers	Firms	Analysts	Brokers	Firms	Analysts	Brokers	Firms
1992	249	33	50	250	20	40	51	11	19
1993	874	97	212	849	83	157	150	35	62
1994	1023	103	332	1023	79	157	211	52	89
1995	1142	102	385	1143	91	239	275	52	117
1996	1270	120	419	1313	98	274	294	47	117
1997	1452	136	438	1364	104	310	314	57	132
1998	1608	151	463	1554	129	370	338	70	140
1999	1614	119	471	1583	125	391	402	65	157
2000	1628	155	464	1559	98	313	351	59	130
2001	1710	125	499	1688	101	352	413	59	150
2002	1922	124	546	1794	70	289	326	55	140
2003	1879	147	592	1918	74	393	480	62	213
2004	2023	179	647	1963	134	519	686	83	262
2005	2038	198	712	1983	174	629	910	115	348
2006	2092	185	774	1996	167	688	937	106	402
2007	1969	123	795	1985	161	713	1029	107	450
2008	1848	138	803	1838	147	730	1000	95	476
2009	2015	189	973	2063	153	882	1249	126	639
2010	2313	201	1096	2187	150	813	1269	141	726
2011	2295	181	1148	2185	135	851	1365	144	766
2012	2243	181	1170	2227	159	1051	1415	142	812
2013	2254	195	1165	2258	172	1081	1560	134	833
2014	2252	182	1139	2337	174	1070	1451	134	848
2015	947	118	135	996	99	126	483	60	105
Distinct Number	10700	745	2828	10641	742	2728	6457	520	2286
Observations	40660	3482	15428	40056	2897	12438	16959	2011	8133

Notes: This table presents the sample distributions of analysts, brokers and firms over the period 1992 - 2015 for the current, 1-year and 2-years ahead forecast horizons.

Table 3 reports the industry breakdown over different forecast horizons. Clearly across forecast horizons (see Panels A, B and C in Table 3) there is a stable pattern of what appears as *'popular'* industries to forecast. For example, firms in Information Technology industry show a high percentage of earnings forecasts at 17.75%, 13.18% and 17.39% of for the current, 1-year ahead and 2-years ahead forecast horizons respectively. Consumer Discretionary also shows strong *'popularity'* (at 17.19%, 15.42% and 16.98% of overall earnings forecasts for the current, 1-year ahead and 2-years ahead forecast horizons

respectively), as well as Financials (at 17.39%, 17.31% and 17.57% of overall earnings forecasts for the current, 1-year ahead and 2-years ahead forecast horizons respectively).

Table 3: Distribution of analysts' forecasts over industries.

		Panel A: Current year forecast		Panel B: 1-year ahead forecast		Panel C: 2-years ahead forecast	
SIC Code	Industry group	Observ.	%	Observ.	%	Observ.	%
10	Energy	18424	9.43%	6786	10.96%	17366	9.12%
15	Materials	11855	6.07%	3985	6.44%	11589	6.09%
20	Industrial	22775	11.65%	7640	12.34%	21718	11.41%
25	Consumer Discretionary	33603	17.19%	9547	15.42%	32317	16.98%
30	Consumer Staples	8168	4.18%	2393	3.87%	8087	4.25%
35	Health Care	22955	11.75%	9272	14.98%	22688	11.92%
40	Financials	33981	17.39%	10712	17.31%	33447	17.57%
45	Information Technology	34695	17.75%	8158	13.18%	33099	17.39%
50	Telecom.	3266	1.67%	1002	1.62%	3372	1.77%
55	Utilities	5704	2.92%	2400	3.88%	6693	3.52%
	Total	195426	100.00%	61895	100.00%	190376	100.00%

Notes: This table presents the sample distribution of analysts' forecasts over the different industries for the period between 1992 and 2015 for the current, 1-year and 2-years ahead forecast horizons. We classify industries based on the 2-digit SIC codes.

2.3.2. Earnings forecast errors

The starting block of our analysis is analysts' forecast errors. Consistent with previous literature (O'Brien 1990; Sinha et al. 1997; Clement et al. 2005), we construct forecast errors taking as forecast the most recent forecast issued by analyst *i* for year *t*. The actual value is the actual earning as reported by firm *j* for year *t*. Thus, the forecast error is:

$$FE_{i,j,t} = (ANALYST\_EST_{i,j,t} - ACTUAL_{j,t})/PRICE_{j,t-1}, \quad (1)$$

where $FE_{i,j,t}$ presents analyst's i earning forecast error for firm j and year t, $ANALYST\_EST_{i,j,t}$ is the most recent earning forecast issued by analyst i for firm j and year t, and $ACTUAL_{j,t}$ is the actual earning reported by firm j for year t. Finally, $PRICE_{j,t-1}$ is the stock price of firm j one year before the forecast period end t, which is

a way to scale the forecast error in order to facilitate comparisons across firms (Duru and Reeb 2002; Bhat et al. 2006). A positive/negative forecast error in equation (1) would indicate that analysts are optimistic/pessimistic.

Having derived the forecast error, we turn to analyst's characteristics, such as experience. We employ two measures: the first measure indicates analyst *i* firm-specific experience (FIRM_EXP thereafter) and is calculated as the number of years that analyst *i* follows firm *j*. The second measure reflects the general experience of analyst *i* and it is measured as the total number of years that analyst *i* issues earnings forecasts (GEN_EXP thereafter). We also account for the forecast revision (FOR_REV thereafter) of analyst *i* calculated as the number of days remained until the forecast period ends and since the last forecast revision issued by analyst *i* for firm *j* and year *t*. FOR_FREQ captures the number of earning forecasts of analyst *i* for firm *j* during year *t.* In addition, we employ a metric for the brokerage size of analyst *i* (BROKERAGE thereafter). BROKERAGE stands for the number of analysts hired by the brokerage company that has employed analyst *i.*

Table 4 indicates that the mean forecast error varies across different forecast horizons from 0.0002 in the current year to 0.0054 and -0.0008 in 1-year ahead and 2-years ahead respectively. A positive value in forecast errors implies that analysts are, on average, rather optimistic when it comes to forecasting earnings. This optimism is much greater for 1-year ahead forecast horizon, while interestingly for 2-years ahead analysts turn to be more pessimistic. It is remarkable that in the current year, there is a strong correction in the degree of optimism of analysts' forecasts. On the other hand, analysts' forecast frequency during the forecast period decreases in longer forecast horizon, indicating that analysts prefer releasing forecasts for short-term than for long-term. There is an increasing trend in the number of days remained until the forecast period ends and since the last forecast revision issued by analyst *i* for firm *j* and year *t* from 81 for the current

year to 360 and 711 days for 1-year and 2-years ahead respectively. This increasing number of days elapsed is in line with the lower forecast frequency for longer forecast horizons.

Table 4 shows that both firm and general experience are relatively similar for current and 1-year ahead forecasts (about 3 years of firm experience and 7 years of general experience in current and 1-year ahead), whereas analysts have less experience in 2-years ahead earnings forecasting (about 2.5 years of firm experience and 5 years of general experience). In addition, the number of analysts that the broker company employs for current year forecasts is significantly higher than those of the longer-term horizons (about 69 analysts for the current year forecasts and 19 to 18 analysts for 1-year and 2-years ahead forecasts respectively).

Table 4: Descriptive statistics

Panel A: Analysts' specific variables

	Current year forecast		1-year ahead forecast		2-years ahead forecast	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
FE	0.0002	0.0096	0.0054	0.0292	-0.0008	0.0094
ANALYST_EST	2.05	2.51	2.11	2.32	2.69	2.59
FOR_FREQ	4.42	2.66	3.79	2.58	2.92	2.52
FOR_REV	81.09	69.77	360	102.56	711	99.25
FIRM_EXP	3.26	2.52	3.26	4.1	2.52	1.9
GEM_EXP	6.86	4.71	6.74	4.67	5.19	3.47
BROKERAGE	69.2	61.62	19.4	17.73	18.34	15.1

Panel B: CEO and other firm-specific variables

Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
SALARY	733	446	IN_THE_MONEY OPTIONS	740.25	1756
BONUS	442	1412	LVRGE	0.18	0.18
TOTALPAY	6363.21	10120	NUM_ANAL	20.26	10.88
STOCK_OWNERSHIP	1822.98	13043	SIZE	8.22	1.85
CEO_SENSITIVITY	0.19	0.21	ACTUAL	1.95	2.54
RESTRICTED_STOCKS	564.51	1929	DA	-0.001	0.007

Note: This table reports descriptive statistics for our sample. Panel A describes analyst-specific variables, while Panel B presents CEO and other firm-specific variables. Analyst-specific variables are obtained from I/B/E/S Detailed file for current, 1-year and 2-years ahead forecast horizons. FE stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price

of the previous year *t-1*. ANALYST_EST stands for the last earning forecast issued by analyst *i* for firm *j* and year *t.* FOR_FREQ presents analyst forecast frequency and is calculated as the number of earnings forecasts by analyst *i* for firm *j* during year *t.* Next, FOR_REV stands for analyst forecast horizon and is calculated as the number of days remaining until the forecast period ends since the last forecast revision issued by analyst *i* for firm *j* and year *t.* FIRM_EXP is the analyst firm-specific experience and is measured as the number of years that analyst *i* follows firm *j*. GEN_EXP presents the general experience of analyst and is calculated as the total number of years that an analyst *i* issue earnings forecasts. Finally, BROKERAGE presents the size of the broker that employs analyst *i* and is calculated as the number of analysts hired by the analyst's *i* broker company during year *t.* CEO characteristics are derived from EXECUCOMP database. SALARY and BONUS stand for CEO salary and bonus respectively TOTALPAY stands for CEO total compensation as measured by the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan pay-outs and other annual compensation as reported in EXECUCOMP under the variable TDC1. STOCK_OWNERSHIP reflects CEO stock ownership. The above CEO characteristics are expressed in thousand dollars. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation (CEO sensitivity) that would be resulted from one percentage point increase in the value of firm's equity. RESTRICTED_STOCKS stands for the value of restricted stock holdings and IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options. ACTUAL is the actual earning reported by firm *j* for year *t.* LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. *t*. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets. Finally, DA stands for firms' engagement in earnings management through the use of discretionary accruals. Details for the calculation of DA are presented in section 2.3.4.

2.3.3. Measuring CEO compensation

Table 4 also reports some descriptive statistics for CEO compensation. We use CEO total compensation (TOTALPAY thereafter) as the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants, long-term incentive plan payouts, and other annual compensation as reported in EXECUCOMP under the variable TDC1. Our next indicator for CEO compensation is CEO cash bonus (BONUS thereafter) measured by the ratio of executive's bonus over total salary.[10]

We proxy CEO option compensation including CEO in-the-money option holdings (IN_THE_MONEY_OPTIONS thereafter).[11] We also consider for CEO compensation driven by restricted stock holdings employing the value of restricted stock holding grants over CEO salary (RESTRICTED_STOCKS thereafter). Additionally, we account for executive's stock ownership. Bhagat et al. (1999) argue that CEOs with greater stock

[10] Following McAnally et al. (2008) and Efendi et al. (2007), we deflate CEO compensation measures by CEO salary so as to capture the relative degree of the incentive.

[11] We also account for the impact of the total value of CEO options on analysts' forecasts, however the impact is either insignificant or the same with in-the-money options in few cases.

holdings could exhibit greater incentives for efficient monitoring and information disclosure reducing analysts' forecast errors. Since current earnings are employed as a proxy to predict future earnings, it could be the case that CEOs might attempt to eliminate analysts' forecast errors to achieve high short-term stock prices (Stein 1989). Our executive's stock ownership measure (STOCK_OWNERSHIP thereafter) is the ratio of the fair value of stocks owned by the executive, excluding options, divided by executive's salary.

Furthermore, following Bergstresser and Philippon (2006) we calculate CEO compensation sensitivity to changes in firm's equity value using the following equation:

$$\text{CEO\_SENSITIVITY}_{j,t} = ONEPCT_{jt}/(ONEPCT_{jt} + SALARY_{jt} + BONUS_{jt}), \quad (2)$$

where *SALARY* and *BONUS* are CEO salary and bonus respectively as reported in EXECUCOMP. *ONEPCT* is the dollar change in the value of CEO's stock and option portfolio due to one percentage point increase in the company's stock price and is calculated as follows:

$$\text{ONEPCT}_{jt} = 0.01 * PRICE_{jt} \times (SHARES_{jt} + OPTIONS_{jt}), \quad (3)$$

where $PRICE_{jt}$ stands for firm's stock price, $SHARES_{jt}$ for the number of shares held by the CEO and $OPTIONS_{it}$ stands for the total number of options held by the CEO. The above indicator of CEO sensitivity captures the share of hypothetical CEO total compensation that would be the result of one percentage point increase in the value of firm's equity.

Regarding CEO power measures, we employ an indicator variable that takes the value of one if the CEO occupies the position of the Director on the board and zero otherwise (CEO_DIR thereafter). Finally, EXECUCOMP provides information regarding the

ranking of the CEO within the firm. We employ CEO ranking within the company based on the sum of the salary plus bonus as an indicator for CEO power (CEO_RANK thereafter).

In addition, we include firm-specific characteristics. To this end, we employ the natural logarithm of the number of the distinct analysts following firm *j* during year *t* (NUM_ANAL thereafter) and this variable serves as a proxy for analysts' coverage and an indicator for a greater information disclosure. The greater number of analysts following a firm could increase information disclosure, and as a result, it might decrease analysts' forecast errors (Lang and Lundholm 1996; Gu and Wu 2003; Yu 2010). However, it could be the case that a greater number of analysts covering a firm increases the competition between analysts for higher commission fees, increasing forecast errors. Furthermore, we account for years with a loss, including a dummy that takes the value one for loss years and zero otherwise (LOSS thereafter). There is evidence that earnings forecasts for firms with losses are less accurate than those of profitable firms due to the problematic estimation of losses arising from managerial compensation (Brown 2001; Abarbanell and Lehavy 2003; Mande and Son 2012). We also account for firm size (SIZE thereafter) measured by the natural logarithm of total assets and firm's leverage (LVRGE thereafter) as the ratio of long-term debt to total assets.

2.3.4. Measuring discretionary accruals

We define earnings management as the intentional misreporting of firms' performance and/or misapplication of accounting standards by insiders to deceive and mislead market participants (Leuz et al. 2003). Following Cohen and Zarowin (2010), we employ the modified version of Jones (1991) to measure the discretionary accruals for each year and

each industry classified by its 2-digit SIC code. This measure takes into account industry-level changes that might affect accruals and enables for time-varying coefficients. We measure discretionary accruals based on the following model:

$$\frac{TAit}{Assets_{i,t-1}} = k_1 \frac{1}{Assets_{i,t-1}} + k_2 \frac{\Delta SALES_{it}}{Assets_{i,t-1}} + k_3 \frac{PPE_{it}}{Assets_{i,t-1}} + \varepsilon_{it}, \quad (4)$$

where TA_{it} is the total accruals defined as $TA_{it} = EBXI_{it} - CFO_{it}$, where EBXI presents the earnings before the extraordinary items and discontinued operations and CFO stands for the operational cash flows as are reported in the cash flow statement. Furthermore, $\Delta SALES_{it}$ is the change in revenues, while PPE_{it} represents the gross value of property, plant and equipment. Finally, we use total assets of the previous year ($Assets_{i,t-1}$) to deflate our variables.

We use the estimated coefficients form equation (4) to calculate the normal accruals (NA_{it}) for each firm.

$$NA_{it} = \hat{k}_1 \frac{1}{Assets_{i,t-1}} + \hat{k}_2 \frac{\Delta SALES_{it}}{Assets_{i,t-1}} + \hat{k}_3 \frac{PPE_{it}}{Assets_{i,t-1}} \quad (5)$$

Next, we measure discretionary accruals for each firm as the difference between total accruals and the estimated normal accruals based on the following equation:

$$DA_{it} = \left(\frac{TA_{it}}{Assets_{i,t-1}}\right) - NA_{it} \quad (6)$$

Since earnings manipulation involves both positive and negative value of discretionary accruals, in our analysis, we employ the absolute value of discretionary accruals (Warfield et al. 1995; Gabrielsen et al. 2002; Wang 2006; Barth et al. 2008; Sáenz

González and García-Meca 2014). The absolute value of discretionary accruals measures the extent to which managers engage in earnings manipulation practices to adjust reporting earnings. Descriptive statistics of discretionary accruals are reported in Table 4, while Table 5 reports the correlation matrix. The mean value of discretionary accruals for our sample is -0.001 suggesting that on average firms manage their accruals downwards.

Table 5: Correlation matrix for variables

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	FE	TOTALPAY	BONUS	CEO_SENSITIVITY	IN_THE_MONEY_OPTIONS	RESTRICTED_STOCKS	STOCK_OWNERSHIP	DA	CEO_RANK	CEO_DIR	FIRM_RXP	FOR_REV	FOR_FREQ	BROKERAGE	NUM_ANAL	LOSS	SIZE	LVRGE
FE	1.000																	
TOTALPAY	-0.083	1.000																
BONUS	-0.002	-0.011	1.000															
CEO_SENSITIVITY	0.013	-0.021	-0.001	1.000														
IN_THE_MONEY_OPTIONS	-0.006	0.017	0.674	0.072	1.000													
RESTRICTED_STOCKS	0.003	-0.020	0.000	0.052	0.000	1.000												
STOCK_OWNERSHIP	-0.004	-0.131	0.003	0.125	0.005	0.003	1.000											
DA	0.019	0.009	-0.001	-0.011	-0.002	0.001	-0.002	1.000										
CEO_RANK	0.012	-0.329	-0.009	-0.003	0.038	0.056	0.085	-0.003	1.000									
CEO_DIR	0.009	0.167	0.007	0.121	0.012	0.009	0.012	0.004	-0.429	1.000								
FIRM_RXP	-0.015	0.143	0.000	0.049	-0.001	0.006	-0.009	-0.005	-0.124	0.084	1.000							
FOR_REV	0.023	-0.029	0.005	0.006	0.005	0.001	0.002	0.000	-0.001	-0.012	0.009	1.000						
FOR_FREQ	-0.024	0.086	-0.006	0.020	-0.010	-0.004	0.003	-0.003	0.002	0.033	0.206	-0.384	1.000					
BROKERAGE	-0.022	0.077	-0.006	0.006	-0.008	0.002	0.002	-0.003	0.016	-0.030	0.047	-0.050	0.109	1.000				
NUM_ANAL	-0.044	0.408	0.034	0.121	0.053	0.012	0.045	-0.015	0.067	0.014	0.056	-0.039	0.130	0.056	1.000			
LOSS	0.041	-0.073	-0.007	-0.073	0.001	0.042	-0.011	0.031	-0.023	0.025	-0.051	0.004	0.008	-0.014	-0.053	1.000		
SIZE	-0.033	0.532	0.026	-0.028	0.040	-0.009	0.032	0.023	0.105	0.011	0.140	-0.070	0.127	0.109	0.573	-0.103	1.000	
LVRGE	0.054	0.069	-0.018	-0.089	-0.029	-0.014	-0.010	0.029	-0.004	0.025	0.011	-0.023	0.034	0.050	0.026	0.110	0.201	1.000

Note: The table presents the correlation matrix for the variables used in this analysis

2.4. Model specification and empirical estimations

2.4.1. The association between earnings forecast errors and CEO compensation

In this chapter, we use the last earnings forecast issued by the individual analyst rather than the consensus earnings forecast. The starting point of our analysis is a panel estimation of the interplay between analysts' forecast errors and CEO compensation (Kanagaretnam et al. 2012). Our regressions control for fixed effects and time effects, while we report robust standard errors.

$$\begin{aligned} Analyst\_FE_{ijt} = {} & \alpha_0 + \alpha_1 TOTALPAY_{jt} + \alpha_2 BONUS_{jt} + \\ & \alpha_3 CEO\_SENSITIVITY_{jt} + \alpha_4 IN\_THE\_MONEY\_OPTIONS_{jt} + \\ & \alpha_5 RESTRICTED\_STOCKS_{jt} + \alpha_6 STOCK\_OWNERSHIP_{jt} + \\ & \alpha_7 DA_{jt} + \alpha_8 ANAL\_EXP_{ijt} + \alpha_9 FOR\_FREQ_{ijt} + \\ & \alpha_{10} FOR\_REV_{ijt} + \alpha_{11} BROKERAGE_{ijt} + \alpha_{12} CEO\_DIR_{jt} + \\ & \alpha_{13} CEO\_RANK_{jt} + \alpha_{14} NUM\_ANAL_{jt} + \alpha_{15} LOSS_{it} + \\ & \alpha_{16} SIZE_{it} + \alpha_{17} LVRGE_{it} + fixed\ effects + time\ dummies + \\ & \varepsilon_{it}, \end{aligned} \quad (7)$$

where $Analyst\_FE_{ijt}$ stands for analyst's i forecast error for firm j in year t. $TOTALPAY_{jt}$, $BONUS_{jt}$, $CEO\_SENSITIVITY_{jt}$, $IN\_THE\_MONEY\_OPTIONS_{jt}$, $RESTRICTED\_STOCKS_{jt}$, $STOCK\_OWNERSHIP_{jt}$ are proxies of CEO compensation and stand for CEO total compensation, cash bonus, CEO sensitivity to firm's equity value, in-the-money options, restricted stock holdings and stock ownership respectively. DA_{jt} captures firms' engagement in earnings management using discretionary accruals. $ANALYSTS\_EXP_{ijt}$ presents analysts' general or firm-specific experience,

FOR_FREQ_{ijt} is analysts' forecast frequency, FOR_REV_{ijt} measures analysts' forecast revision period, and $BROKERAGE_{ijt}$ is the size of broker house that employs analyst i. In an extension, CEO_RANK_{jt} and CEO_DIR_{jt} proxy CEO power and are the ranking of the CEO among the executives in the firm during the year and the CEO – Director duality respectively.[12] NUM_ANAL_{jt}, $LOSS_{it}$, $SIZE_{it}$ and $LVRGE_{it}$ stands for the number of analysts following the firm during a year, the loss years, the size and the leverage ratio of the firm respectively.

The interplay between CEO compensation and analysts' forecast errors is reported in Tables 6 – 8 for the current, 1-year and 2-years ahead forecasts respectively. Starting with the current year forecasts in Table 6, in Models (1) – (6) we examine the individual impact of the CEO compensation variables on forecast errors, while Model (7) considers the simultaneous effect of all CEO compensation measures on forecasts. The coefficients of TOTALPAY, RESTRICTED_STOCKS and STOCK_OWNERSHIP are negative and significant at 5% or better (see Models 1, 5 and 7). These results are in line with the *"interest alignment"* effect proposed by Kanagaretnam et al. (2012). Higher the total compensation, restricted stock holding and stock ownership, greater the alignment of managers' interests with those of the shareholders (Johnson and Natarajan 2005; Lilienfeld-Toal and Ruenzi 2014). Managers with higher compensation and stock holdings might improve firm performance to achieve specific performance targets. This, in turn, can increase the information disclosure lowering the forecast complexity for analysts. Furthermore, CEOs with high salary compensation driven by career concerns might have fewer incentives to mislead analysts and thus, enhance the accuracy of forecasts for the latter. Therefore, our results confirm hypothesis H1 for current year

[12] In this analysis, we have also accounted for CEO-Chairperson duality as an indicator for CEO power, however the impact was insignificant.

forecasts, providing evidence for the *"interest alignment"* effect of higher compensation and stock holdings.

Conversely, the impact of BONUS, CEO sensitivity to one percentage change in the value of firm's equity (CEO_SENSITIVITY) and IN_THE_MONEY_OPTIONS is positive and significant at 1% level in Models (2) – (4) in Table 6. These results are consistent with Hypotheses H1 for current year forecasts, suggesting that analysts' forecast errors are higher for firms where CEOs enjoy higher cash bonus, are more sensitive to the changes in firm's equity value and have substantial in-the-money option holdings. Our findings are in agreement with previous evidence that higher level of CEO bonus and option compensation may induce executives to take greater risks. CEOs by engaging in opportunistic behaviour, such as earnings and disclosure management, would escalate forecasting complexity (Bergstresser and Philippon 2006; Burns and Kedia 2006, Efendi et al. 2006; Kanagaretnam et al. 2012). Finally, in Model (7) which accounts for all CEO compensation variables simultaneously, estimated coefficients for TOTALPAY, CEO_SENSITIVITY, RESTRICTED_STOCKS and STOCK_OWNERSHIP maintain their significant effect on analysts' forecast errors. Interestingly, in Model (7) the impact of in-the-money options turns negative, albeit insignificant indicating that perhaps other forms of compensation are of importance for analysts' forecasts rather than the option holdings.

Table 6: The impact of CEO compensation on analysts' forecast errors for current year forecasts.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
TOTALPAY	-0.082***						-0.088***
	(0.006)						(0.006)
BONUS		0.074***					0.047
		(0.024)					(0.037)
CEO_SENSITIVITY			0.002***				0.003***
			(0.000)				(0.000)
IN_THE_MONEY_OPTIONS				0.001***			-0.001
				(0.000)			(0.003)
RESTRICTED_STOCKS					-0.011**		-0.012**
					(0.004)		(0.005)
STOCK_OWNERSHIP						0.005*	-0.009***
						(0.003)	(0.003)
NUM_ANAL	0.052***	0.047***	0.039**	0.046***	0.047***	0.047***	0.043**
	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
LOSS	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	0.002	0.002	0.003	0.002	0.003	0.002	0.002
	(0.041)	(0.040)	(0.050)	(0.040)	(0.024)	(0.030)	(0.040)
Constant	-0.008***	-0.012***	-0.012***	-0.012***	-0.012***	-0.012***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time effects	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES
Observations	191,518	191,518	191,518	191,518	191,518	191,518	191,518
R-squared	0.525	0.524	0.524	0.524	0.524	0.524	0.526

Note: The table reports estimation results for the association between analyst forecast errors and CEO compensation for the current year forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. CEO compensation includes the following variables: TOTALPAY that stands for CEO total compensation as measured by the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan payouts and other annual compensation as reported in EXECUCOMP under the variable TDC1. BONUS presents CEO bonus and is calculated as the ratio of CEO bonus over CEO salary. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation that would be resulted from one percentage point increase in the value of firm's equity. IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options, RESTRICTED_STOCKS stands for the value of restricted stock holdings and STOCK_OWNERSHIP reflects CEO stock ownership measured by the ratio of the value of CEO stock grants excluding options over CEO salary. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. LOSS is a dummy variable that takes the value one for loss year and zero otherwise. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets, while LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Next, we turn to the impact of CEO compensation for 1-year ahead forecast horizon as presented in Table 7. TOTALPAY decreases analysts' forecast errors at 1% significance level, whereas analysts' forecast errors increase at 1% level for firms where CEOs enjoy higher bonus and are more sensitive to changes in the value of firm's equity (see Models 1-3).

One can notice that the impact of IN_THE_MONEY_OPTIONS on analysts' forecast varies across different forecast horizons (compare current year with 1-year ahead forecasts). While IN_THE_MONEY_OPTIONS variable carries a positive sign for the current year (see Model 4 in Table 6), for 1-year forecast horizon, the coefficient is insignificant (see Model 4 in Table 7). Interestingly, along with STOCK_OWNERSHIP, IN_THE_MONEY_OPTIONS would reduce analysts' forecast errors at 1% level as reported in Model (7) in Table 7 which considers for all CEO compensation variables. This result, in combination with the insignificant impact of in-the-money options in Model (7) in Table (6), implies that when we account for other forms of CEO compensation, option compensation is of a lower importance for analysts' forecasts for the shorter-term forecasts. Notably, for the longer-term forecast, analysts face lower difficulty in forecasting for firms where CEOs have substantially higher in-the-money option holdings. This result supports the "*interest alignment"* effect of options and is at odds with Kanagaretnam et al. (2012) who find that options increase analysts forecast errors.

Herein, we argue that there are other forms of compensation that affect analysts' forecasts and, in line with the interest alignment effects of options, the latter could lead to a higher information disclosure and thus, to lower forecast errors. Overall, for 1-year forecast horizon, estimation results confirm hypothesis H1, according to which CEO compensation can affect analysts' forecast errors.

Table 7: The impact of CEO compensation on analysts' forecast errors for 1-year ahead forecasts.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
TOTALPAY	-0.048***						-0.051***
	(0.002)						(0.002)
BONUS		0.342***					0.275**
		(0.074)					(0.138)
CEO_SENSITIVITY			0.006***				0.009***
			(0.001)				(0.001)
IN_THE_MONEY_OPTIONS				0.003			-0.004***
				(0.005)			(0.001)
RESTRICTED_STOCKS					-0.005		-0.010
					(0.007)		(0.013)
STOCK_OWNERSHIP						-0.013	-0.094***
						(0.008)	(0.012)
NUM_ANAL	-0.043	-0.077	-0.097*	-0.076	-0.076	-0.077	-0.079
	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)
LOSS	0.001*	0.001**	0.001***	0.001**	0.001**	0.001**	0.001*
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
SIZE	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	0.001	0.001	0.002	0.002	0.001	0.002	0.001
	(0.012)	(0.014)	(0.022)	(0.024)	(0.017)	(0.024)	(0.015)
Constant	-0.045***	-0.072***	-0.071***	-0.072***	-0.072***	-0.072***	-0.042***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Time effects	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES
Observations	186,572	186,572	186,572	186,572	186,572	186,572	186,572
R-squared	0.563	0.558	0.558	0.558	0.558	0.558	0.563

Note: The table reports estimation results for the association between analyst forecast errors and CEO compensation for 1-year ahead forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. CEO compensation includes the following variables: TOTALPAY that stands for CEO total compensation as measured by the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan payouts and other annual compensation as reported in EXECUCOMP under the variable TDC1. BONUS presents CEO bonus and is calculated as the ratio of CEO bonus over CEO salary. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation that would be resulted from one percentage point increase in the value of firm's equity. IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options, RESTRICTED_STOCKS stands for the value of restricted stock holdings and STOCK_OWNERSHIP reflects CEO stock ownership measured by the ratio of the value of CEO stock grants excluding options over CEO salary. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. LOSS is a dummy variable that takes the value one for loss year and zero otherwise. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets, while LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Finally, Table 8 reports the regression results for 2-years ahead forecast horizon. Among all compensation variables, TOTALPAY and CEO_SENSITIVITY maintain their significant impact on forecast errors confirming hypothesis H1 for 2-years ahead forecasts (see Models 1, 2 and 7). In the literature (Bergstresser and Philippon 2006; Jiang et al. 2010; Sáenz González and García-Meca 2014) is reported that CEOs with a greater sensitivity to changes in firm's value might have a greater motivation to engage in earnings manipulation. Our results show that such actions would increase analysts' forecast complexity and thus, their forecast errors.

In line with the results in Model (7) in Table (7), the negative coefficient of IN_THE_MONEY_OPTIONS provides further evidence for the *"interest alignment"* effect of the stock options for longer-term forecasts. This finding is at odds with previous evidence that support the forecast complexity hypothesis for options (Kanagaretnam et al. 2012). Therefore, our results suggest that the sign of the above relationship varies across different forecasting horizons. Furthermore, the insignificant coefficients of restricted stock holdings and stock ownership for 2-years ahead forecasts imply that the *"interest alignment"* effect of stock holdings is less pronounced for longer-term forecasts.

Overall, our results complement Kanagaretnam et al. (2012) suggesting that CEO option compensation indeed affects analysts' forecasts. However, we extend their findings showing that CEOs do not affect analysts' forecasts only through their option holdings, but total compensation, cash bonus, restricted stock holdings and ownership are also significant determinants of earnings forecast errors. Finally, we extend Kanagaretnam et al. (2012) research suggesting that these effects vary for longer forecast horizon.

Table 8: The impact of CEO compensation on analysts' forecast errors for 2-years ahead forecasts.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
TOTALPAY	-0.005***						-0.005***
	(0.001)						(0.001)
BONUS		-0.019					0.103
		(0.044)					(0.073)
CEO_SENSITIVITY			0.003***				0.003***
			(0.001)				(0.001)
IN_THE_MONEY_OPTIONS				-0.000			-0.002*
				(0.001)			(0.001)
RESTRICTED_STOCKS					-0.017		-0.019
					(0.011)		(0.012)
STOCK_OWNERSHIP						-0.001	-0.008
						(0.007)	(0.007)
NUM_ANAL	0.080	0.077	0.066	0.077	0.077	0.076	0.068
	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.052)	(0.051)
LOSS	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	0.001	0.001	0.001	0.002	0.001	0.002	0.001
	(0.011)	(0.011)	(0.014)	(0.010)	(0.01)	(0.011)	(0.010)
Constant	-0.009***	-0.012***	-0.011***	-0.012***	-0.012***	-0.012***	-0.008***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Time effects	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES
Observations	60,659	60,659	60,659	60,659	60,659	60,659	60,659
R-squared	0.595	0.595	0.595	0.595	0.595	0.595	0.596

Note: The table reports estimation results for the association between analyst forecast errors and CEO compensation for 2-years ahead forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. CEO compensation includes the following variables: TOTALPAY that stands for CEO total compensation as measured by the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan payouts and other annual compensation as reported in EXECUCOMP under the variable TDC1. BONUS presents CEO bonus and is calculated as the ratio of CEO bonus over CEO salary. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation that would be resulted from one percentage point increase in the value of firm's equity. IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options, RESTRICTED_STOCKS stands for the value of restricted stock holdings and STOCK_OWNERSHIP reflects CEO stock ownership measured by the ratio of the value of CEO stock grants excluding options over CEO salary. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. LOSS is a dummy variable that takes the value one for loss year and zero otherwise. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets, while LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Concerning the impact of other firm-specific variables, the greater the number of analysts following a firm the higher the current year forecast errors. The greater number of analysts following a firm might signal higher competition among the analysts who strive for better commission fees and management relations leading them to issue less accurate forecasts (Das et al. 1998; Gu and Wu 2003). We also control for firm size, leverage and firms in loss. SIZE has a positive impact on forecast error in all specifications at 1% level, insinuating that analysts issue earnings forecasts with greater errors for larger firms. The insignificant coefficient of LVRGE shows that analysts' forecasts are not affected by firm's leverage ratio. Note that the coefficient of the LOSS is negative (positive) for current year (1-year ahead) forecasts, indicating that for longer-term forecasts, forecast errors are greater for firms with losses than for firms without losses (Abarbanell and Lehavy 2003; Mande and Son 2012).

2.4.2. Earnings management, CEO compensation and analysts' forecast errors

One of the motivations of our analysis is to examine whether CEO compensation would encourage executives to engage in financial misreporting (Greenspan 2002; Cheng and Warfield 2005; Bergstresser and Philippon 2006; Burns and Kedia 2006; Efendi et al. 2007), and this in turn, would affect analysts' forecasts since they use firms' financial reports to extract information. Furthermore, existing literature argues that earnings management can affect analysts' forecasts (Bradshaw et al. 2001; Matsumoto 2002; Cohen and Lys 2003; Ahmed et al. 2005; Brown and Caylor 2005; Burgstahler and Eames 2006; Mande and Son 2012). For this reason, we account for earnings management employing firms' discretionary accruals. Most importantly, we include the interaction terms between discretionary accruals and indicators of CEO compensation to examine whether behind earnings management lay CEOs with specific forms of compensation

(Frankforter et al. 2000; Dunn 2004; Combs et al. 2007) who would further undermine analysts' forecasts.

Starting from the current year forecasts, Table 9 presents estimation results for the model including the impact of discretionary accruals. Apparently, analysts' forecast errors are higher for firms that engage in earnings management. This is supported by the positive and 1% significant coefficient of DA in most specifications. Turning to the interaction terms between discretionary accruals and CEO compensation, DA×TOTALPAY is insignificant suggesting that total compensation does not motivate CEOs to engage in earnings management and this, in turn, does not affect analysts' forecasts. However, when it comes to the interaction between bonus and discretionary accruals, results reveal different relation. CEOs with higher cash bonus augment the positive impact of DA on analysts' forecast errors at 1% level confirming hypothesis H2 (see Model 3 and Model 8). Cash bonus compensation directly links executives' compensation to earnings. Therefore, CEOs with greater bonus might have higher incentives to engage in financial misreporting (Efendi et al. 2007) augmenting the positive relationship between analysts' forecast errors and discretionary accruals.

The interaction term DA×CEO_SENSITIVITY carries a negative coefficient at 1% level (see Model 4 and Model 8) indicating that CEO sensitivity to changes in firm's value curbs the positive impact of DA on forecast errors. Similarly, the interaction terms DA×IN_THE_MONEY_OPTIONS in Model (8), DA×RESTRICTED_STOCKS in Model (6) and DA×STOCK_OWNERSHIP in Models (7) and (8) are of a negative sign at 5% level or better. Thus, this analysis concludes that when CEOs are more sensitive to changes in firm's value and/or their interests are aligned with those of the shareholders, the impact of earnings management on analysts' forecasts will be less pronounced. Given these results, we accept hypothesis H2 for the current year forecasts.

Table 9: The impact of earnings management, CEO compensation and their interactions for current year forecast errors.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
DA	0.015***	-0.012	0.016***	0.026***	0.016***	0.016***	0.016***	0.032
	(0.004)	(0.022)	(0.004)	(0.006)	(0.004)	(0.004)	(0.004)	(0.034)
DAXTOTALPAY		0.371						-0.077
		(0.307)						(0.404)
TOTALPAY		-0.075***						-0.081***
		(0.006)						(0.006)
DAXBONUS			4.470***					4.290***
			(0.813)					(0.838)
BONUS			6.121***					5.901***
			(1.105)					(1.139)
DA×CEO_SENSITIVITY				-4.456***				-4.429**
				(1.328)				(1.861)
CEO_SENSITIVITY				0.001***				0.002***
				(0.000)				(0.000)
DA× IN_THE_MONEY_ OPTIONS					-0.445			-2.910***
					(0.507)			(0.866)
IN_THE_MONEY_OPTIONS					-0.003			-0.005***
					(0.003)			(0.001)
DA×RESTRICTED_STOCKS						-2.496**		-0.996
						(1.013)		(12.089)
RESTRICTED_STOCKS						-0.026***		-0.013
						(0.009)		(0.010)
DA×STOCK_OWNERSHIP							-0.343**	-0.371**
							(0.162)	(0.165)
STOCK_OWNERSHIP							0.003	-0.009***
							(0.003)	(0.003)
NUM_ANAL	0.063***	0.068***	0.063***	0.059***	0.063***	0.063***	0.063***	0.061***
	(0.018)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
LOSS	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	-0.001	-0.001	-0.002	-0.001	-0.001	-0.002	-0.001	-0.001
	(0.020)	(0.021)	(0.020)	(0.020)	(0.024)	(0.027)	(0.020)	(0.028)
Constant	-0.014***	-0.010***	-0.014***	-0.013***	-0.014***	-0.014***	-0.014***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time effects	YES	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	161,374	161,374	161,374	161,374	161,374	161,374	161,374	161,374
R-squared	0.534	0.535	0.534	0.534	0.534	0.534	0.534	0.535

Note: The table reports estimation results for the impact of earnings management on the association between analyst forecast errors and CEO compensation for current year forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. DA stands for firms' engagement in earnings manipulation and presents the use of discretionary accruals. CEO compensation includes the following variables: TOTALPAY that stands for CEO total compensation as measured by the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan payouts and other annual compensation as reported in EXECUCOMP under the variable TDC1. BONUS presents CEO bonus and is calculated as the ratio of CEO bonus over CEO salary. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation that would be resulted from one percentage point increase in the value of firm's equity. IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options, RESTRICTED_STOCKS stands for the value of restricted stock holdings and STOCK_OWNERSHIP reflects CEO stock ownership measured by the ratio of the value of CEO stock grants excluding options over CEO salary. DA×TOTALPAY, DA×BONUS, DA×CEO_SENSITIVITY, DA×OPTIONS_IN_THE_MONEY, DA×RESTRICTED_STOCKS, and DA×STOCK_OWENSHIP are the interaction terms between DA and CEO compensation. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. LOSS is a dummy variable that takes the value one for loss year and zero otherwise. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets, while LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Next, Table 10 presents estimation results for 1-year ahead forecast horizon. The negative and significant at 1% level coefficients of DA×TOTALPAY in Models (2) and (8) show that for longer-term forecast horizon, higher CEO compensation can curb the impact of earnings management on analysts' forecasts. Similarly, higher CEO sensitivity to changes in firm's value and greater stock ownership mitigate the impact of DA on analysts' forecasts at 1% level in Model (8). Conversely, CEOs who enjoy greater cash bonus augment the above effect leading to higher forecast errors.

Although the interaction term DA×IN_THE_MONEY_OPTIONS has a positive sign in Model (5), this impact turns insignificant in Model (8). Interestingly, DA×RESTRICTED_STOCKS carries a positive sign in Model (8) suggesting that CEOs with greater restricted stock holdings augment the impact of earnings management on analysts for 1-year ahead forecasts. It could be the case that, CEOs engage in earnings management to meet the performance requirements put on their restricted stocks for the next year and this, in turn, can increase forecast errors for analysts. Therefore, estimation results provide strong evidence to accept hypothesis H2 for 1-year ahead forecasts as well.

Table 10: The impact of earnings management, CEO compensation and their interactions for 1-year ahead forecast errors.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
DA	-0.011	0.480***	-0.011	0.014	-0.011	-0.011	-0.011	0.873***
	(0.018)	(0.096)	(0.018)	(0.026)	(0.018)	(0.018)	(0.018)	(0.138)
DAXTOTALPAY		-0.648***						-1.055***
		(0.136)						(0.171)
TOTALPAY		-0.045***						-0.048***
		(0.002)						(0.002)
DAXBONUS			3.309***					2.975***
			(0.273)					(0.290)
BONUS			4.398***					3.994***
			(0.287)					(0.297)
DA×CEO_SENSITIVITY				-1.027				-3.491***
				(0.612)				(0.683)
CEO_SENSITIVITY				-0.000				0.003***
				(0.001)				(0.001)
DA× IN_THE_MONEY_ OPTIONS					9.644***			-3.839
					(1.404)			(4.739)
IN_THE_MONEY_OPTIONS					0.014***			-0.007
					(0.002)			(0.008)
DA×RESTRICTED_STOCKS						1.971		1.329***
						(2.002)		(0.431)
RESTRICTED_STOCKS						0.001		0.059**
						(0.014)		(0.026)
DA×STOCK_OWNERSHIP							-0.556	-0.818**
							(0.353)	(0.400)
STOCK_OWNERSHIP							-0.016**	-0.087***
							(0.008)	(0.011)
NUM_ANAL	-0.079	-0.047	-0.083	-0.077	-0.078	-0.079	-0.080	-0.068
	(0.058)	(0.058)	(0.058)	(0.059)	(0.059)	(0.058)	(0.059)	(0.058)
LOSS	0.002***	0.001**	0.002***	0.002***	0.002***	0.002***	0.002***	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
SIZE	0.010***	0.011***	0.010***	0.010***	0.010***	0.010***	0.010***	0.011***

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.069***	-0.043***	-0.069***	-0.069***	-0.069***	-0.069***	-0.069***	-0.041***
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Time effects	YES	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	156,991	156,991	156,991	156,991	156,991	156,991	156,991	156,991
R-squared	0.570	0.575	0.570	0.570	0.570	0.570	0.570	0.576

Note: The table reports estimation results for the impact of earnings management on the association between analyst forecast errors and CEO compensation for 1-year ahead forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. DA stands for firms' engagement in earnings manipulation and presents the use of discretionary accruals. CEO compensation includes the following variables: TOTALPAY that stands for CEO total compensation as measured by the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan payouts and other annual compensation as reported in EXECUCOMP under the variable TDC1. BONUS presents CEO bonus and is calculated as the ratio of CEO bonus over CEO salary. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation that would be resulted from one percentage point increase in the value of firm's equity. IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options, RESTRICTED_STOCKS stands for the value of restricted stock holdings and STOCK_OWNERSHIP reflects CEO stock ownership measured by the ratio of the value of CEO stock grants excluding options over CEO salary. DA×TOTALPAY, DA×BONUS, DA×CEO_SENSITIVITY, DA×OPTIONS_IN_THE_MONEY, DA×RESTRICTED_STOCKS, and DA×STOCK_OWENSHIP are the interaction terms between DA and CEO compensation. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. LOSS is a dummy variable that takes the value one for loss year and zero otherwise. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets, while LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Finally, for 2-years ahead forecasts one can notice that while the impact of DA on analysts' forecasts is almost insignificant in all specifications, the interaction terms between CEO compensation and DA are of importance (see Table 11). In line with the findings for current year forecasts, the interaction terms DA×CEO_SENSITIVITY, DA×RESTRICTED_STOCKS and DA×STOCK_OWNERSHIP are of a negative sign indicating that for firms that CEOs have such compensation, the impact of earnings management on forecast errors is less pronounced. Contrary, the bonus compensation appears to enhance the positive effect of DA on forecast errors at 1% level in Model (8). Overall, the findings of this analysis document an interaction channel between CEO compensation and earnings management that can affect analysts' forecast errors.

Table 11: The impact of earnings management, CEO compensation and their interactions for 2-year ahead forecast errors.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
DA	0.009	0.039	0.009	0.027*	0.009	0.009	0.009	0.082
	(0.012)	(0.100)	(0.012)	(0.015)	(0.012)	(0.012)	(0.012)	(0.101)
DAXTOTALPAY		-0.037						-0.071
		(0.133)						(0.127)
TOTALPAY		-0.005***						-0.005***
		(0.001)						(0.001)
DAXBONUS			-7.005					0.439***
			(9.436)					(0.118)
BONUS			-9.542					5.972***
			(12.828)					(1.620)
DA×CEO_SENSITIVITY				-9.100				-7.865*
				(5.919)				(4.757)
CEO_SENSITIVITY				0.001*				0.002**
				(0.001)				(0.001)
DA×IN_THE_MONEY_ OPTIONS					-1.219			-0.912
					(1.480)			(2.064)
IN_THE_MONEY_OPTIONS					-0.002			-0.003
					(0.002)			(0.004)
DA×RESTRICTED_STOCKS						-4.267*		-3.169
						(2.403)		(2.675)
RESTRICTED_STOCKS						-0.045*		-0.025
						(0.024)		(0.020)
DA×STOCK_OWENERSHIP							-8.779**	-7.539***
							(3.815)	(1.949)
STOCK_OWNERSHIP							-0.017	-0.102***
							(0.011)	(0.027)
NUM_ANAL	0.079	0.082	0.079	0.073	0.079	0.080	0.077	0.072
	(0.052)	(0.052)	(0.052)	(0.051)	(0.052)	(0.052)	(0.052)	(0.051)
LOSS	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.012***	-0.009***	-0.012***	-0.012***	-0.012***	-0.012***	-0.012***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Time Effects	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	51,488	51,488	51,488	51,488	51,488	51,488	51,488	51,488
R-squared	0.609	0.610	0.609	0.610	0.609	0.610	0.610	0.611

Note: The table reports estimation results for the impact of earnings management on the association between analyst forecast errors and CEO compensation for 2-years ahead forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. DA stands for firms' engagement in earnings manipulation and presents the use of discretionary accruals. CEO compensation includes the following variables: TOTALPAY that stands for CEO total compensation as measured by the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan payouts and other annual compensation as reported in EXECUCOMP under the variable TDC1. BONUS presents CEO bonus and is calculated as the ratio of CEO bonus over CEO salary. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation that would be resulted from one percentage point increase in the value of firm's equity. IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options, RESTRICTED_STOCKS stands for the value of restricted stock holdings and STOCK_OWNERSHIP reflects CEO stock ownership measured by the ratio of the value of CEO stock grants excluding options over CEO salary. DA×TOTALPAY, DA×BONUS, DA×CEO_SENSITIVITY, DA×OPTIONS_IN_THE_MONEY, DA×RESTRICTED_STOCKS and DA×STOCK_OWENSHIP are the interaction terms between DA and CEO compensation. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. LOSS is a dummy variable that takes the value one for loss year and zero otherwise. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets, while LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

2.4.3. The association between analysts' earnings forecast errors and analysts' characteristics

Tables 12-14 present the panel fixed effects regressions where the impact of analysts' characteristics is the main focus. We account for two different measures of analyst experience, the firm-specific experience and the general experience. Furthermore, we hypothesize that analysts' forecast frequency, revision period and the brokerage size are related to their forecast errors. Results are reported for the current year, 1-year and 2-years ahead forecasts respectively.

For the current year, firm-specific experience exerts a positive impact on forecast errors at 1% level (see Table 12). A one percentage point increase in analysts' firm-specific experience would increase forecast errors by 0.045 percentage. Our findings could be compared with Clarke and Subramanian (2006) who argue that less experienced analysts are more likely to be fired for inaccurate earnings forecasts compared to more experienced analysts. According to the authors, less experienced analysts might put greater effort in forecasting and thus, are associated with lower forecast errors. Conversely, we find that forecast errors decrease with forecast frequency at 5% level in the Model (3), while the impact turns insignificant when we consider the full Models (6) and (7). Finally, results suggest that forecast errors increase with forecast revisions at 1% level, whereas the impact of broker's size is insignificant. These results indicate that higher forecast frequency corrects analysts' optimism lowering forecast errors. On the contrary, greater the number of days remained until the forecast period ends (FOR_REV), higher the forecast errors.

Table 12: The impact of analysts' characteristics on earnings forecast error for current year forecasts.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
FIRM_EXP	0.045***					0.042***	
	(0.009)					(0.009)	
GEN_EXP		0.015					0.012
		(0.013)					(0.013)
FOR_FREQ			-0.014**			-0.009	-0.007
			(0.006)			(0.006)	(0.006)
FOR_REV				0.014***		0.010***	0.012***
				(0.003)		(0.003)	(0.003)
BROKERAGE					-0.003	-0.005	-0.003
					(0.008)	(0.008)	(0.008)
NUM_ANAL	0.047***	0.047***	0.047***	0.046***	0.047***	0.047***	0.046***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
LOSS	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	0.001	0.001	0.002	0.001	0.001	0.001	0.001
	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.011)	(0.012)
Constant	-0.010***	-0.012***	-0.012***	-0.012***	-0.012***	-0.010***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time Effects	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	191,518	191,518	191,518	191,518	191,518	191,518	191,518
R-squared	0.524	0.524	0.524	0.524	0.524	0.524	0.524

Note: The table reports estimation results for the association between analysts' forecast errors and analysts' characteristics for current year forecast. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. The explanatory variables are the natural logarithm of the following analysts' characteristics: GEN_EXP presents the general experience of analyst and is calculated as the total number of years that an analyst *i* issue earnings forecasts. FIRM_EXP is the analyst firm-specific experience and is measured as the number of years that analyst *i* following firm *j*. FOR_FREQ presents analyst forecast frequency and is the number of earnings forecasts by analyst *i* for firm *j* during year *t*. FOR_REV stands for analyst forecast horizon and is calculated as the number of days remained until the forecast period ends since the last forecast revision issued by analyst *i* for firm *j* and year *t*. Finally, BROKERAGE presents the size of the broker that employs analyst *i* and is calculated as the number of analysts hired by the analyst's *i* broker company during year *t*. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets. Finally, LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

When it comes to the longer-term forecast horizon, Table 13 shows that both general and firm-specific analysts' experience assert a positive and 1% level significant impact on forecast errors for 1-year ahead forecast horizon. A one percentage increase in analysts' firm-specific (general) experience would increase forecast errors by 0.188 percentage

(0.139 percentage) in 1-year-ahead forecasts (see Models 6 and 7). The effect of forecast frequency on analysts' forecast errors is negative and significant at 1% level. Note, though, that there is some variability in the results across forecast horizons.

Specifically, while the impact of FOR_FREQ is insignificant for the current year (see Models 6 and 7 in Table 12), a one percent increase in the number of earnings forecasts would decrease forecast errors by 0.073 percentage on average in 1-year ahead (see Models 6 and 7 in Table 13). Apparently, more frequent earnings forecasts are associated with lower forecast errors, in particular in one year ahead. Interestingly, one percent increase in the number of days remained until the forecast period ends (FOR_REV) decreases analysts' forecast errors by 0.023 percentage. It could be the case that, for longer-term forecast horizons, the greater revision period provides analysts with further opportunities of correcting their bias. [13]

Finally, Table 14 presents results for 2-years ahead earnings forecasts. For longer-term forecasts, analysts' experience appears to mitigate their errors, albeit the relationship is insignificant is all models. Among all analysts' characteristics variables, only forecast revision exerts a positive impact on analysts' forecasts errors at 5% level. Overall, these findings show that the impact of analysts' characteristics on the forecast errors varies across forecast horizons, in terms of both magnitude and sign, being more pronounced for 1-year ahead.

[13] We have to note that the variable "forecast revision" of an earnings forecast issued by analysts *i* for firm *j* and year *t* is different for the current, 1-year ahead and 2-years ahead forecast horizons. The first one is a variable that measures the number of days that mediate until the forecast period end for the specific earnings forecast, while the second one presents the different forecast windows that we examine.

Table 13: The impact of analysts' characteristics on earnings forecast error for 1-year ahead forecasts.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
FIRM_EXP	0.161***					0.188***	
	(0.028)					(0.028)	
GEN_EXP		0.116***					0.139***
		(0.037)					(0.037)
FOR_FREQ			-0.061***			-0.078***	-0.068***
			(0.015)			(0.015)	(0.015)
FOR_REV				-0.023***		-0.023***	-0.023***
				(0.009)		(0.009)	(0.009)
BROKERAGE					0.005	0.004	0.006
					(0.017)	(0.017)	(0.017)
NUM_ANAL	-0.069	-0.072	-0.069	-0.073	-0.076	-0.054	-0.059
	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)
LOSS	0.001**	0.001**	0.001**	0.001**	0.001**	0.001**	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
SIZE	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	0.001	0.002	0.002	0.002	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.066***	-0.069***	-0.072***	-0.071***	-0.072***	-0.064***	-0.068***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Time Effects	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	186,572	186,572	186,572	186,572	186,572	186,572	186,572
R-squared	0.558	0.558	0.558	0.558	0.558	0.558	0.558

Note: The table reports estimation results for the association between analysts' forecast errors and analysts' characteristics for 1-year ahead forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. The explanatory variables are the natural logarithm of the following analysts' characteristics: GEN_EXP presents the general experience of analyst and is calculated as the total number of years that an analyst *i* issue earnings forecasts. FIRM_EXP is the analyst firm-specific experience and is measured as the number of years that analyst *i* following firm *j*. FOR_FREQ presents analyst forecast frequency and is the number of earnings forecasts by analyst *i* for firm *j* during year *t*. FOR_REV stands for analyst forecast horizon and is calculated as the number of days remained until the forecast period ends since the last forecast revision issued by analyst *i* for firm *j* and year *t*. Finally, BROKERAGE presents the size of the broker that employs analyst *i* and is calculated as the number of analysts hired by the analyst's *i* broker company during year *t*. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets. Finally, LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 14: The impact of analysts' characteristics on earnings forecast error for 2-years ahead forecasts.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
FIRM_EXP	-0.006					-0.008	
	(0.021)					(0.021)	
GEN_EXP		-0.037					-0.040
		(0.029)					(0.029)
FOR_FREQ			0.003			0.003	0.004
			(0.011)			(0.011)	(0.011)
FOR_REV				0.015**		0.015**	0.015**
				(0.007)		(0.007)	(0.007)
BROKERAGE					0.010	0.009	0.010
					(0.012)	(0.012)	(0.012)
NUM_ANAL	0.076	0.074	0.076	0.073	0.078	0.073	0.071
	(0.051)	(0.051)	(0.051)	(0.052)	(0.051)	(0.052)	(0.052)
LOSS	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LVRGE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.012***	-0.013***	-0.012***	-0.012***	-0.012***	-0.013***	-0.013***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Time Effects	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	60,659	60,659	60,659	60,659	60,659	60,659	60,659
R-squared	0.595	0.595	0.595	0.595	0.595	0.595	0.595

Note: The table reports estimation results for the association between analysts' forecast errors and analysts' characteristics for 2-years ahead forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. The explanatory variables are the natural logarithm of the following analysts' characteristics: GEN_EXP presents the general experience of analyst and is calculated as the total number of years that an analyst *i* issue earnings forecasts. FIRM_EXP is the analyst firm-specific experience and is measured as the number of years that analyst *i* following firm *j*. FOR_FREQ presents analyst forecast frequency and is the number of earnings forecasts by analyst *i* for firm *j* during year *t*. FOR_REV stands for analyst forecast horizon and is calculated as the number of days remained until the forecast period ends since the last forecast revision issued by analyst *i* for firm *j* and year *t*. Finally, BROKERAGE presents the size of the broker that employs analyst *i* and is calculated as the number of analysts hired by the analyst's *i* broker company during year *t*. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets. Finally, LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

2.4.4. The interaction between analysts' characteristics and CEO compensation

In the previous sections (see sections 2.4.1. and 2.4.3.), we show that the individual impact of both CEO compensation and analysts' characteristics are of importance for earnings forecasts. It might be the case that there are inter-linkages between the two that could amplify their impact on forecast errors. For example, the impact of CEO compensation on analysts' forecasts could vary with differences in analysts' characteristics. In this stage, we also account for CEO power including indicators of CEO-Director duality (CEO_DIR) and the ranking of the CEO among the executives in the firm (CEO_RANK). We employ these measures to account for any variability in analysts' forecast errors that might be driven by the opportunistic behaviour of powerful CEOs and is not captured by the CEO compensation variables.

The estimated results for the interaction between CEO compensation and analysts' characteristics for the current year, 1-year and 2-years ahead forecasts are presented in Table 15. In this analysis, we focus on firm-specific experience. Interestingly, CEO compensation, such as TOTALPAY, BONUS, CEO_SENSITIVITY and STOCK_OWNERSHIP, when interact with analysts' experience correct for optimism in earnings forecasts especially for the current year (see the negative coefficients of the interaction variables in Table 15). These results indicate that analysts with greater firm experience issue less optimistic forecasts for firms where CEOs enjoy higher compensation, cash bonus, are more sensitive to changes in firm's value and have greater ownership. Conversely, the interaction term between analysts' experience and restricted stock holdings is positive and significant across all forecast horizons, insinuating that for firms where CEOs hold substantially higher restricted stocks would signal to analysts' to present higher optimism. This evidence shows the existence of a trade-off between the various CEO compensation forms and analysts' behaviour. From the one hand, restricted

stock holdings curb analysts' forecast errors as presented by the negative coefficient of RESTRICTED_STOCKS in Table 15, but on the other hand, analysts with greater firm experience issue more optimistic forecasts when CEOs restricted stock holdings increases (see EXP×RESTRICTED_STOCKS in Table 15).

Overall, these results reveal that there might be channels of interaction between CEOs and analysts' confirming hypothesis H3. It is also of interest that such channels are stronger in 1-year ahead forecasts, compared to the current year forecasts where a correction in optimism is reported as some actual data regarding firm's earnings become available.

Next, we report panel regressions, focusing on the frequency of forecasts (FOR_FREQ). Results show that the higher the forecast frequency of an analyst for a specific firm, the lower the forecast error, in particular for the current year (see the individual impact of FOR_FREQ in Table 15). On the other side, the interactions FOR_FREQ×TOTALPAY, FOR_FREQ×BONUS and FOR_FREQ×STOCK_OWNERSHIP are positive and highly significant for the current year forecasts. These results imply that when CEOs enjoy higher compensation, bonus and hold greater stock ownership, an increase in the forecast frequency can augment analysts' forecast optimism. However, it is not the same story when there is a strong CEO sensitivity, as the interaction term FOR_FREQ×CEO_SENSITIVITY reveals that analysts correct their optimism. Once again, we show that there is a channel on operation between CEOs and analysts when it matters most for the formers, with the latter willing to revise frequently their forecasts in a window dressing fashion.

Finally, we also report the estimation results for the interactions between analysts' forecast revisions, measured as the number of days remained until the forecast period

ends since the last forecast revision (FOR_REV) and CEO compensation. The individual impact of FOR_REV on forecast errors is positive and significant at 1% level for current and 2-year ahead forecasts. The interactions between FOR_REV – CEO total compensation, in-the-money options and restricted stock holdings reduce forecast errors for the current year, thus correcting for the individual positive effect of FOR_REV. On the other hand, the interaction coefficient of FOR_REV×CEO_SENSITIVITY for the current year forecasts is positive at 5% significance level. This result implies that CEO sensitivity to changes in firm's value would increase analysts' forecast errors at the expense of forecast accuracy when the number of days remained until the forecast period ends is greater. Finally, for the 2-years ahead forecasts, CEOs with higher ownership appear to mitigate the impact of forecast revision on analysts' forecast at 5% level.

One can notice that the inclusion of the CEO power measures has not changed the impact of the CEO compensation on analysts' forecasts, with CEO_DIR being positive and significant in all specifications at 5% level or better. This finding implies that it is of importance to separate the role of the CEO and other top executives to enhance board effectiveness. The CEO – Director duality could reduce the board independence and impair the monitoring of the CEO. This in turn, allows the CEO to serve self-interests (Frankforter et al. 2000; Dunn 2004; Combs et al. 2007). CEO driven by self-interests lean towards practices of financial misreporting and conceal bad news from market participants (Graham et al. 2005; Kothari et al. 2009; Ball 2009). Such practices could impede the information disclosure to analysts and thus, increase forecast errors (Lustgarten and Mande 1995).

Overall, we reveal evidence supporting hypothesis H3 according to which the interaction between CEOs and analysts should be examined as it assists our understanding of how analysts form their forecasts.

Table 15: The interaction effects between CEO compensation and analysts' characteristics on analysts' forecast errors for the current, 1-year and 2-years ahead forecasts.

VARIABLES	Current year forecast	1-year ahead forecast	2-years ahead forecast
FIRM_EPX×TOTALPAY	-1.275***	-0.817***	-0.031
	(0.473)	(0.149)	(0.108)
FIRM_EPX×BONUS	-6.622*	-2.134	4.436
	(3.748)	(9.449)	(3.251)
FIRM_EPX ×CEO_SENSITIVITY	-3.408*	1.915	-4.221
	(2.069)	(6.483)	(4.929)
FIRM_EXP×OPTIONS_IN_THE_MON	0.037	-0.107	0.011
	(0.033)	(0.084)	(0.307)
FIRM_EXP×RESTRICTED_STOCKS	7.657***	1.959***	7.257**
	(1.732)	(0.615)	(2.910)
FIRM_EXP×STOCK_OWNERSHIP	-0.615***	-1.054***	-0.341
	(0.100)	(0.166)	(0.212)
FOR_FREQ×TOTALPAY	1.978***	0.254*	0.138
	(0.630)	(0.151)	(0.103)
FOR_FREQ×BONUS	1.599***	-5.357	1.438
	(0.583)	(12.113)	(2.733)
FOR_FREQ×CEO_SENSITIVITY	-3.423	-1.833***	-0.309
	(2.898)	(0.695)	(4.562)
FOR_FREQ×OPTIONS_IN_THE_MON	-0.033	0.064	-0.166
	(0.037)	(0.096)	(0.351)
FOR_FREQ×RESTRICTED_STOCKS	-2.052*	1.486	-2.954*
	(1.057)	(2.879)	(1.753)
FOR_FREQ×STOCK_OWNERSHIP	0.156***	-0.023	0.191
	(0.046)	(0.073)	(0.124)
FOR_REV×TOTALPAY	-1.860***	-0.025	-0.280***
	(0.303)	(0.085)	(0.076)
FOR_REV×BONUS	-1.232	-6.199	1.267
	(2.817)	(4.593)	(3.177)
FOR_REV×CEO_SENSITIVITY	3.165**	-2.852	3.739
	(1.339)	(3.865)	(3.075)
FOR_REV×OPTIONS_IN_THE_MON	-0.033**	0.058	-0.211
	(0.015)	(0.039)	(0.314)
FOR_REV×RESTRICTED_STOCKS	-0.535*	1.744	0.991
	(0.322)	(1.132)	(1.160)
FOR_REV×STOCK_OWNERSHIP	0.010	0.063	-0.243**
	(0.027)	(0.056)	(0.102)
DA×TOTALPAY	-0.092	-1.055***	-0.074
	(0.407)	(0.171)	(0.128)
TOTALPAY	-0.025	-0.046***	0.005
	(0.017)	(0.004)	(0.003)
DA×BONUS	0.429***	2.978***	5.089***
	(0.084)	(0.249)	(0.028)
BONUS	0.569***	4.080***	6.821***
	(0.164)	(0.293)	(1.727)
DA×CEO_SENSITIVITY	-4.455**	-3.517***	-7.517
	(1.886)	(0.687)	(4.868)
CEO_SENSITIVITY	0.002**	0.008***	0.001
	(0.001)	(0.002)	(0.002)
DA×OPTIONS_IN_THE_MONEY	-2.781***	-5.303	-0.988
	(0.964)	(5.580)	(3.383)

VARIABLES	Current year forecast	1-year ahead forecast	2-years ahead forecast
IN_THE_MONEY_OPTIONS	-0.003*	-0.012	0.007
	(0.002)	(0.010)	(0.018)
DA×RESTRICTED_STOCKS	-8.355***	-4.614	-4.898
	(2.477)	(6.840)	(3.103)
RESTRICTED_STOCKS	-0.141***	-0.445**	-0.149**
	(0.043)	(0.181)	(0.075)
DA×STOCK_OWNERSHIP	-2.581***	-6.332***	-8.621***
	(0.448)	(1.050)	(2.125)
STOCK_OWNERSHIP	-0.008**	-0.096***	-0.101***
	(0.004)	(0.012)	(0.027)
DA	0.033	0.871***	0.084
	(0.035)	(0.139)	(0.102)
CEO_RANK	0.002	-0.144***	0.018
	(0.011)	(0.032)	(0.023)
CEO_DIR	0.000**	0.002***	0.001**
	(0.000)	(0.000)	(0.000)
FIRM_EXP	0.156***	0.867***	0.026
	(0.039)	(0.124)	(0.095)
FOR_REV	0.158***	0.014	0.254***
	(0.026)	(0.073)	(0.068)
FOR_FREQ	-0.187***	-0.283**	-0.106
	(0.053)	(0.129)	(0.094)
BROKERAGE	-0.003	-0.008	0.003
	(0.008)	(0.018)	(0.012)
NUM_ANAL	0.067***	-0.027	0.071
	(0.019)	(0.058)	(0.051)
LOSS	-0.001***	0.001**	-0.000
	(0.000)	(0.001)	(0.000)
SIZE	0.001***	0.011***	0.001***
	(0.000)	(0.000)	(0.000)
LVRGE	-0.001	-0.000	-0.001
	(0.010)	(0.001)	(0.001)
Constant	-0.012***	-0.036***	-0.020***
	(0.002)	(0.005)	(0.004)
Time Effects	YES	YES	YES
Fixed effects	YES	YES	YES
Observations	161,374	156,991	51,488
R-squared	0.537	0.577	0.612

Note: The table reports estimation results for the interaction effects of CEO compensation and analysts' characteristics on analysts' forecast errors for the current, 1-year and 2-years ahead forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. The explanatory variables are the natural logarithm of the following analysts' characteristics: GEN_EXP presents the general experience of analyst and is calculated as the total number of years that an analyst *i* issue earnings forecasts. FIRM_EXP is the analyst firm-specific experience and is measured as the number of years that analyst *i* following firm *j*. FOR_FREQ presents analyst forecast frequency and is the number of earnings forecasts by analyst *i* for firm *j* during year *t*. FOR_REV stands for analyst forecast horizon and is calculated as the number of days remained until the forecast period ends since the last forecast revision issued by analyst *i* for firm *j* and year *t*. Finally, BROKERAGE presents the size of the broker that employs analyst *i* and is calculated as the number of analysts hired by the analyst's *i* broker company during year *t*. CEO compensation includes the following variables: TOTALPAY that stands for CEO total compensation as measured by the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan payouts and other annual compensation as reported in EXECUCOMP under the variable TDC1. BONUS presents CEO bonus and is calculated as the ratio of CEO bonus over CEO salary. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation that would be resulted

from one percentage point increase in the value of firm's equity. IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options, RESTRICTED_STOCKS stands for the value of restricted stock holdings and STOCK_OWNERSHIP reflects CEO stock ownership measured by the ratio of the value of CEO stock grants excluding options over CEO salary. FIRM_EPX×TOTALPAY, FIRM_EPX×BONUS, FIRM_EPX×CEO_SENSITIVITY, FIRM_EXP×OPTIONS_IN_THE_MONEY, EXP×RESTRICTED_STOCKS, EXP×STOCK_OWNERSHIP are the interactions between analysts' experience and CEO compensation. FOR_FREQ×TOTALPAY, FOR_FREQ×BONUS, FOR_FREQ×CEO_SENSITIVITY, FOR_FREQ×OPTIONS_IN_THE_MONEY, FOR_FREQ×RESTRICTED_STOCKS, FOR_FREQ×STOCK_OWNERSHIP stands for the interactions between analysts' forecast frequency (FOR_FREQ) and CEO compensation. FOR_REV×TOTALPAY, FOR_REV×BONUS, FOR_REV×CEO_SENSITIVITY, FOR_REV×OPTIONS_IN_THE_MONEY, FOR_REV×RESTRICTED_STOCKS, FOR_REV×STOCK_OWNERSHIP present the interactions between analysts' forecast revision (FOR_REV) and CEO compensation. DA×TOTALPAY, DA×BONUS, DA×CEO_SENSITIVITY, DA×OPTIONS_IN_THE_MONEY, DA×RESTRICTED_STOCKS and DA×STOCK_OWENSHIP are the interaction terms between DA and CEO compensation. CEO_RANK stands for CEO ranking among the executives in the firm based on the salary and bonus compensations and CEO_DIR is an indicator variable that takes the value one if the CEO occupies the role of the director on the board, and zero otherwise. NUM_ANAL presents the number of distinct analysts following firm *j* during year *t* and serves as a proxy for analyst coverage. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets. Finally, LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

2.4.5. The impact of regulation changes on analysts' forecasts: Global Analyst Research Statement and Dodd-Frank Act

Both analysts and CEOs operate in regulated market conditions. Since regulations might affect analysts' forecasts, we shall take into account such conditions. For this reason, we extend our analysis accounting for the impact of the Global Analyst Research Statement (GS) and Dodd-Frank Act (DF) on the relation between analysts' forecasts and analysts' characteristics/CEO compensation. This research is imperative as it sheds light on an issue of great importance for both regulators and market participants: To what extent regulations can curb or augment the impact of CEO compensation and analysts'-specific characteristics on the forecasting ability of the latter?

Table 16 presents panel regression results for the current year, 1-year and 2-years ahead forecasts. GS and DF are indicator variables that take the value one following the implementation of the GS and DF regulations respectively, and 0 otherwise. The individual impact of analysts' and CEO compensation variables present the relationship between these variables and analysts' forecast errors pre-GS and pre-DF period. Whereas, the coefficients of the interaction terms between analysts' characteristics – GS and CEO compensation – DF present the impact of the regulations on the underlying relationships. Therefore, if the interaction coefficients are greater (less) than zero, then the relation between forecast errors and analysts' characteristics/CEO compensation has increased (decreased) following GS and DF regulations respectively.

One can observe that GS variable carries a negative sign as predicted for the current year forecasts at 1% level suggesting that GS has indeed reduced analysts' forecast errors. Conversely, analysts' forecast errors are positively related to DF regulation for the current year and negatively related for 1-year ahead at 1% level. Thus, DF augments analysts' errors for current year forecasts, while it mitigates forecast errors for 1-year ahead.

Furthermore, while the individual impact of analysts' experience on forecast error is positive, the interaction term GS×FIRM_EXP is negative and significant at 1% and 5% level for current and 1-year ahead forecasts respectively. These results imply that following the GS regulation, more experienced analysts issue more accurate forecasts. In opposition, the positive sign of GS×FOR_FREQ suggests that following the GS, greater forecast frequency augments analysts' errors for the current year. The interaction between FOR_REV and GS carries a positive sign for 1-year ahead forecasts, indicating that after GS, longer forecast revision increases analysts' errors. Overall, our findings provide evidence to accept the H4 hypothesis that the GS regulation would affect the relationship between analysts' errors and their own characteristics, documenting a significant correction in the over-prediction of analysts' earnings forecasts by experienced analysts.

Next, we turn to the impact of the DF regulation on the relationship between CEO compensation and analysts' forecasts. One can observe that the correction in the analysts' forecasts driven by CEO total compensation and ownership is more pronounced for the current year following the DF regulation (see the interaction terms DF×TOTALPAY and DF×STOCK_OWNERSHIP in Table 16). Interestingly, post-DF, the results of this section document a significant decrease in analysts' forecast optimism for firms where the CEO is more sensitive to changes in firm's equity value (see the negative coefficients for DF×CEO_SENSITIVITY). Note, that the coefficients of the interaction terms DF×BONUS and DF×RESTRICTED_STOCKS are positive and significant at 1% level for the current year, implying that the DF regulation could augment forecast errors for analysts following firms where CEOs enjoy high cash bonus and hold a greater amount of restricted stocks. Regarding the 1-year ahead forecasts, while the DF has reduced analysts' optimism, there is a significant enhancement of forecast errors for firms where

CEOs enjoy higher compensation, hold a greater amount of restricted stocks and have greater ownership.

Overall, the findings of this section document a significant reduction in analysts' forecast errors post DF for the current year forecasts regarding firms where CEOs enjoy high compensation, are more sensitive to stock price changes and have higher ownership. Following the DF regulation, analysts issue less optimistic forecasts for the 1-year-ahead horizon. Our findings are consistent with hypothesis H4 according to which Dodd-Frank Act can affect the relationship between analysts' forecast errors and CEO compensation.

The results of this analysis complement earlier findings (Kadan et al. 2006; Ertimur et al. 2007; Ke and Yu 2007; Chan et al. 2012; Dehaan et al. 2013; Hovakimian and Saenyasiri 2014) showing that analysts' forecast errors have declined significantly after the implementation of the GS and DF regulations. Our study extends prior research suggesting that these regulations do not affect the relationship between forecast errors and analysts' characteristics/CEO compensation in the same way. Variability exists both across firms with different forms of CEO compensation and across analysts' characteristics. Therefore, we suggest that it would be prudent for future regulation changes to account for analysts' experience, forecast frequency and revision. Additionally, the efficacy of the regulations could be enhanced if policymakers put greater emphasis on CEO bonus, CEO sensitivity to changes in firm's value and CEO restricted stock holdings.

Table 16: The impact of the Global Analyst Research Statement (GS) and Dodd-Frank Act (DF) on analysts' forecast errors for the current, 1-year and 2-yeards ahead forecasts.

VARIABLES	Current year forecast	1-year ahead forecast	2-years ahead forecast
GS	-0.003***	-0.004	0.000
	(0.001)	(0.002)	(0.003)
GS×FIRM_EXP	-0.055***	-0.104**	-0.039
	(0.017)	(0.052)	(0.077)
GS×FOR_FREQ	0.001***	-0.000	-0.001
	(0.000)	(0.000)	(0.001)
GS×FOR_REV	-0.006	0.059***	-0.035
	(0.008)	(0.021)	(0.027)
GS×BROKER	0.014	0.022	0.010
	(0.012)	(0.033)	(0.039)
FIRM_EXP	0.090***	0.313***	0.028
	(0.016)	(0.048)	(0.073)
FOR_REV	0.016**	-0.055***	0.054**
	(0.007)	(0.019)	(0.026)
FOR_FREQ	-0.073***	-0.083**	0.069
	(0.015)	(0.034)	(0.058)
BROKERAGE	-0.014	-0.022	-0.007
	(0.013)	(0.032)	(0.038)
DF	0.003***	-0.020***	0.003
	(0.001)	(0.003)	(0.002)
DF×TOTALPAY	-0.017**	0.006**	-0.000
	(0.009)	(0.003)	(0.002)
DF×BONUS	12.191***	-4.1089	4.573
	(3.981)	(12.339)	(7.607)
DF×CEO_SENSITIVITY	-0.080**	-0.028	-0.115
	(0.036)	(0.112)	(0.085)
DF×OPTIONS_IN_THE_MONEY	-0.002	-0.002	-0.000
	(0.002)	(0.008)	(0.005)
DF×RESTRICTED_STOCKS	0.099***	0.615***	0.038
	(0.029)	(0.082)	(0.070)
DF×STOCK_OWNERSHIP	-0.041***	0.055**	-0.020
	(0.008)	(0.024)	(0.016)
DF×DA	0.004	0.060	0.048
	(0.015)	(0.053)	(0.032)
TOTALPAY	-0.084***	-0.054***	-0.006***
	(0.006)	(0.002)	(0.002)
BONUS	0.011	-0.062	0.053
	(0.039)	(0.146)	(0.077)
CEO_SENSITIVITY	0.002***	0.005***	0.002***
	(0.000)	(0.001)	(0.001)
IN_THE_MONEY_OPTIONS	-0.000	-0.001	-0.001
	(0.000)	(0.001)	(0.001)
RESTRICTED_STOCKS	-0.103***	-0.595***	-0.054
	(0.030)	(0.083)	(0.070)
STOCK_OWNERSHIP	0.010**	-0.144***	0.005
	(0.005)	(0.017)	(0.013)

VARIABLES	Current year forecast	1-year ahead forecast	2-years ahead forecast
CEO_RANK	0.002	-0.130***	0.018
	(0.011)	(0.032)	(0.023)
CEO_DIR	0.000**	0.002***	0.001**
	(0.000)	(0.000)	(0.000)
DA	0.016***	-0.011	0.003
	(0.004)	(0.019)	(0.013)
NUM_ANAL	0.062***	-0.042	0.067
	(0.019)	(0.058)	(0.051)
LOSS	-0.001***	0.001**	-0.000
	(0.000)	(0.001)	(0.000)
SIZE	0.001***	0.011***	0.001***
	(0.000)	(0.000)	(0.000)
LVRGE	-0.001	-0.000	-0.000
	(0.010)	(0.001)	(0.001)
Constant	-0.006***	-0.026***	-0.011***
	(0.001)	(0.004)	(0.004)
Time Effects	YES	YES	YES
Fixed Effects	YES	YES	YES
Observations	161,374	156,991	51,488
R-squared	0.536	0.576	0.611

Note: The table reports estimation results for the effects of the Global Analyst Research Statement (GS) and Dodd-Frank Act (DF) on analysts' forecast errors for the current, 1-year and 2-years ahead forecasts. We control for time and fixed effects. The dependent variable is FE, which stands for analyst forecast error and is measured as the difference between the last forecast issued by analyst *i* for firm *j* and year *t* minus the actual reported earning form firm *j* and year *t*, scaled with the stock price of the previous year *t-1*. GS and DF are indicator variables that take the value one following the implementation of GS and DF regulations respectively, and 0 otherwise. The explanatory variables are the natural logarithm of the following analysts' characteristics: GEN_EXP presents the general experience of analyst and is calculated as the total number of years that an analyst *i* issue earnings forecasts. FIRM_EXP is the analyst firm-specific experience and is measured as the number of years that analyst *i* following firm *j*. FOR_FREQ presents analyst forecast frequency and is the number of earnings forecasts by analyst *i* for firm *j* during year *t*. FOR_REV stands for analyst forecast horizon and is calculated as the number of days remained until the forecast period ends since the last forecast revision issued by analyst *i* for firm *j* and year *t*. Finally, BROKERAGE presents the size of the broker that employs analyst *i* and is calculated as the number of analysts hired by the analyst's *i* broker company during year *t*. CEO compensation includes the following variables: TOTALPAY that stands for CEO total compensation as measured by the natural logarithm of the sum of cash pay, stock option grants, restricted stock grants long-term incentive plan payouts and other annual compensation as reported in EXECUCOMP under the variable TDC1. BONUS presents CEO bonus and is calculated as the ratio of CEO bonus over CEO salary. CEO_SENSITIVITY captures the share of the hypothetical CEO total compensation that would be resulted from one percentage point increase in the value of firm's equity. IN_THE_MONEY_OPTIONS presents the value of CEO in-the-money options, RESTRICTED_STOCKS stands for the value of restricted stock holdings and STOCK_OWNERSHIP reflects CEO stock ownership measured by the ratio of the value of CEO stock grants excluding options over CEO salary. GS×FIRM_EXP, GS×FOR_FREQ, GS×FOR_REV, GS×BROKER are the interactions between GS regulation and analysts' characteristics. DF×TOTALPAY, DF×BONUS, DF×CEO_SENSITIVITY, DF×OPTIONS_IN_THE_MONEY, DF×RESTRICTED_STOCKS, DF×STOCK_OWENERSHIP stands for the interactions between DF regulation and CEO compensation. GS×DA and DF×DA are the interaction terms between GS/DF regulations and DA. CEO_RANK stands for CEO ranking among the executives in the firm based on the salary and bonus compensations and CEO_DIR is an indicator variable that takes the value one if the CEO occupies the role of the director on the board, and zero otherwise. NUM_ANAL presents the number of distinct analysts following firm *j* during

year *t* and serves as a proxy for analyst coverage. SIZE stands for firm's size and is measured as the natural logarithm of firm's total assets. Finally, LVRGE presents firm leverage and is calculated as the ratio of firm long-term debt over total assets. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

2.5. Conclusion

The results of this chapter show that CEO compensation such as restricted stock holdings and stock ownership could correct analysts' optimism reducing their forecast errors. Conversely, CEO cash bonus, sensitivity to changes in firm's equity value and in-the-money options could enhance analysts' optimism. Accounting for different forecast horizons, we report stronger impact of CEO compensation for the current year forecasts. We further provide evidence of significant interaction effects between CEO compensation and earnings management on analysts' forecasts. This analysis concludes that when CEOs are more sensitive to changes in firm's value and/or their interests are aligned with those of the shareholders, the impact of earnings management on analysts' forecasts will be less pronounced. In contrast, CEOs with higher cash bonus augment the positive impact of DA on analysts' forecast errors.

We also account for the interactions between analysts' characteristics and CEO compensation. Estimation results reveal that there is a channel of interaction between CEOs and analysts. It is also of interest that such channels are stronger for 1-year ahead forecasts, compared to the current year forecasts. Finally, we show that following the Global Analyst Research Statement, experienced analysts are less optimistic, while analysts who issue more frequently forecasts exhibit greater errors for current year forecasts. Following the Dodd-Frank Act, results for the current year forecasts report a

significant reduction in forecast optimism for firms where CEOs have high compensation, are more sensitive to changes in firm's value and have greater ownership.[14]

The results of this study could be of high interest to several groups. In particular, the findings of this chapter could be of interest in designing compensation packages for the executives. Additionally, this study could provide investors with valuable information when it comes to the reliability of analysts' earnings forecasts. Investors take into account analysts' forecasts when they decide on their portfolio allocation. Thus, our findings could facilitate investors' ability to assess the accuracy of analysts' earnings forecasts. This study also provides new evidence to broker houses that employ financial analysts. We show that experienced analysts issue more optimistic earnings forecasts and thus, brokers might consider a threshold in the number of years that an analyst could follow a firm. In this way, the networking channel between analysts and firms might be mitigated. Furthermore, since forecast frequency corrects analysts' optimism, brokers should introduce a minimum number of forecasts by each analyst for each firm during the forecast period. Moreover, given the evidence that the impact of CEO compensation on analysts' forecasts varies with analysts' characteristics, brokers could enhance the forecasts of analysts' that they employ in several ways. First, by assigning relatively more experienced analysts to firms where CEOs have higher compensation. Second, reducing the forecast frequency for analysts' following firms where CEOs enjoy higher compensation and cash bonus. Finally, brokers can reduce analysts' optimism by increasing the forecast frequency for firms where CEOs are more sensitive to changes in firm's value and hold substantially higher amount of restricted stocks.

[14] We also show that both DF and GS regulations affect analysts' accuracy. However, we argue that the effects of GS and DF enforcements vary with analysts' characteristics and CEO compensation respectively and are less pronounced for longer-term forecasts. Thus, incorporating analysts' characteristics and CEO compensation in future changes in regulations could increase their efficacy.

Chapter 3: Does country governability affect analysts' earnings forecasts?

3.1. Introduction

Analysts' earnings forecasts play a crucial role for market participants, as they reduce information asymmetries between firms and investors (Loh and Mian 2006; Hall and Tacon 2010). Although there have been many studies regarding the importance of analysts' earnings forecasts (Abarbanell and Lehavy 2003; Cohen and Lys 2003; Loh and Mian 2006; Kanagaretnam et al. 2012; Mande and Son 2012), up till now there has not been adequate research on the impact, if any, of governance. In this chapter, we distinguish between the micro-level (corporate governance) and macro-level (country governability) factors that could affect analysts' forecasts. We extend the literature employing macro indicators such as country-level governability. We demonstrate that the impact of country governability matters, whilst corporate governance also affects analysts' earnings forecasts.

Existing studies suggest that the country governability affects the effective function of economies by reducing the opportunistic behaviour of firms' managers (Gill and Kharas 2007; Aidt 2009; Sáenz González and García-Meca 2014). There is also evidence that country governability affects analysts' forecasts (Hope 2003; Hope and Kang 2005; Bhat et al. 2006). Bhat et al. (2006) examine the relationship between governance transparency and analysts' accuracy. They account for governance transparency by including measures of (1) corporate reporting, (2) acquisition of private information and (3) information dissemination.[15] Hope (2003) using a sample of 22 countries over the period 1993 – 1995,

[15] The authors employ a country-level proxy of governance transparency as developed by Bushman et al. (2004).

examines the impact of information disclosure by firms and the degree of enforcement of accounting standards of a country on analysts' accuracy.[16] He documents a positive association between the level of information disclosure by firms and analysts' accuracy, while he also shows that country-level enforcement is significantly and positively related to accuracy. These findings indicate that strong enforcement of accounting standards in a country can force managers to follow the rules and thereby, reduce analysts' uncertainty.

Hope and Kang (2005) employing a sample of non-U.S. firms for the period 1992 – 2002 investigate the impact of macroeconomic uncertainty as measured by the inflation and foreign exchange rate volatility on analysts' accuracy, suggesting that macroeconomic uncertainty undermines analysts' accuracy. Furthermore, they examine the impact of country governability on analysts' accuracy and show that strong country governability enhances analysts' forecasts. The authors capture the degree of country governability through the degree of legal enforcement. The degree of legal enforcement is captured as a linear combination of the La Porta et al. (1997) enforcement variables including the efficiency of the judicial system, rule of law, corruption, risk of expropriation and risk of contract repudiation. Furthermore, Bhat et al. (2006) document a positive association between government transparency and analysts' accuracy and suggest that weak country governability can augment this effect.[17] In this thesis, we employ indicators of country governability as proposed by Kaufmann et al. (2010), such as the rule of law, the quality of government regulations and government effectiveness.

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[16] Hope (2003) employs the total disclosure index obtained from the Centre for International Financial Analysis and Research (CIFAR), which is constructed using 85 annual report variables as a measure of firm-level disclosure. Regarding the enforcement of accounting standards, he constructs an index based on the following five country-level factors: (i) audit spending measured by the total fees of 10 largest auditing firms for each country as a percentage of the GDP (Meek et al. 1995), (ii) insider trading laws assigning a value of 1 for countries that had laws against insider trading and 0 otherwise (Bhattacharya and Daouk 2002), (iii) judicial efficiency which measures the " efficiency and integrity of the legal environment as it affects business" obtained from La Porta (1997), (iv) the rule of law which presents the law and order tradition for each country (La Porta et al. 1997), and (v) shareholder protection (La Porta et al. 1998).

[17] Bhat et al. (2006) measure the strength of country governability through the degree of legal enforcement.

Disclosures over corporate governance attitudes could also affect forecasts as they provide financial analysts with information regarding the corporate policy and the associated risks for firms (Klapper and Love 2004; Durnev and Kim 2005; Yu 2010).[18] There is evidence that the quality of analysts' information goes hand in hand with the quality of corporate governance (Karamanou and Vafeas 2005; Byard et al. 2006; Kanagaretnam et al. 2007; Kanagaretnam et al. 2012). According to this strand of literature, more effective boards improve the quality as well as the quantity of information disclosure by the firms leading to more accurate earnings forecasts.

Regarding corporate governance and specifically CEO equity incentives, previous literature documents some association with analysts' forecasts (Bartov et al. 2002; Kasznik and McNichols 2002; Beaver et al. 2008).[19] This strand of research has been gaining significance as stock options are becoming an important part of CEO compensation. Firms have many reasons for granting stock options to the CEOs as a form of compensation. The enhancement of CEOs incentives to make decisions that would benefit shareholders is one of these motivations. Furthermore, firms might use stock options as a part of CEO compensation to reduce reported accounting expenses, to attract high skilled executives, as well as to delay tax payments (Kanagaretnam et al. 2012; Mande and Son 2012).[20]

Furthermore, it is well documented that firms with boards where the CEO is dominant disclose less information, whilst a powerful CEO can overpower all other members of the

[18] We define the term *"corporate governance"* as the control of a company's operations through the system of laws, rules and other factors (Gillan and Starks 1998).

[19] Most of prior studies have examined the impact of stock options on firm performance (Core et al. 1999; Bauman and Shaw 2006; Lam and Chng 2006; Hayes et al. 2012).

[20] The Securities and Exchange Commission (SEC) has implemented executive compensation disclosure rules in August 2006. According to Donahue (2008), these rules intend to increase transparency and information disclosure so as to provide investors detailed information about board compensation. Moreover, Sheu et al. (2010) argue that Taiwanese firms that voluntarily disclose information about executive compensation document higher market valuation.

board (Eisenhardt and Bourgeois 1988; Haleblian and Finkelstein 1993). Klein (2002) shows that more independent boards and audit committees enhance the monitoring effectiveness, while Bizjak et al. (2009) provide strong evidence that firms with no CEO-Chair separation exhibit higher level of financial fraud by backdating the stock options. Furthermore, Adutet et al. (2011) argue that CEO-Chair duality could dampen corporate governance as the absence of duality can improve managerial decision-making leading to a better performance. Boards with CEOs who are also the chairmen could be less effective as they might be influenced by the powerful CEOs, who could discourage other directors from expressing their viewpoints (Bhagat and Bolton 2008; Adut et al. 2011; Mande and Son 2012).[21] Moreover, given that the primary role of a CFO is the financial reporting and that the CFO compensation includes items that are sensitive to reported profits such as equity incentives and earnings-based bonuses (Thurm 2005; Wilson and Wang 2010), a CEO who is at the same time the CFO of a firm might have a greater impact on analysts' earnings forecasts.[22]

An alternative way of counting for earning forecast management is to focus on abnormal accruals (Leuz et al. 2003).[23] Weak governance structure might encourage managers to involve in accruals manipulation and that, in turn, could result in impediments on the information disclosure regarding earnings (Leuz et al. 2003). Graham (2005) states that firms manage their reported earnings to meet analysts' forecast. Furthermore, the author argues that around 73.5% of the CFOs consider achieving analysts' forecasts as an important managerial target. Brown and Caylor (2005) show that during the period

[21] Additionally, Ashbaugh-Skaife et al. (2006) argue that credit ratings are negatively associated with CEO-Chair duality, suggesting that rating agencies assign lower credit ratings to firms with powerful CEOs.
[22] Jiang et al. (2010) examine the relationship between the CEO and CFO equity incentives and the likelihood of meeting analysts' forecasts. They show that the likelihood of meeting or beating analysts' earnings forecasts is more sensitive to the CFO equity incentives than those to the CEO.
[23] Abnormal accruals are defined as the difference between the total accruals and normal accruals. Normal accruals are estimated employing Jones (1991) model.

between 1996 and 2001, the main aim of firm managers was to eliminate negative earnings surprises rather than mitigate losses.[24] Furthermore, Dechow et al. (1995) support that firms that announce actual earnings close to the analysts' forecasts have significantly higher discretionary accruals than other firms. In line with these findings, Matsumoto (2002) investigates whether firms manage earnings upward or try to guide analysts' forecasts downwards to meet the earnings forecasts of the latter. The results indicate a positive relationship between earnings management and the probability of meeting analysts' forecasts. In contrast, Athanasakou et al. (2009) who examine whether U.K. firms engage in earnings management to achieve analysts' forecasts do not find a significant association between abnormal accruals and the probability of meeting analysts' forecasts. However, firms that engage in earnings manipulation by using accruals are subject to U.S. SEC enforcement actions as they violate accounting principles reducing information transparency.[25] Since previous literature (Dechow et al. 1995; Matsumoto 2002; Payne and Robb 2000; Mande and Son 2012) supports that firms' managers engage in earnings manipulation using abnormal accrual to achieve analysts' forecasts, we conduct an additional analysis to investigate the impact of discretionary accruals on analysts' earnings forecast accuracy.

This chapter contributes to the literature on analysts' forecasts in many ways. First, it extends the limited research on the relationship between country-level governability and

[24] Earnings surprises are the difference between the actual earnings as announced by the firm and analysts' earnings forecast.

[25] Due to the ineffectiveness of internal governance in detecting managerial opportunism, new directives have been implied as regards the information disclosure by firms. Specifically, according to Sarbanes-Oxley (SOX) requirements, audit committees should be comprised of independent directors so as to prohibit loans as a part of executive compensation, and requires the Chief Executive Officer (CEO) and Chief Financial Officer (CFO) to confirm the firm's SEC's filings. In addition to the above, Dodd-Frank requires disclosure of the board's compensation committee by expanding the SOX-based rules regarding compensation claw backs, and authorizes the SEC to provide greater information to investors. These regulations are based on the argument that internal governance has been ineffective in deterring managerial opportunism. For further details see Bainbridge (2010).

analysts' accuracy for a sample of 911 firms in the Standard and Poor's EXECUCOMP database for the period 2000 – 2014. Second, we investigate the impact of corporate governance, as well as, their cross interaction with country governability on analysts' accuracy. Furthermore, this chapter takes into account firms' engagement in earnings management by examining the impact of abnormal accruals on analysts' forecasts. We also perform a sensitivity analysis to account for endogeneity and therefore, underlying causality, opting for a flexible panel VAR model. This model provides the response to analysts' earnings forecasts to shocks in the main variables in the VAR.

This chapter is organized as follows: In section 3.2. we develop the main hypotheses to be tested, section 3.3. describes our data selection, while section 3.4. presents the methodology and the estimated results. Next, section 3.5. provides the panel VAR model and reports the results, whilst section 3.6. concludes.

3.2. Hypotheses to be tested

3.2.1. The impact of country governability on analysts' forecast accuracy

There is evidence that the degree of legal enforcement affects analysts' forecast accuracy (Hope 2003; Hope and Kang 2005; Bhat et al. 2006). The above literature demonstrates a significant positive relationship between the degree of legal enforcement and forecast accuracy indicating that a stronger country governance could enhance analysts' accuracy. Despite this evidence, to the best of our knowledge, there is no detailed analysis regarding the association between analysts' forecast accuracy and the level of the country governability. Therefore, we intend to fill this gap in the literature by testing the following hypothesis where we predict a positive sign for the impact of country-level factors on analysts' accuracy (see Table 1):

Hypothesis 1: Country-level governability could enhance analysts' forecast accuracy.

3.2.2. The impact of corporate governance on analysts' forecast accuracy

Lang and Lundholm (1996) provide evidence that increasing corporate governance disclosure would reduce analysts' earnings forecast errors. Along these lines, Hope (2003) and Ashbaugh and Morton (2001) show that analysts' forecast errors are negatively related to the degree of firms' information disclosure. In this chapter, as indicators of corporate governance (micro-level factors), we include CEO equity incentives and CEO power. Concerning the impact of executive incentives on analysts' earnings forecast errors, Kanagaretnam et al. (2012) show that if a plethora of stock options are available this results in a lower analysts' forecast accuracy and thereby, higher forecast errors due to a higher level of forecasting complexity.[26]

Moreover, voluntary disclosure from management might increase forecast complexity. Aboody and Kasznik (2000) examine stock price evolution around earnings forecasts and show that CEOs engage in opportunistically voluntary information disclosures about the grants of the compensation plans to maximize their gains. In a recent study, Devos et al. (2015) show that firms manipulate the stock splitting time announcement relative to CEO option grants in an attempt to maximize CEO compensation. To this end, it is possible that managers who are granted stock options might show opportunistic disclosure behaviour increasing the complexity of analysts' earnings forecasts (Kanagaretnam et al. 2012). Gong and Li (2013) suggest that analysts do not incorporate information about CEO equity incentives in their predictions and hence, including CEO equity incentives

[26] The increase in forecasting complexity might be because the incentives for better managerial efforts (Kanagaretnam et al. 2012). When firms use stock options as a part of the CEO compensation, they intend to motivate executives to exert higher effort for a better firm performance. These new incentives induce executives to put more emphasis on long-term performance (Bushman and Indjejikian 1993). The shift in the CEOs' incentives from short-term oriented performance improvement efforts to long-term plans could have a negative impact on the current performance. Since this re-allocation in efforts is not directly observable by analysts, it might lead to an increase in forecast complexity (Kanagaretnam et al. 2012).

might increase their forecast accuracy.[27] Therefore, we predict a negative sign for all CEO incentive variables (see the predicted signs for OPTIONS, EXOPTIONS, UNOPTIONS and ONEPCT in Table 1). Furthermore, boards with powerful CEOs might be less effective as they might be influenced by the dominant CEOs, who could discourage other directors from expressing their viewpoints (Bhagat and Bolton 2008; Adut et al. 2011; Mande and Son 2012). However, the opposite view also exists suggesting that powerful CEOs can increase the unity of the boards and form clear strategic lines fastening the decision-making procedures (Cannella and Monroe 1997; Adut et al. 2011). For this reason, a positive or a negative coefficient for the CEO power is equally likely.

Based on this evidence, herein we extend previous studies to test whether CEO equity incentives, CEO-Chair/CEO-CFO duality, CEO ownership and tenure would also affect analysts' forecast accuracy. Thus, the following hypothesis is tested:

Hypothesis 2: Corporate governance could affect analysts' forecast accuracy.

3.2.3. Earnings manipulation and analysts' forecasts

Despite the plethora of studies reporting a significant relationship between CEO – Board characteristics and earnings management (Xie et al. 2003; Cheng and Warfield 2005; Rahman and Ali 2006; Ebrahim 2007; Cornett et al. 2008; Sáenz González and García-Meca 2014), the empirical evidence on the association between analysts' earnings forecasts and abnormal accruals is limited (Dechow et al. 1995; Payne and Robb 2000; Matsumoto 2002; Athanasakou et al. 2009; Mande and Son 2012). Specifically, Mande and Son (2012) test whether firms meet analysts' earnings forecasts by using discretionary accruals. Their results provide evidence for earnings manipulation from

[27] Cheng and Warfield (2005) examine whether higher CEO equity incentives are associated with a higher probability of meeting or even beating analysts' forecasts. They argue that CEOs with high stock and stock option portfolios engage in earnings manipulation in order to avoid future earnings disappointments.

firms that achieve earnings forecasts. Additionally, Payne and Robb (2000) argue that when analysts' forecasts in the month preceding the annual earnings announcement are greater than the actual earnings, firms increase discretionary accruals.

In this chapter, we extend the existing literature investigating whether earnings management and specifically the use of discretionary accruals affect analysts' forecast accuracy. We predict a negative sign expecting that firms' engagement in earnings manipulation would increase analysts' forecast complexity leading to lower accuracy. Thus, we test the following hypothesis:

Hypothesis 3: Earnings manipulation could decrease analysts' earnings forecast accuracy.

Table 1: Predicted signs for variables

Variable	Predicted sign
Macro-level (Country Governability) factors	
GOV_RULEOFLAW	+
GOV_QUAL	+
GOV_EFFECT	+
Micro-level (Corporate Governance) factors	
OPTION_GRANTS	-
EXOPTIONS	-
UNOPTIONS	-
ONEPCT	-
CEO_OWNERSHIP	+/-
CEO_CHAIR	+/-
CEO_CFO	+/-
CEO_TENURE	+/-
BOARDSZ	+/-
DA	-
SIZE	+
ROE	+/-
LOSS	-
DISP_AF	-

Notes: the table reports the predicted sign of the variables. A negative (positive) predicted sign corresponds to a decrease (increase) in analysts' forecast errors. Finally, when either a positive or a negative relationship is equally likely, both signs are reported.

3.3. Data Section

3.3.1. Sample selection criteria

Our sample consists of all firms covered by EXECUCOMP, I/E/B/S and COMPUSTAT databases over the years between 2000 and 2014. Data regarding CEO compensation and board characteristics such as total salary, stock options grants, board size and CEO-Chair duality are obtained from EXECUCOMP, while earnings forecasts, actual earnings and stock prices from I/B/E/S database. We use the mean of all forecasts issued for a specific year for a firm before the actual earnings announcement date for that year. The main advantage of using I/B/E/S as our source for actual and forecast earnings is that I/B/E/S forecasts exclude extraordinary items and other special items and therefore we ensure higher consistency in our data (Philbrick and Ricks 1991).

We opt for COMPUSTAT for all other required firm-specific financial data. Additionally, because we want to control for CEO incentives, following Kanagaretnam et al. (2012), we exclude firms with total CEO compensation less than one million dollars to avoid firms with low CEO incentives. Furthermore, we require stock prices to be at least 1 dollar to avoid the small deflator problem. Finally, we restrict our sample to firms that have at least 3 years annually observations to ensure efficient estimation results. Our final sample consists of 7,868 firm-year observations for 911 firms.

3.3.2. Measuring analysts' earnings forecast accuracy

Following Kanagaretnam et al. (2012), we calculate analysts' accuracy as minus one times the absolute value of the difference between mean earnings forecast and actual earnings for a year, divided by the stock price at the forecast date. Hence, forecast accuracy is defined as:

$$\mathrm{ACCURACY_{it}} = (-1)\frac{\mathrm{absolute(F_{it}-A_{it})}}{\mathrm{P_{it-1}}} * 100 \qquad (1)$$

where, A_{it} represents the actual earnings for firm *i* in year *t*, and F_{it} is the forecast of the firm's earnings for year *t* made at year *t-1*, while P_{it-1} is the stock price at the forecast date.[28]

3.3.3. Determinants of analysts' earnings forecast accuracy

We control for analysts' forecast characteristics and firm-specific characteristics. Particularly, we employ a dummy variable LOSS as previous literature documents that analysts' forecasts for firms with losses are less accurate than those of profitable firms. This could be due to the problematic estimation of losses arising from managerial incentives such as *"big baths"* (Brown 2001; Abarbanell and Lehavy 2003; Mande and Son 2012).[29] Furthermore, we include firm size (SIZE) measured by the natural logarithm of total assets. Since large firms operate in a more informative environment, we expect a positive relationship between firm size and analysts' forecast accuracy. Moreover, analysts have greater incentives to release higher earnings forecasts for smaller firms than for larger. Analysts need to establish better relationships with the managers of smaller firms due to the lack of public information for these firms (Lim 2001; Kanagaretnam et al. 2012).

Also, given that firm performance is a significant determinant of analysts' earnings forecasts (Lim 2001; Loh and Mian 2006), we account for firm's profitability and growth. We include firm return on equity (ROE) as a profitability measure and the sales growth

[28] In this chapter, we employ analysts' accuracy as minus one times the absolute value of the difference between mean earnings forecast and actual earnings for a year. We have decided to use this measure as we put a particular attention on the absolute magnitude of analysts' forecast errors and not whether the latter are optimistic (positive forecast errors) or pessimistic (negative forecast errors) which was the case in Chapter 2. However, similar results were obtained using the same forecast measure with that used in Chapter 2.

[29] *"Big bath"* refers to the event when managers of a firm under-report earnings by a large amount. When firms take a big bath in the current period, it is more likely for earnings and managerial compensation to increase in the future (Frantz 1999).

(GROWTH) calculated as the ratio of the difference in current period sales and sales of the previous period over total assets. The above performance measures might have a significant impact on analysts' forecast accuracy as could be important drivers of the forecast complexity. Finally, we also consider forecast uncertainty. Forecast uncertainty for a firm could affect analysts' ability for earnings forecasts, leading to less accurate and more biased forecasts. Uncertainty is estimated by the standard deviation of analysts' forecasts for a firm scaled by the stock price (DISP_AF) (Zhang 2006; Amiram et al. 2014).

3.3.4. Measuring country governability

We use the government index from the Worldwide Governance Indicator (WGI). We opt for three indicators that cover the rule of law (GOV_RULEOFLAW), the regulatory quality (GOV_QUAL) and the effectiveness of the government (GOV_EFFECT). The rule of law captures *"the quality of contract enforcement, property rights, the police and the courts"*. Regulatory quality stands for the quality of regulations imposed by the government and captures *"the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development"*. Finally, government effectiveness captures *"the effectiveness of public and civil services, and as well the degree of the independence of these services from political pressures and the credibility of government commitment to such policies"*.[30] Additionally, we take into account the government effectiveness by interacting the GOV_EFFECT index with other determinants of analysts' forecast accuracy. By employing the cross terms between country governability and other determinates for

[30] Government index has been used in prior literature (Aidt 2009; Voliotis 2011; Galag 2011; Saenz 2014). The empirical analyses show that this index is an important factor in measuring the degree in which the governability of a country can eliminate or enhance opportunistic behaviour in firms.

analysts' accuracy, we aim to reveal any complexities regarding the impact of governability on accuracy.[31]

3.3.5. Measuring CEO equity incentives

We employ different measures of CEO equity incentives. We use OPTION_GRANTS as the value of the total number of options granted to the CEO. As alternative measures of CEO incentives, we use existing exercisable options (EXOPTIONS) and existing unexercisable options (UNOPTIONS). Following McAnally et al. (2008), we scale CEO equity incentive metrics by CEO salary to capture the relative degree of incentive. Furthermore, as an additional equity incentive measure we calculate the dollar change in the value of CEO's stock and option portfolio due to one percentage point increase in the company stock price (Bergstresser and Philippon 2006) as follows:

$$\text{ONEPCT}_{i,t} = 0.01 * PRICE_{it} \times (SHARES_{it} + OPTIONS_{it}) \quad (2)$$

where $PRICE_{jt}$ stands for firm's stock price, $SHARES_{jt}$ for the number of shares held by the CEO and $OPTIONS_{it}$ stands for the total number of options held by the CEO.

3.3.6. Measuring CEO Power

We measure CEO power by employing CEO-Chair and CEO-CFO duality as dummy variables that take the value 1 if the CEO is the Chair of the board/CFO at the same time and 0 otherwise. As an additional measure of CEO power, we include CEO stock ownership. The important role of CEO stock ownership was introduced by Bhagat et al. (1999). CEOs with high stock ownership could monitor firms more efficiently, disclosing

[31] Worldwide Governance Indicator measures are aggregate indexes reflecting the quality of the governance. In recent years these indexes have become popular. However, the reliability of these indexes has been questioned. Langbein and Knack (2008) show that while these indexes are supposed to measure distinct concepts such as the rule of law, government quality and government effectiveness, they essentially measure the same broad concept. Thus, the authors argue that these indexes fail to distinguish among various aspects of the quality of governance questioning the robustness of the models. There is also evidence arguing that the WGI measures lack precision (Knack and Manning 2000; Van de Walle 2006; Brewer et al. 2007) and thus could lead to meaningless results.

a greater amount of information to analysts, and thus, improve the accuracy of earnings forecasts for the latter (Johnson and Natarajan 2005). Our CEO stock ownership measure (CEO_OWNERSHIP) is the value of stocks owned by the CEO excluding options divided by executive's salary. Finally, we include CEO tenure (CEO_TENURE) as an indicator of executive's power measured as the natural logarithm of the years that the CEO has served as a CEO in a firm. [32]

We also account for board size. Board size might be related to the board performance as larger the size of the board, higher the knowledge base (Karamanou and Vafeas 2005). However, there is some evidence that finds the opposite to be true (Yermack 1997). Also, Byardet et al. (2006) suggest that firms with a small board of directors are associated with increased voluntary information disclosure and thereby, decreased analysts' earnings forecast errors.[33]

Descriptive statistics for the variables used in our analysis are presented in Table 2.

[32] In our analysis, we employ other corporate governance characteristics such as CEO gender and age. However, these variables do not appear to exert a significant impact on analysts' accuracy, and thereby, we do not include them in our regressions.

[33] Board composition characteristics such as the presence of outside directors on the board could also be significant factors affecting analysts' forecasts. Outside directors who are independent from the management could mitigate the conflict of interests between CEOs and shareholders making less pronounced the impact of CEO equity incentives. Dahya et al. (2016) examine the association between board structure and acquirer performance documenting a positive relationship between acquirer's performance and the number of outside directors on the board. In an earlier research, Dahya et al. (2002) motivated by Cadbury's recommendations regarding the inclusion of outside directors on the board, report an increase in the sensitivity of managers' turnover to performance due to the increase in the number of outside directors. Furthermore, Dahya and McConnell (2005) show that market participants appear to view the appointment of outside directors as a positive event expecting a better decision-making. Moreover, Dahya et al. (2008) document a positive relationship between corporate value and the number of outside directors. Interestingly, the authors argue that this relationship is more pronounced in countries with weak investor protection. However, in this thesis data availability issues regarding the presence of outside directors on the board dictate the choice of our variables.

Table 2: Descriptive statistics.

Variables	Mean	S.D.	Min	Max
1. Forecast variables				
ACCURACY	-0.0028	0.0076	-0.2117	0
DISP_AF	0.0478	0.2365	0.0007	11.149
2. Governability indexes				
GOV_QUAL	1.5024	0.1303	1.2600	1.7400
GOV_RULEOFLAW	1.5628	0.0484	1.4300	1.6300
GOV_EFFECT	1.6084	0.1047	1.5000	1.8400
3. Corporate Governance				
OPTION_GRANTS	0.0018	0.0036	0	0.1111
EXOPTIONS	0.0079	0.0130	0	0.3522
UNOPTIONS	0.0038	0.0059	0	0.1375
ONEPCT	931.75	11186	0	507181
CEO_OWNERSHIP	0.0191	0.1105	0	3.6115
CEO_CHAIR	0.2146	0.4105	0	1
CEO_CFO	0.0007	0.0851	0	1
BOARDSZ	5.7308	1.1297	2	12
CEO_TENURE	12.697	7.6199	1	66
4. Control variables				
SIZE	7.8527	1.5618	3.4543	13.589
ROE	0.0550	0.0968	-2.369	0.5036
GROWTH	0.4578	0.3608	-3.154	7.6436
LOSS	0.0073	0.0851	0	1

Note: This table displays the summary statistics for the variables used in the main regressions. ACCURACY stands for analysts' accuracy and is calculated as (-1)*absolute value of (mean forecast – actual forecast)/price at forecast date, DISP_AF is the standard deviation of analysts' forecasts scaled by the stock price, OPTION_GRANTS stands for the ratio of the total value of options over CEO salary, EXOPTIONS is the ratio of existing exercisable options over CEO salary, UNOPTIONS is the ratio of existing unexercisable options over CEO salary, ONEPCT stands for the dollar change in the value of CEO's stock and option portfolio due to one percentage point increase in the company stock price, CEO_OWNERSHIP is the ratio of total the value of firm's stocks owned by the CEO (CEO stock ownership excluding options) divided by CEO salary, CEO_CHAIR is a dummy for CEO power that takes the value one if CEO is also the chairman of the board, CEO_CFO is a dummy that takes the value one if CEO is also the CFO, CEO_TENURE is the natural logarithm of the number of years the CEO has been CEO, BOARDSZ is the natural logarithm of as the number of board members, GOV_QUAL reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, GOV_RULEOFLAW reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence, GOV_EFFECT reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies, SIZE is the natural logarithm of total assets, ROE is the return on equity, GROWTH is the ratio of the difference in sales and sales of the previous period over total assets and LOSS is a dummy that takes the value 1 for loss years.

3.3.7. Measuring discretionary accruals

We use the Jones (1991) model to estimate the discretionary accruals. We employ a cross-sectional model to measure the discretionary accruals for each year and every industry classified by its 2-digit SIC code. This measure takes into account industry-level changes that might affect accruals and enables for time-varying coefficients based on the following model:

$$\frac{TAit}{Assets_{i,t-1}} = k_1 \frac{1}{Assets_{i,t-1}} + k_2 \frac{\Delta SALES_{it}}{Assets_{i,t-1}} + k_3 \frac{PPE_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (3)$$

where *t* indexes the fiscal year and *i* the frim. TA_{it} is the total accruals defined as $TA_{it} = EBXI_{it} - CFO_{it}$, where EBXI presents the earnings before the extraordinary items and discontinued operations and CFO stands for the operational cash flows as are reported in the cash flow statement. Furthermore, we use total assets of the previous year ($Assets_{i,t-1}$) to deflate our variables while $\Delta SALES_{it}$ is the change in revenues. Finally, PPE_{it} represents the gross value of property, plant and equipment.

We use the estimated coefficients form Equation (3) to calculate the normal accruals (NA_{it}) for each firm.

$$NA_{it} = \hat{k}_1 \frac{1}{Assets_{i,t-1}} + \hat{k}_2 \frac{\Delta SALES_{it}}{Assets_{i,t-1}} + \hat{k}_3 \frac{PPE_{it}}{Assets_{i,t-1}} \quad (4)$$

We measure the discretionary accruals for each firm as the difference between total accruals and the estimated normal accruals based on the following equation:

$$DA_{it} = \left(\frac{TA_{it}}{Assets_{i,t-1}}\right) - NA_{it} \quad (5)$$

Table 3 presents the descriptive statistics for all variables used in the model.

Table 3: Descriptive statistics for discretionary accruals.

Variable	Mean	Std. Dev.	Min	Max
DA	-0.0907	0.0851	-0.8338	0.8105
TA	-0.1253	0.0887	-1.1535	0.6984
ASSETS	10052.71	36394	31.6360	797769
SALES	7803.51	21635	0	474259
PPE	5189.54	12742	0.9490	178678
EBXI	1.7234	2.5211	-29.72	44.64
CFO	1033.17	2939	-3991	59713
NA	-0.0526	0.0343	-0.5219	0.2112

Note: This table displays the summary statistics for the variables used for the estimation of discretionary accruals. DA is the discretionary accruals, TA is the total accruals calculated as the difference between the earnings before the extraordinary items and discontinued operations and the operational cash flows as are reported in the cash flow statement, ASSETS stands for the total assets, SALES is the total sales, PPE represents the gross value of property, plant and equipment, EBXI presents the earnings before the extraordinary items and discontinued operations, CFO stands for the operational cash flows as are reported in the cash flow statement and NA is firm-specific normal accruals.

3.4. Empirical analysis and results

3.4.1. Country Governability and analysts' forecast accuracy

We examine the impact of country governability on analysts' forecast accuracy by using the following regression. To control for industry and year fixed effects, we include year dummies and industry dummies based on the 2-digit SIC codes.

$$ACCURACY_{it} = \alpha_0 + \alpha_1 COUNTRY\_GOV_t + \alpha_2 SIZE_{it} + \alpha_3 LOSS_{it} + \alpha_4 DISP\_AF_{it} + \alpha_5 GROWTH_{it} + \alpha_6 ROE_{it} + industry\ dummies + time\ dummies + \varepsilon_{it} \quad (6)$$

where t indexes the fiscal year and i the firm, $COUNTRY\_GOV_t$ stands for the macro/country-level governability indexes, $SIZE_{it}$ presents firm's size and is calculated as the natural logarithm of total assets, ROE_{it} is the return on assets for firm i in year t, $GROWTH_{it}$ presents firms growth and is calculated as the ratio of the difference in sales and sales of the previous period over total assets. Finally, $LOSS_{it}$ is a dummy variable that takes the value 1 for loss years and zero otherwise and $DISP\_AF_{it}$ stands for earnings forecast dispersion and is calculated as the standard deviation of analysts' forecasts scaled by the stock price.

The individual impact of each of the three governability indexes is presented in Models (1) to (3) in Table 4. Results in Model (1) show that the relationship between analysts' forecast accuracy and the quality of government regulations (GOV_QUAL) is positive and significant at 1% level. This finding indicates that earnings forecasts are more accurate when the government implements sound policies and regulations that promote private sector development. By contrast, the rule of law (GOV_RULEOFLAW) in Model (2) is negatively associated with analysts' forecasts accuracy at 1% significance level, suggesting that greater contract enforcement, stronger property rights and more efficient courts could undermine analysts' accuracy. Our results demonstrate that there might be some trade-off between further enforcement of government regulations and analysts' forecasts accuracy, as the former increase red tape and bureaucracy at the expense of simplicity and transparency.

Finally, in Model (3) we employ government effectiveness index (GOV_EFFECT). Estimation results show that analysts' accuracy increases when a government promotes policies to improve the effectiveness of government services, such as the government independence from political pressures and the credibility of the commitment to such policies. Model (4) presents the regression results for the full model, where we account

for all governability indexes simultaneously. GOV_QUAL and GOV_EFFECT maintain their positive impact on analysts' accuracy at 10% and 5% significance level respectively. The positive and significant at 5% level coefficient of government effectiveness in Model (4) indicates that when we control for the other governability indexes, a higher effectiveness of public and civil services, as well as greater independence from political pressures could enhance analysts' forecast accuracy. These findings could be compared to those reported in the previous literature (Hope 2003; Hope and Kang 2005; Bhat et al. 2006) according to which stronger legal enforcement can increase analysts' accuracy.

Overall, our results provide evidence in favour of hypothesis H1, suggesting that the level of analysts' forecast accuracy is associated with the level of the country governability. We notice a significant positive relationship between the level of country governability – as measured by the quality of government regulations and the degree of government effectiveness – and analysts' accuracy. Whilst, our findings show that stronger rule of law undermines analysts' forecast accuracy.

Regarding the impact of control variables, size is positively related to forecast accuracy at 1% level. This positive relationship shows that it is easier for analysts to predict earnings for larger firms as larger firms disclose more information than smaller. Loss years undermine analysts' accuracy. The negative coefficient of growth suggests that past sales growth is a significant determinant of analysts' forecast accuracy, indicating that firms with increasing growth in the past increase forecast errors (Hribar and Jenkins 2004).

Table 4: Regression analysis of analysts' forecast accuracy on country governability.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)
GOV_QUAL	0.0381***			0.0206*
	(0.0133)			(0.0124)
GOV_RULOFLAW		-0.0569***		0.0220
		(0.0157)		(0.0336)
GOV_EFFECT			0.0515***	0.0423**
			(0.0133)	(0.0183)
SIZE	0.0122***	0.0113***	0.0121***	0.0124***
	(0.0021)	(0.0019)	(0.0020)	(0.0022)
LOSS	-0.0320***	-0.0318***	-0.0321***	-0.0322***
	(0.0054)	(0.0053)	(0.0053)	(0.0054)
ROE	0.0015	0.0016	0.0015	0.0015
	(0.0011)	(0.0011)	(0.0011)	(0.0011)
GROWTH	-0.0150**	-0.0180***	-0.0160**	-0.0147**
	(0.0064)	(0.0068)	(0.0066)	(0.0064)
DISP_AF	-0.0325	-0.0325	-0.0323	-0.0324
	(0.0236)	(0.0236)	(0.0235)	(0.0236)
Constant	-0.173***	-0.0208	-0.0197***	-0.250**
	(0.0354)	(0.0256)	(0.0350)	(0.100)
Time dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Adjusted R^2	0.1995	0.2084	0.1996	0.1966
Observations	7,868	7,868	7,868	7,868
Number of firms	911	911	911	911

Note: this table reports regression results of analysts' forecast accuracy on country governability. Year dummies and industry dummies are included. ACCURACY stands for analysts' accuracy and is calculated as (-1)*absolute value of (mean forecast – actual forecast)/price at forecast date. GOV_QUAL reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, GOV_RULEOFLAW reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence, GOV_EFFECT reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies, SIZE is the natural logarithm of total assets, ROE is the return on equity, GROWTH is the ratio of the difference in sales and sales of the previous period over total assets and LOSS is a dummy that takes the value 1 for loss years. DISP_AF is the standard deviation of analysts' forecasts scaled by stock price. All regressions are estimated with robust standard errors to solve issues of heteroscedasticity and serial correlation. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

3.4.2. Corporate governance and analysts' forecast accuracy

Our second hypothesis H2 tests whether the level of analysts' forecast accuracy changes with the corporate governance structure based on the following model:

$$ACCURACY_{it} = \alpha_0 + \alpha_1 CORPORATE\_GOV_{it} + \alpha_2 SIZE_{it} + \alpha_3 LOSS_{it} + \alpha_4 DISP\_AF_{it} + \alpha_5 GROWTH_{it} + \alpha_6 ROE_{it} + industry\ dummies + time\ dummies + \varepsilon_{it} \quad (7)$$

$CORPORATE\_GOV_{it}$ stands for indicators of corporate governance structure. The first measure of corporate governance is the CEO equity incentives. Recall that we are using four different measures for equity incentives: total options (OPTION_GRANTS thereafter), existing exercisable options (EXOPTIONS thereafter), existing unexercisable options (UNOPTIONS thereafter) and the dollar change in the value of CEO's stock and option portfolio due to one percentage point increase in the company stock price (ONEPCT thereafter).

Table 5 represents estimation result for equation (7). Models (1) to (3) show that all measures of CEO equity-based incentives exert a negative impact on accuracy at 1% level. Model (4) suggests that 1% point change in the value of CEO equity-based compensation due to 1 % increase in firm's share price will lead to 0.55% decrease in analysts' forecast accuracy. Results obtained from Models (1) and (4) indicate that CEO equity incentives could weaken analysts' forecast accuracy confirming Hypothesis 2. These findings are in agreement with those obtained from Kanagaretnam et al. (2012) and McAnally et al. (2008) who argue that CEOs with high equity-based compensation undermine analysts' forecasts accuracy. Further, in Models (5) to (8), we include country-level governability indexes in our regressions. After accounting for one equity incentive measure at each

model, our findings show that greater government effectiveness and higher quality of government services enhance analysts' forecasts at 5% and 10% level respectively. The impact of equity incentives after controlling for country governability is negative, albeit weak. Overall, results presented in Table 5 confirm hypotheses H1 and H2 according to which country and firm-level governability could affect analysts' accuracy.

Table 5: Regression analysis of analysts' forecast accuracy on the corporate governance and country governability.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
OPTION_GRANTS	-0.0196***				-0.0170*			
	(0.00457)				(0.00924)			
EXOPTIONS		-0.0253***				-0.0224*		
		(0.00581)				(0.0118)		
UXOPTIONS			-0.0784***				-0.0625	
			(0.0190)				(0.0384)	
ONEPCT				-0.557**				-0.318
				(0.268)				(0.203)
GOV_QUAL					0.0215*	0.0215*	0.0215*	0.0224*
					(0.0124)	(0.0124)	(0.0124)	(0.0123)
GOV_RULOFLAW					0.0194	0.0194	0.0194	0.0189
					(0.0337)	(0.0337)	(0.0337)	(0.0336)
GOVEFFECT					0.0397**	0.0397**	0.0397**	0.0394**
					(0.0182)	(0.0182)	(0.0182)	(0.0181)
SIZE	0.0112***	0.0112***	0.0112***	0.0112***	0.0123***	0.0123***	0.0123***	0.0124***
	(0.00191)	(0.00191)	(0.00191)	(0.00194)	(0.00224)	(0.00224)	(0.00224)	(0.00226)
LOSS	-0.0319***	-0.0319***	-0.0319***	-0.0317***	-0.0325***	-0.0325***	-0.0325***	-0.0324***
	(0.00536)	(0.00536)	(0.00536)	(0.00542)	(0.00541)	(0.00541)	(0.00541)	(0.00547)
ROE	0.00163	0.00163	0.00163	0.00164	0.00152	0.00152	0.00152	0.00153
	(0.00112)	(0.00112)	(0.00112)	(0.00113)	(0.00113)	(0.00113)	(0.00113)	(0.00114)
GROWTH	-0.0189***	-0.0189***	-0.0189***	-0.0190***	-0.0147**	-0.0147**	-0.0147**	-0.0147**
	(0.00688)	(0.00688)	(0.00688)	(0.00690)	(0.00645)	(0.00645)	(0.00645)	(0.00645)
DISP_AF	-0.0328	-0.0328	-0.0328	-0.0335	-0.0324	-0.0324	-0.0324	-0.0331
	(0.0237)	(0.0237)	(0.0237)	(0.0240)	(0.0236)	(0.0236)	(0.0236)	(0.0239)
Constant	-0.108***	-0.108***	-0.108***	-0.109***	-0.243**	-0.244**	-0.243**	-0.244**
	(0.0160)	(0.0160)	(0.0160)	(0.0162)	(0.100)	(0.100)	(0.100)	(0.101)
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
Adjusted R^2	0.2119	0.2119	0.2119	0.2120	0.1975	0.1975	0.1975	0.1974
Observations	7,868	7,868	7,786	7,868	7,868	7,868	7,868	7,868
Number of firms	911	911	911	911	911	911	911	911

Note: This table reports regression results of analysts' forecast accuracy on corporate governance and country governability. Year dummies and industry dummies are included. ACCURACY stands for analysts' accuracy and is calculated as (-1)*absolute value of (mean forecast – actual forecast)/price at forecast date, OPTION_GRANTS stands for the ratio of the total value of options over CEO salary, EXOPTIONS is the ratio of existing exercisable options over CEO salary, UNOPTIONS is the ratio of existing unexercisable options over CEO salary, ONEPCT stands for the dollar change in the value of CEO's stock and option portfolio due to one percentage point increase in the company stock price, GOV_QUAL reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, GOV_RULEOFLAW reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence, GOV_EFFECT reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies, SIZE is the natural logarithm of total assets, ROE is the return on equity, GROWTH is the ratio of the difference in sales and sales of the previous period over total assets and LOSS is a dummy that takes the value 1 for loss years. DISP_AF is the standard deviation of analysts' forecasts scaled by stock price. All regressions are estimated with robust standard errors to solve issues of heteroscedasticity and serial correlation. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 *** p<0.01, ** p<0.05, * p<0.1

Next, we test our second hypothesis about the impact of corporate governance on forecast accuracy using metrics of CEO power. We use four different measures for CEO power: CEO-Chair and CEO-CFO duality, CEO ownership and CEO tenure (CEO_CHAIR, CEO_CFO, CEO_OWNERSHIP and CEO_TENURE thereafter). Furthermore, we include board size as an additional indicator of corporate governance. Table 6 presents the estimation results. Our results demonstrate a strong positive impact of corporate governance measures on accuracy. Particularly, in Models (1) to (3) CEO_CHAIR, CEO_CFO and CEO_TENURE improve analysts' accuracy at 5% significance level, while in Model (4) the coefficient of CEO_OWNERSHIP is significant at 1% level. Conversely, board size does not exert a significant impact on accuracy in Model (5).

Our findings conform to hypothesis H2 which states that corporate governance could affect analysts' forecast accuracy and in this case, analysts issue more accurate earnings forecasts for firms with powerful CEOs. A powerful CEO who is the Chair of the board or the CFO of the firm at the same time could have higher accountability enhancing the unity of the board and improving firm performance (Cannella and Monroe 1997; Finkelstein and D'aveni 1994; Adut et al. 2011) which, in turn, can increase analysts' forecast accuracy. Moreover, CEO with long tenure might be considered as a connoisseur of the firm with considerable experience in firm management, and therefore, CEO tenure can enhance analysts' earnings forecast accuracy. Models (6) and (7) include the indicators of country governability in the regressions. After controlling for the impact of corporate governance on analysts' forecasts, the degree of government effectiveness maintains its positive impact on accuracy at 5% level, suggesting that country-level governability is indeed a significant determinant of analysts' accuracy.

Overall, the regression results presented in Tables (5) and (6) provide evidence in favour of the hypotheses H1 and H2, indicating that corporate governance and country governability could affect analysts' accuracy. Specifically, this chapter suggests that increasing CEO power, constraining CEO equity incentives and implementing more effective government regulations could enhance analysts' accuracy.

Table 6: Regression analysis of analysts' forecast accuracy on corporate governance and country governability.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
CEO_ CHAIR	0.0531**					0.0528**	0.0128
	(0.0230)					(0.0220)	(0.0206)
CEO_CFO		0.196**				0.239**	0.256**
		(0.0968)				(0.108)	(0.120)
CEO_TENURE			0.0494**			0.0407	0.0202
			(0.0245)			(0.0249)	(0.0254)
CEO_OWNERSHIP				0.0133***		0.0140***	0.088***
				(0.00267)		(0.00274)	(0.00238)
BOARDSZ					0.0693	0.0772	0.0218
					(0.0492)	(0.0485)	(0.0455)
GOV_QUAL							0.0190
							(0.0130)
GOV_RULOFLAW							0.0274
							(0.0338)
GOV_EFFECT							0.0425**
							(0.0179)
SIZE	0.0112***	0.0112***	0.0112***	0.0111***	0.0112***	0.0111***	0.0121***
	(0.00191)	(0.00191)	(0.00192)	(0.00190)	(0.00191)	(0.00190)	(0.00222)
LOSS	-0.0317***	-0.0316***	-0.0308***	-0.0317***	-0.0320***	-0.0315***	-0.0319***
	(0.00538)	(0.00537)	(0.00541)	(0.00542)	(0.00542)	(0.00553)	(0.00556)
ROE	0.00163	0.00163	0.00161	0.00162	0.00162	0.00156	0.00148
	(0.00112)	(0.00112)	(0.00107)	(0.00109)	(0.00112)	(0.00105)	(0.00106)
GROWTH	-0.0184***	-0.0189***	-0.0183***	-0.0183***	-0.0191***	-0.0173**	-0.0139**
	(0.00688)	(0.00689)	(0.00689)	(0.00690)	(0.00692)	(0.00693)	(0.00652)
DISP_AF	-0.0327	-0.0329	-0.0324	-0.0325	-0.0327	-0.0318	-0.0317
	(0.0237)	(0.0237)	(0.0236)	(0.0236)	(0.0237)	(0.0234)	(0.0233)
Constant	-0.109***	-0.108***	-0.120***	-0.107***	-0.120***	-0.131***	-0.263***
	(0.0160)	(0.0159)	(0.0173)	(0.0158)	(0.0198)	(0.0215)	(0.101)

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
Time dummies	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES
Adjusted R^2	0.2063	0.2111	0.2027	0.2118	0.2109	0.2002	0.1932
Observations	7,868	7,868	7,786	7,868	7,868	7,868	7,868
Number of firms	911	911	911	911	911	911	911

Note: this table reports regression results of analysts' forecast accuracy on corporate governance and country governability. Year dummies and industry dummies are included. ACCURACY stands for analysts' accuracy and is calculated as (-1)*absolute value of (mean forecast – actual forecast)/price at forecast date, CEO_CHAIR is a dummy variable for the CEO power that takes the value one if the CEO is also the chairman of the board, CEO_CFO is a dummy that takes the value one if the CEO is also the CFO, CEO_TENURE is the natural logarithm of the number of years the CEO has been CEO, CEO_OWNERSHIP is the value of firm's stocks owned by the CEO (excluding options) divided by CEO salary, BOARDSZ is the natural logarithm of as the number of board members, GOV_QUAL reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, GOV_RULEOFLAW reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence, GOV_EFFECT reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies, SIZE is the natural logarithm of total assets, ROE is the return on equity, GROWTH is the ratio of the difference in sales and sales of the previous period over total assets and LOSS is a dummy that takes the value 1 for loss years. DISP_AF is the standard deviation of analysts' forecasts scaled by stock price. All regressions are estimated with robust standard errors to solve issues of heteroscedasticity and serial correlation. Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

3.4.3. The interaction effect between country governability and corporate governance structure on analysts' accuracy

Regarding the interaction effect of country governability and corporate governance measures on analysts' earnings forecast accuracy we opt for the following model:

$$ACCURACY_{it} = \alpha_0 + \alpha_1 CORPORATE\_GOV \times COUNTRY\_GOV_{it} + \alpha_2 SIZE_{it} + \alpha_3 LOSS_{it} + \alpha_4 DISP\_AF_{it} + \alpha_5 GROWTH_{it} + \alpha_6 ROE_{it} + industry\ dummies + time\ dummies + \varepsilon_{it} \quad (8)$$

Table 7 reports the regression results for equation (8). As an indicator of country governability we employ the government effectiveness index (GOV_EFFECT). In all specifications in Table 6, GOV_EFFECT exerts a positive impact on forecast accuracy at 1% significance level. Concerning the impact of the interaction terms between government effectiveness and corporate governance, our results show that while the impact of the interaction terms between GOV_EFFECT – ONEPCT and GOV_EFFECT – CEO_CHAIR is insignificant, the coefficients for the interaction terms OPTION_GRANTS×GOV_EFFECT, CEO_CFO×GOV_EFFECT and CEO_OWNERSHIP×GOV_EFFECT are significant. One can notice that, while the individual impact of GOV_EFFECT on accuracy is positive, the interaction term OPTION_GRANTS×GOV_EFFECT in Model (1) is of opposite sign. This finding reveals the complexities associated with the governability and CEO equity incentives. Although the individual effect of the CEO equity incentives on analysts' forecast accuracy maintains its negative sign, the interaction term OPTION_GRANTS×GOV_EFFECT exerts a weaker impact on accuracy (see Model (1) in Table 4 and Models (1) - (2) in Table 7). Our findings indicate that when government

enhances the effectiveness of public and civil services as well as the independence of government authorities from political pressures, the negative impact of equity incentives on analysts' accuracy becomes less pronounced. Next, the positive and significant coefficients of the interaction terms CEO_CFO×GOV_EFFECT and CEO_OWNERSHIP×GOV_EFFECT in Models (4) - (6) suggest that government effectiveness can augment the positive impact of CEO-CFO duality and CEO ownership on accuracy. Overall, regression results in Table 7 show that effective governability not only can improve analysts' forecast accuracy but further, it can mitigate the negative and enhance the positive impact of corporate governance on accuracy.

Table 7: Regression analysis of the interactions between governability and corporate governance for analysts' forecast accuracy.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
OPTION_GRANTS×GOV_EFFECT	-0.0129**					-0.0145*
	(0.00512)					(0.00878)
ONEPCT×GOV_EFFECT		-0.225				-0.205
		(0.138)				(0.148)
CEO_CHAIR×GOV_EFFECT			0.00713			0.0146
			(0.0125)			(0.0124)
CEO_CFO×GOV_EFFECT				0.145**		0.150**
				(0.0681)		(0.0714)
CEO_OWNERSHIP×GOV_EFFECT					0.00636***	0.00144
					(0.00153)	(0.00486)
GOV_EFFECT	0.0509***	0.0516***	0.0498***	0.0517***	0.0525***	0.0493***
	(0.0133)	(0.0134)	(0.0132)	(0.0133)	(0.0133)	(0.0132)
SIZE	0.0120***	0.0121***	0.0120***	0.0121***	0.0119***	0.0119***
	(0.00207)	(0.00209)	(0.00206)	(0.00206)	(0.00205)	(0.00205)
LOSS	-0.0324***	-0.0323***	-0.0322***	-0.0322***	-0.0322***	-0.0322***
	(0.00539)	(0.00545)	(0.00540)	(0.00539)	(0.00544)	(0.00545)
ROE	0.00156	0.00156	0.00156	0.00156	0.00154	0.00154
	(0.00114)	(0.00115)	(0.00114)	(0.00114)	(0.00111)	(0.00111)
GROWTH	-0.0159**	-0.0160**	-0.0159**	-0.0159**	-0.0153**	-0.0152**
	(0.00664)	(0.00665)	(0.00665)	(0.00664)	(0.00666)	(0.00667)
DISP_AF	-0.0322	-0.0329	-0.0323	-0.0323	-0.0319	-0.0319
	(0.0235)	(0.0238)	(0.0235)	(0.0235)	(0.0234)	(0.0234)
Constant	-0.196***	-0.198***	-0.195***	-0.0198***	-0.198***	-0.193***
	(0.0350)	(0.0352)	(0.0350)	(0.0350)	(0.0347)	(0.0348)
Time dummies	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES
Adjusted R^2	0.2005	0.2005	0.1989	0.1996	0.2000	0.1986

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Observations	7,868	7,868	7,868	7,868	7,868	7,868
Number of firms	911	911	911	911	911	911

Note: this table reports regression results of the interactions between governability and corporate governance for analysts' forecast accuracy. Year dummies and industry dummies are included. ACCURACY stands for analysts' accuracy and is calculated as (-1)*absolute value of (mean forecast – actual forecast)/price at forecast date, OPTION_GRANTS×GOV_EFFECT and ONEPCT×GOV_EFFECT stand for the interaction terms between OPTION_GRANTS – GOV_EFFECT and ONEPCT– GOV_EFFECT respectively. CEO_CHAIR×GOV_EFFECT, CEO_CFO×GOV_EFFECT and CEO_OWNERSHIP×GOV_EFFECT are the interaction terms between CEO_CHAIR – GOV_EFFECT, CEO_CFO – GOV_EFFECT and CEO_OWNERSHIP – GOV_EFFECT respectively. GOV_EFFECT reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. OPTION_GRANTS stands for the ratio of the total value of options over CEO salary, ONEPCT stands for the dollar change in the value of CEO's stock and option portfolio due to one percentage point increase in the company stock price, CEO_CHAIR is a dummy variable for the CEO power that takes the value one if the CEO is also the chairman of the board, CEO_CFO is a dummy that takes the value one if the CEO is also the CFO and CEO_OWNERSHIP is the value of firm's stock owned by the CEO (CEO stock ownership excluding options) divided by CEO salary. SIZE is the natural logarithm of total assets, ROE is the return on equity, GROWTH is the ratio of the difference in sales and sales of the previous period over total assets and LOSS is a dummy that takes the value 1 for loss years. DISP_AF is the standard deviation of analysts' forecasts scaled by stock price. All regressions are estimated with robust standard errors to solve issues of heteroscedasticity and serial correlation. Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

3.4.4. Earnings management and analysts' forecast accuracy

We use the following regression to estimate the impact of discretionary accruals on analysts' forecast accuracy:

$$ACCURACY_{it} = \alpha_0 + \alpha_1 DA_{it} + \alpha_2 CORPORATE\_GOV_{it} + \alpha_3 COUNTRY\_GOV_{it} + \alpha_4 SIZE_{it} + \alpha_5 LOSS_{it} + \alpha_6 DISP\_AF_{it} + \alpha_7 GROWTH_{it} + \alpha_8 ROE_{it} + time\ dummies + industry\ dummies + \varepsilon_{it} \quad (9)$$

where DA_{it} stands for the discretionary accruals used by firm *i* during year *t*. We account for corporate governance by including CEO equity incentives (OPTION_GRANTS), CEO-Chair/CFO duality (CEO_CHAIR and CEO_CFO respectively), CEO ownership (CEO_OWNERSHIP), CEO tenure (CEO_TENURE) and board size (BOARDSZ). As an indicator for country governability we use the government effectiveness index (GOV_EFFECT).

Table 8 represents regression results for equation (9). Model (1) examines the individual impact of discretionary accruals on analysts' accuracy. The coefficient of DA is negative and significant at 1% level. This finding confirms hypothesis H3 which tests whether earnings management could affect analysts' accuracy. Particularly, in this case, we show that firms' engagement in earnings manipulation undermines analysts' accuracy. This relationship is in agreement with previous evidence (Bradshaw et al. 2001; Cohen and Lys 2003; Ahmed et al. 2005) according to which earnings management through the use of discretionary accruals might increase the complexity of analysts' forecasts resulting in less accurate forecasts for the latter. The coefficient of discretionary accruals maintains its negative sign after controlling for other control variables in Model (2), country governability in Model (3), corporate governance in Model (4) and all determinants

simultaneously in Model (5). Regression results obtained from Model (5) suggest that government effectiveness exerts a positive impact on analysts' accuracy at 1% significance level even after controlling for earnings manipulation, highlighting the importance of an effective governability for analysts' forecasts.

Table 8: Regression analysis of analysts' forecast accuracy on discretionary accruals, corporate governance and country governability.

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
DA	-0.111***	-0.101***	-0.0304	-0.0752**	-0.0882**
	(0.0337)	(0.0328)	(0.0388)	(0.0321)	(0.0436)
OPTION_GRANTS				-0.0181	-0.0170
				(0.0140)	(0.0168)
CEO_CHAIR				0.0534**	0.0407
				(0.0232)	(0.0251)
CEO_CFO				0.225	0.305**
				(0.146)	(0.152)
CEO_OWNERSHIP				-0.00417	0.00452
				(0.00778)	(0.00939)
CEO_TENURE				0.0367*	0.0326
				(0.0209)	(0.0341)
BOARDSZ				0.0765*	0.0545
				(0.0451)	(0.0645)
GOV_EFFECT			0.0509***		0.0687***
			(0.0150)		(0.0208)
SIZE		0.00995***	0.0104***	0.00987***	0.0203***
		(0.00162)	(0.00170)	(0.00164)	(0.00567)
LOSS		-0.0364***	-0.0368***	-0.0359***	-0.0259***
		(0.00599)	(0.00602)	(0.00610)	(0.00577)
ROE		0.00126	0.00124	0.00122	0.00576
		(0.00838)	(0.00844)	(0.00797)	(0.00661)
GROWTH		-0.0168**	-0.0141*	-0.0159**	-0.00723
		(0.00773)	(0.00762)	(0.00783)	(0.00621)
DISP_AF		-0.0390	-0.0385	-0.0385	-0.0106
		(0.0269)	(0.0267)	(0.0269)	(0.0150)
Constant	-0.0185***	-0.0991***	-0.181***	-0.121***	-0.310***
	(0.00193)	(0.0140)	(0.0333)	(0.0182)	(0.0761)
Time dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Adjusted R^2	0.0303	0.2464	0.2367	0.2381	0.2401
Observations	7,868	7,868	7,868	7,868	7,868
Number of firms	911	911	911	911	911

Note: this table reports regression results of analysts' forecast accuracy on discretionary accruals, corporate governance and country governability. Year dummies and industry dummies are included. ACCURACY stands for analysts' accuracy and is calculated as (-1)*absolute value of (mean forecast – actual forecast)/price at forecast date, DA stands for the discretionary accruals as a measure of earnings

manipulation by firms. OPTION_GRANTS stands for the ratio of the total value of options over CEO salary, CEO_CHAIR is a dummy variable for the CEO power that takes the value one if the CEO is also the chairman of the board, CEO_CFO is a dummy that takes the value one if the CEO is also the CFO and CEO_OWNERSHIP is the ratio of the value of firm's stocks owned by the CEO (CEO stock ownership excluding options) divided by CEO salary. CEO_TENURE is the natural logarithm of the number of years the CEO has been CEO and BOARDSZ is the natural logarithm of the number of board members. GOV_EFFECT reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. SIZE is the natural logarithm of total assets, ROE is the return on equity, GROWTH is the ratio of the difference in sales and sales of the previous period over total assets and LOSS is a dummy that takes the value 1 for loss years. DISP_AF is the standard deviation of analysts' forecasts scaled by stock price. All regressions are estimated with robust standard errors to solve issues of heteroscedasticity and serial correlation. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

3.5. A panel-VAR model: the impact of shocks

As a part of the sensitivity analysis and in order to take into account possible criticism regarding the endogeneity of some of the covariates in the previous analysis, we opt for a panel VAR model. Such model also allows identifying the underlying causality directions between the main variables of our analysis in a dynamic way. To account for endogeneity, we employ the Arellano-Bond GMM estimator for the lag order of one.[34] Moreover, to simplify the exposition, we present a first order 4x4 panel VAR model as:[35]

$$X_{it} = \mu_i + \Phi X_{it-1} + e_{i,t}, \quad i = 1,\ldots, N, \; t = 1,\ldots,T. \tag{10}$$

where X_{it} is a vector of four random variables that is the accuracy of analysts' earnings forecasts, CEO power, government effectiveness and growth. Thus, Φ indicates a matrix of coefficients (4x4), whilst μ_i a vector of firm-specific effects and $e_{i,t}$ iid residuals. Essentially, the panel VAR is a system of equations as:

[34] We seek for the optimal lag order following Lutkepohl (2006). We also apply the Akaike Information Criterion (AIC) and the Arellano-Bond AR tests. The optimal lag identified is equal to one. Sargan test reports for lag equals to one the null hypothesis is not rejected. Results are available upon request.
[35] Note that without loss of generality we could estimate a panel VAR 5x5, and so on.

$$
\begin{aligned}
X_{1it} &= \beta_{10} + \sum_{j=1}^{J} \beta_{11} X_{1it-j} + \sum_{j=1}^{J} \beta_{12} X_{2it-j} + \sum_{j=1}^{J} \beta_{13} X_{3it-j} + \sum_{j=1}^{J} \beta_{14} X_{4t-j} + e_{1i,t} \\
X_{2it} &= \beta_{20} + \sum_{j=1}^{J} \beta_{21} X_{1it-j} + \sum_{j=1}^{J} \beta_{22} X_{2it-j} + \sum_{j=1}^{J} \beta_{23} X_{3it-j} + \sum_{j=1}^{J} \beta_{24} X_{4t-j} + e_{2i,t} \\
X_{3it} &= \beta_{30} + \sum_{j=1}^{J} \beta_{31} X_{1it-j} + \sum_{j=1}^{J} \beta_{32} X_{2it-j} + \sum_{j=1}^{J} \beta_{33} X_{3it-j} + \sum_{j=1}^{J} \beta_{34} X_{4t-j} + e_{3i,t} \\
X_{4it} &= \beta_{40} + \sum_{j=1}^{J} \beta_{41} X_{1it-j} + \sum_{j=1}^{J} \beta_{42} X_{2it-j} + \sum_{j=1}^{J} \beta_{43} X_{3it-j} + \sum_{j=1}^{J} \beta_{44} X_{4t-j} + e_{4i,t}
\end{aligned}
\tag{11}
$$

The above system of equations has a moving average (MA) representation as a function of a set of present and past residuals e_1, e_2, e_3 and e_4. Given possible endogeneity, these equations could be correlated and thereby, the coefficients of the MA representation are not meaningful. A way to have meaningful estimations is to orthogonalize the residuals opting for the Cholesky decomposition of the covariance matrix. In addition, we introduce fixed effects to ensure heterogeneity in the levels.[36]

3.5.1 Impulse Response Functions and Variance Decompositions: the response of forecast accuracy on shocks in discretionary accruals, CEO power and government effectiveness

IRFs in Figure 1 present the response of accuracy to shocks in accuracy, discretionary accruals, CEO power, government effectiveness and growth (ACCURACY, DA, CPS, GOV_EFFECT and GROWTH respectively). The reverse ordering has also been estimated to further control for issues related to endogeneity. Results remain similar to the one reported herein.

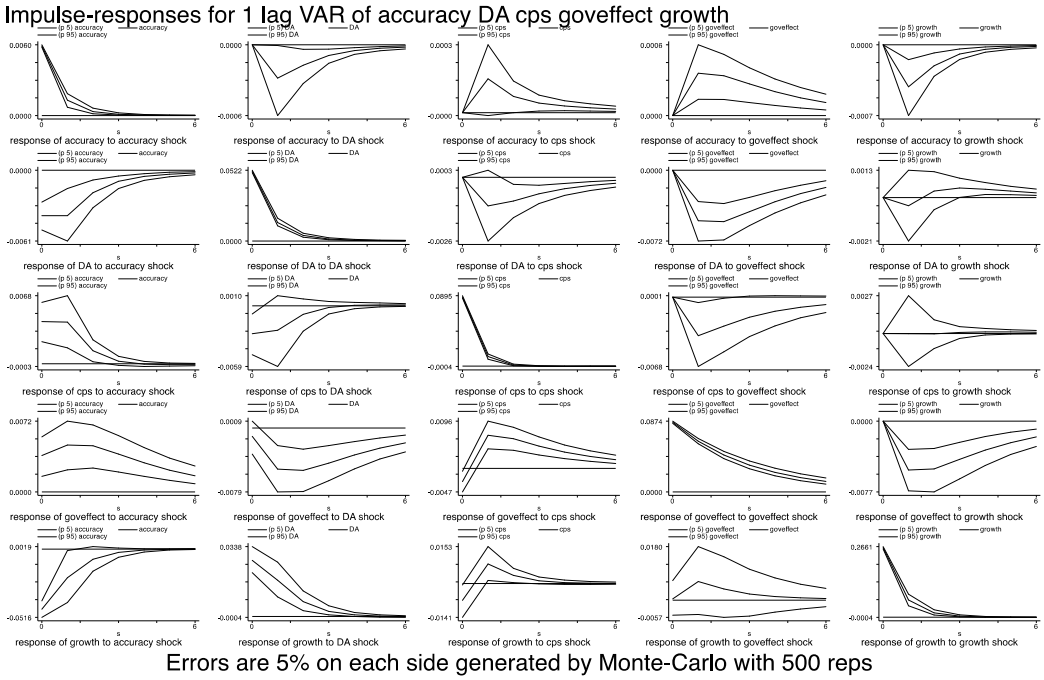
[36] Following Love and Zicchino (2006), we apply the Helmert procedure to the dataset. That is the data are forward mean differenced.

From the first row of Figure 1, the second plot from the left shows that the effect of one standard deviation shock of discretionary accruals on accuracy is negative across the whole period. It converges to equilibrium after around the third period. This result is consistent with our main results as reported in Section 3.4.4. (see Table 8) and in agreement with hypothesis H3, suggesting that analysts' forecast accuracy decreases as firms engage in earnings manipulation by using accruals.

One can notice from the third plot in the first row of Figure 1 shows that the effect of one standard deviation shock of CEO power based on stock ownership (CPS) on accuracy is positive and it converges towards the equilibrium after the first period. This result is in agreement with previous results reported in Table 6, where CEO stock ownership enhances analysts' accuracy (see Section 3.4.2.). Furthermore, our findings conform to the hypothesis H2, suggesting that corporate governance and in this case, powerful CEOs, can enhance analysts' forecast accuracy.

Finally, in the case of government effectiveness, the panel VAR methodology appears to confirm the findings of Table 4 (see Figure 1, the fourth plot from the left in the first row that reports the response of ACCURACY to one standard deviation shock of GOV_EFFECT. The response is positive across the whole period and in agreement with the positive coefficients of GOV_EFFECT as presented in Section 3.4. Thus, the panel VAR results show that a higher government effectiveness enhances financial analysts' accuracy confirming hypothesis H1.

Figure 3: Impulse Response Functions for ACCURACY, DA, CEO POWER, GOV_EFFECT, GROWTH.



Note: The figure presents Impulse Response Functions for ACCURACY which stands for analysts' accuracy and is calculated as (-1)*absolute value of (mean forecast – actual forecast)/price at forecast date, DA stands for the discretionary accruals, CPS which stands for CEO power as measured by CEO stock ownership, GOV_EFFECT reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies and GROWTH which is the ratio of the difference in sales and sales of the previous period over total assets. Dashed lines are 5% S.E. on each side generated by Monte Carlo with 500 replications.

Next, in Table 9 we present VDCs, which show the percent of the variation in one variable that is explained by the shock to another variable, accumulated over time. The variance decompositions show the magnitude of the total effect. We report the total effect accumulated over the 10 and 20 years. Longer time horizons produced equivalent results. Table 8 presents the VDCs estimations. These results come in agreement with the ones reported by the IRFs, and provide further evidence that the level of country governability explains the variation of accuracy, though mostly it is accuracy itself that explains its variation. Particularly, around 0.31% of the forecast accuracy after ten years is explained

by shocks in the DA variable. Furthermore, the VDCs results show that the level of government effectiveness explains around 1.24% of the variation of accuracy.

Table 9: Variance Decompositions for ACCURACY, DA, CEO POWER, GOV_EFFECT, GROWTH.

	S	ACCURACY	DA	CPS	GOV_EFFECT	GROWTH
ACCURACY	10	0.976869	0.003128	0.000839	0.012350	0.006814
DA	10	0.012183	0.955333	0.001088	0.031113	0.000282
CPS	10	0.004659	0.001707	0.989837	0.003792	0.000006
GOV_EFFECT	10	0.005691	0.005962	0.008181	0.974383	0.005783
GROWTH	10	0.033728	0.014320	0.001649	0.000781	0.949522
ACCURACY	20	0.976800	0.003129	0.000840	0.012416	0.006815
DA	20	0.012184	0.955153	0.001091	0.031287	0.000285
CPS	20	0.004659	0.001707	0.989825	0.003804	0.000006
GOV_EFFECT	20	0.005709	0.005987	0.008200	0.974301	0.005804
GROWTH	20	0.033728	0.014320	0.001649	0.000782	0.949522

Note: The table presents Variance Decompositions for ACCURACY which stands for analysts' accuracy and is calculated as (-1)*absolute value of (mean forecast – actual forecast)/price at forecast date, DA stands for the discretionary accruals, CPS which stands for CEO power measured by CEO stock ownership, GOV_EFFECT reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies and GROWTH which is the ratio of the difference in sales and sales of the previous period over total assets. Finally, s is the number of time periods ahead.

3.6. Conclusion

This main contribution of this chapter lies on investigating the effect of the rule of law, regulatory quality and the effectiveness of the government on analysts' earnings forecast accuracy for the first time in the literature. Our evidence reports that governance variables such as government effectiveness and quality of government regulations positively affect analysts' accuracy. Corporate governance such as CEO equity incentives, on the other hand, asserts a negative impact on accuracy. Our results further provide evidence for a positive association between CEO power and accuracy, whilst there exists evidence of

cross term relationship between the government effectiveness and the latter. We also provide evidence for a significant negative impact of discretionary accruals on analysts' accuracy, suggesting that analysts' forecast accuracy reduces as firms engage in earnings manipulation by using discretionary accruals. Panel VAR modeling enriches the previous finding as it sheds new light regarding the underlying causality of the main covariates of earnings forecasting accuracy, whilst also tackling issues related to endogeneity.

Overall, the results show that analysts' accuracy improves with stronger governability and regulatory quality. Additionally, corporate governance structure, such as CEO-Chair/CFO duality and CEO ownership assert a positive impact on analysts' accuracy. Conversely, analysts' make less accurate earnings forecasts when firms engage in earnings manipulation by using discretionary accruals. Given that analysts' earnings forecasts are an important source of information for market participants, the present results are of value to policymakers, investors, and academics as they indicate that analysts' earnings forecast accuracy could benefit from a strong and effective governance.

Chapter 4: Does corruption matter for analysts' forecasts? A global evidence.

4.1. Introduction

Corruption is considered as cancer in the society and the economy (Everett et al. 2007). The World Bank (1997, p. 8) defines corruption as '*the abuse of public office for private gain'.*[37] Macrae (1982) argues that corruption is '*an arrangement that involves a private exchange between two parties which can influence the allocations of sources and might involve the abuse of public or collective responsibility for private gain*'.[38]

Transparency International (2007) describes corruption as a serious global problem that can affect countries. The globalization and interaction among countries have stimulated the interest of researchers regarding the effects of corruption. There is strong evidence that corruption can reduce foreign direct investment, public investment in education and health and economic growth (Mauro 1995; Tanzi and Davoodi 1997; Wei 2000; Gupta et al. 2002). Furthermore, early research demonstrates that corruption undermines the trust in the political system and mitigates the legitimacy of transactions in markets (Seligson 2002; Branco and Delgado 2012). Initially, most of the corruption related studies have been focused on the impact of the former on economic growth, leaving a space for further research regarding its interaction with financial markets. Understanding the effects of

[37] Other international organizations such as International Monetary Fund (IMF), the Organization for Economic Co-operation and Development (OECD) and Transparency International have conducted many surveys regarding the level of corruption internationally, aiming to combat corruption.

[38] Argandoña (2005, p. 252) proposes a more complex definition of corruption as *"the act or effect of giving or receiving a thing of value, in order that a person do or omit to do something, in violation of a formal or implicit rule about what that person ought to do or omit to do, to be benefit of the person who gives the thing of the value or a third party".*

corruption and its relationship with financial markets can facilitate the assessment of risks and opportunities (Kimbro 2002).

In addition to the early research on the detrimental impact of corruption on the economy, there has also been research on the importance of the quality of financial reporting and its association with corruption. Existing literature provides strong evidence of the adverse effects of corruption on the quality of financial reporting (Kimbro 2002; Riahi-Belkaoui 2004; Wu 2005; Riahi-Belkaoui and Al Najjar 2006; Malageño et al. 2010). These studies show that the quality of both legal and accounting system is negatively associated with corruption. Furthermore, since managers can obfuscate the quality of the financial reporting by engaging in earnings manipulation practices (Biddle et al. 2009), many studies consider the indirect impact of corruption on earnings management (Leuz et al. 2003; Han et al. 2010; Sáenz González and García-Meca 2014). These studies examine the relationship between earnings manipulation and institutional settings, such as the degree of the legal enforcement and they suggest that earnings manipulation can strive in weak institutional environments.[39]

Financial reporting aims to provide market participants with useful information that facilitates their investment decision making. At the same time, the importance of financial analysts as intermediaries providing valuable information that enhances market efficiency is unequivocal (Cheng 2005). Given that analysts use financial reports as their main source of information (Lang and Lundholm 1996; Ashbaugh and Pincus 2001; Byard et al. 2006), greater quality and quantity of information disclosed through financial reports could decrease their forecast errors (Byard et al. 2006). There is also some evidence that firms' engagement in earnings management using discretionary accruals increases

[39] The degree of the legal enforcement is computed as a linear combination of the La Porta et al. (1997) enforcement variables. These variables are the efficiency of judicial system, the rule of law, the level of corruption, the risk of expropriation and the risk of contract repudiation.

analysts' forecast errors (Abarbanell and Lehavy 2003). Motivated by the above insights, we expect that corruption can affect analysts' forecast accuracy through the lower quality of financial reporting.

Although prior research has documented a link between corruption and the quality of financial reporting (Kimbro 2002; Riahi-Belkaoui 2004; Wu 2005; Riahi-Belkaoui and Al Najjar 2006; Malageño et al. 2010), the relationship between corruption and analysts' forecasts accuracy has left almost untouched. A few studies on analysts' forecasts accuracy consider the effects of institutional settings, some related to corruption (Hope 2003; Hope and Kang 2005; Bhat et al. 2006; Chen et al. 2010). Among these studies, only Chen et al. (2010) examine the indirect effects of corruption on analysts. Their analysis is focused on the impact of political connections on analysts' accuracy and how corruption affects this association for the case of 17 jurisdictions between 1991 and 2001. The rest of existing studies investigate the relationship between analysts and corruption employing a legal enforcement variable as proposed by La Porta (1997). According to this strand of literature, the legal enforcement depends on the level of corruption so that greater corruption can result in a weaker legal enforcement and poor quality of financial reporting, leading to higher forecasts errors.

Our study contributes to the growing literature on analysts' forecast accuracy in several ways. First, unlike previous research (Hope 2003; Leuz et al. 2003; Hope and Kang 2005; Bhat et al. 2006; Han et al. 2010; Sáenz González and García-Meca 2014) that uses an indicator of the legal enforcement, this study sheds light on the direct relationship between corruption and analysts' accuracy. Second, while Chen et al. (2010) use a firm-level data of 17 jurisdictions between 1997 and 2001, we construct a unique global cross-country sample of 102,188 observations for 14,449 firms in 71 counties over the period 2000 - 2014. The global sample involves combining multiple data sources such as I/B/E/S,

Compustat Global, North America and Transparency International. There are also methodological advantages of employing a global sample, as it provides appropriate variability across many countries. As corruption varies from country to country, and thereby, its impact on analysts' forecasts could also vary, we assemble a global sample. Such variability comes from the heterogeneity across countries that we adequately deal within a panel regression setting, which also takes into account possible issues related to endogeneity. Third, to fully reveal the link between corruption and analysts' accuracy, we take into account the heterogeneity across countries without loss of the variability in the underlying data generating process by classifying countries into advanced, emerging and developing based on IMF World Economic Outlook. Moreover, we contribute to the earnings management literature by examining whether the effect of earnings manipulation on analysts' forecasts varies with the level of corruption. To the best of our knowledge, this is the first study that considers the interaction between discretionary accruals and corruption at a global level. Finally, we investigate whether the degree of country freedom and anti-corruption institutional arrangements, interact with corruption and affect analysts' accuracy.

A glimpse in our results reveals that corruption negatively affects analysts' accuracy across the world, with some variability though. Analysts' forecast accuracy appears higher for firms located in less corrupt advanced and emerging countries, whereas for firms located in developing countries, results show that corruption could enhance analysts' accuracy. Further, we find that earnings manipulation can exacerbate analysts' accuracy for firms in emerging and developing countries with corruption present. Additionally, we use data from World Freedom Index and Press Freedom Index obtained from the Freedom House as proxies of country freedom. We examine the interaction between country freedom and corruption in relation to the impact of the latter on accuracy. The present

analysis reveals the plethora of complexities involved in the relationship between corruption and analysts' forecasts. Our results suggest that country freedom in parallel with corruption would improve forecast accuracy.

The remainder of this chapter (Chapter 4) is organized as follows: Section 4.2. develops the main hypotheses of our analysis; Section 4.3. describes our sample selection and defines variables, while section 4.4. presents the methodology and the various results. Finally, section 4.5. concludes and provides the policy implication of our findings.

4.2. Hypotheses to be tested

4.2.1. Corruption and analysts' forecast accuracy

There are studies that investigate the impact of institutional settings, some related to corruption, on analysts' accuracy (Hope 2003; Hope and Kang 2005; Bhat et al. 2006; Chen 2010). Hope (2003) and Hope and Kang (2005) in a cross-country analysis, investigate the relationship between analysts' accuracy and the degree of information disclosure/enforcement of the accounting standards.[40] The authors show that both firm-level disclosures and country-level enforcement can enhance analysts' accuracy. Their results indicate that a strong legal enforcement forces managers to follow the rules and hence, reduces analysts' uncertainty.

Bhat et al. (2006) explore the impact of governance transparency on analysts' forecast accuracy for 21 countries. The authors employ a country-level proxy of governance

[40] The authors measure the firm-level disclosure using the total disclosure index obtained from the Centre for International Financial Analysis. Regarding the legal enforcement variable, they construct a composite index based on the following country-level factors: audit fees, insider trading laws, judicial efficiency (La Porta et al. 1997), rule of law (La Porta et al. 1997), and shareholder protection (La Porta et al. 1998).

transparency as developed by Bushman et al. (2004).[41] Bhat et al. (2006) demonstrate that governance transparency is positively related to analysts' accuracy and that this association is more pronounced in countries with weak institutional settings.[42] Chen et al. (2010) using firm-level data over the period 1997 – 2001 for 17 jurisdictions examine the relationship between '*political connections*' and analysts' forecast errors. They find a positive association between politically connected firms and forecast errors. While the authors consider the level of corruption, their main research question is whether the effect of political connections on analysts is stronger with a higher level of corruption. After accounting for the interaction term between corruption and political connections, they show that the effect of political connections on accuracy can strive in corrupt countries, while they also report a positive relationship between analysts' forecast errors and corruption.

Another strand of literature explores the relationship between corruption and the quality of financial reporting (Kimbro 2002; Riahi-Belkaoui 2004; Wu 2005; Riahi-Belkaoui and Al Najjar 2006; Malageño et al. 2010). Kimbro (2002) using a sample of 61 countries investigates the association between economic, cultural and institutional/monitoring variables and corruption. The author captures the institutional and monitoring variables with the quality of legal and accounting system.[43] The findings suggest that the quality of both legal and accounting system is negatively associated with corruption. Specifically, the quality of financial reporting is higher in countries with a lower level of corruption.

[41] Bushman et al. (2004) account for corporate reporting, acquisition of private information and information dissemination. The authors also consider the number of analysts following the firms and media coverage.
[42] Bhat et al. (2006) capture the strength of institutional setting through the degree of legal enforcement.
[43] Kimbro (2002) proxies the quality of legal system using the average of the Rule of Law and the Efficiency of Judiciary variables obtained from International Country Risk Guide. The quality of accounting standards in each country is measured by the average of the Quality of Financial Accounting Statements variable obtained by CIFAR's general index and the concentration of accountants per capita.

A higher quality in financial reporting leads to a greater and more accurate information disclosure, and this, in turn, can uncover corrupt practices mitigating corruption.

Wu (2005) examines the link between accounting quality and bribery for Asian firms. The author concludes that a higher accounting quality can mitigate bribery by decreasing the information asymmetry between market participants and imposing a greater risk of punishment in case of discovery. Malageño et al. (2010) using a sample of 57 countries investigate the relationship between accounting/auditing quality and corruption. The authors capture the accounting and auditing quality with the presence of BIG4 firms. Their findings indicate that countries with a greater quality of financial reporting exhibit a lower level of perceived corruption and that corruption can be reduced by enhancing accounting and auditing quality.

Finally, Riahi-Belkaoui (2004) and Riahi-Belkaoui and Al Najjar (2006) examine the determinants of earnings opacity for 34 countries.[44] Riahi-Belkaoui (2004) suggests that corruption increases earnings opacity and thus, leads to a decrease in the quality of financial reporting. The main argument according to the author is that corruption fosters a *'camouflage'* environment facilitating financial misreporting for managers with self-serving interests (Leuz et al. 2001). In a further analysis, Riahi-Belkaoui and Al Najjar (2006) provide evidence for a positive relationship between earnings opacity and corruption/rule of law/economic growth and a negative relationship between earnings opacity and economic freedom/quality of life.

[44] Riahi-Belkaoui (2004) and Riahi-Belkaoui and Al Najjar (2006) use earnings opacity as a proxy for the quality of financial reporting. The authors employ three measures of earnings opacity as proposed by Bhattacharya et al. (2002): (i) earnings aggressiveness, (ii) loss avoidance and (iii) earnings smoothing.

Financial misreporting can help firms to dodge tax liabilities or to achieve corporate targets such as sales growth and earnings.[45] Therefore, firms in corrupt countries might have fewer incentives to improve the quality of their financial reporting. Corruption not only could tolerate the low quality of accounting information, but it can also encourage fraudulent accounting practices by rapacious governmental officials. This study builds on the notion that poor information disclosure can increase the uncertainty in markets, and that financial reports are the main source of information for analysts (Lang and Lundholm 1996; Ashbaugh and Pincus 2001; Byard et al. 2006). Hence, we expect that corruption can affect analysts' forecasts through its detrimental impact on the quality of financial reporting.

However, in countries with extensive bureaucratic burden, the *'grease the wheels'* hypothesis might dominate (Leff 1964; Leys 1965; Huntington 1968). According to the *'grease the wheels'* hypothesis, corruption could be beneficial for the economy mitigating the distortions caused by ill-functioning institutions. Leff (1964), Leys (1965) and Huntington (1968) state that bureaucracy is an obstacle to economic growth and that corruption can add some *'speed'* or *'grease'* facilitating transactions. Corruption might also be considered as a source of competitive advantage or as a mechanism reducing transaction costs in over-regulated countries (Cuervo-Cazura 2016). The *'grease the wheels'* hypothesis in terms of the content of the current analysis would suggest that corruption might improve analysts' accuracy. It could be the case that in countries with

[45] Regarding the earnings targets, there is a strong evidence that market places higher value to firms that achieve analysts' earnings forecasts on a continuous basis than to those firms that meet analysts' expectations occasionally. In addition, De Jong et al. (2014) in an interview based survey of 306 analysts employed by 11 of the world's largest investment banks conclude that 88.2% of the analysts believe that firms achieving their forecasts built credibility with capital markets and the 87.5% of them sate that meeting earnings forecasts enhances firm's future growth prospects to investors.

inefficient governance, corruption enhances the information exchange between firms and analysts.[46]

A positive relationship between accuracy and corruption might also exist due to the *'income-smoothing'* hypothesis (Chen et al. 2010). In this study, the *'income-smoothing'* hypothesis would suggest that analysts' forecast accuracy should be higher in countries that are more corrupt since higher corruption could help firms smooth their earnings. It could be the case that managers smooth earnings to send signals to markets regarding the future performance of the firms (Sankar and Subramanyam 2001; Tucker and Zarowin 2006; Badertscher et al. 2012). This, in turn, makes earnings more predictable leading to a greater forecast accuracy. Apparently, where corruption is present, managers might have greater incentives to engage in earnings manipulation practices, as they can bribe government officials to reduce monitoring of their activities and thus, there is a lower chance of discovery and punishment.

In this research, we hypothesize that corruption can affect analysts' forecasts through its detrimental impact on the quality of financial reporting.Therefore, we predict a negative sign for the corruption variable as reported in Table 1. The first hypothesis we would test in this chapter is the following:

Hypothesis 1: Corruption could undermine analysts' forecast accuracy.

4.2.2. Earnings manipulation, corruption and analysts' forecast accuracy

Analysts' earnings forecasts might be more complex for firms that engage in earnings manipulation than for those that do not. Following Leuz et al. (2003), we define earnings

[46] Leff (1964) claims that corruption might raise the level of investments in the economy as it can constitute a hedge against risks streaming from inefficient political system and weak governability. Furthermore, Lui (1985) argues that corruption could reduce the time cost of queues.

manipulation as the intentional misreporting of firms' performance and/or misapplication of accounting standards by insiders to deceive and mislead market participants. Firms' engagement in earnings manipulation come through various channels, i.e. through the use of discretionary accruals that increases analysts forecast errors (Abarbanell and Lehavy 2003).

Some studies examine the links between earnings manipulation and institutional settings (Leuz et al. 2003; Han et al. 2010; Sáenz González and García-Meca 2014; Blaylock et al. 2015). Leuz et al. (2003), Han et al. (2010) and Blaylock et al. (2015) using a cross-country analysis show that weak institutional settings, proxied by the mean score across the three legal variables used in La Porta et al. (1997), go hand in hand with earnings manipulation. In line with these findings, Dyreng et al. (2012) examine the location of earnings management for a sample of U.S. firms covering the period between 1994 and 2009. The authors conclude that firms tend to manipulate domestic earnings more, relative to foreign earnings. Moreover, they argue that this event is more pronounced in countries with a weak rule of law than in locations with a strong rule of law. Recently, Sáenz González and García-Meca (2014) analyzed the impact of institutional structure on the magnitude of earnings manipulation in Latin America. The authors construct a government index using three governance indicators taken from the World Bank Indicators: (i) the rule of law, (ii) the control of corruption, and (iii) the government effectiveness (Kaufmann et al. 2010, p. 4). They suggest that a stronger institutional structure can lead to a lower level of discretionary accruals.

Two arguments motivate this study. Firstly, that corruption affects the quality of financial reporting (Kimbro 2002; Riahi-Belkaoui 2004; Wu 2005; Riahi-Belkaoui and Al Najjar 2006; Malageño et al. 2010), and secondly, that firms' engagement in earnings management indicates a lower quality in financial reporting. For the above reasons, we

expect that in countries in which corruption is high, earnings manipulation is likely to be greater, leading to poor earnings forecasts. Therefore, we consider the interaction between the level of corruption and the degree of earnings manipulation. By including this interaction term, we aim to examine whether the effect of earnings manipulation related to discretionary accruals on analysts' accuracy is more pronounced in countries with higher corruption. For this reason in Table 1, we expect that when corruption is present, the negative impact of earnings management will be augmented, predicting a negative sign for the interaction term between corruption and earnings management. Conversely, we expect that stronger control of corruption would mitigate the impact of earnings management on accuracy, predicting a positive sign for the interaction term between control for corruption and earnings management.

Thus, our second hypothesis is sated as follows:

Hypothesis 2: The effect of earnings manipulation on analysts' forecast accuracy is more pronounced with a higher level of corruption.

4.2.3. Country freedom, corruption and analysts' forecast accuracy

The negative effects of corruption might be mitigated through a greater country freedom. The institutional settings literature (Sandholtz and Koetzle 2000) has highlighted the role of democracy in relation to corruption, as the former could deter the latter. Sandholtz and Koetzle (2000) demonstrate that country freedom subdues the level of corruption through the democratic freedoms, such as political rights and civil liberties.[47] Montimola and Jackman (2002) and Sung (2004) suggest that democratization, as reflected by stronger

[47] Sandholtz and Koetzle (2000) employ the Corruption Perception Index obtained from Transparency International while they capture the impact of democratization through Freedom House indexes of political and civil liberties.

political rights, affects the level of corruption positively, albeit this effect is nonlinear.[48] The initial increase in the level of corruption can be explained through the renewed corrupt practices induced by the political liberalization. Moreover, it is possible that in globalized economies, the liberalization of the political and economic systems can both increase the opportunities for corrupt practices and make the detection of corruption more difficult because of electronic commerce and financial renovation (Sung 2004).

Furthermore, the availability and quality of information is a significant determinant of the decision-making by market participants (Bushman et al. 2004). According to the World Bank (2002), media increases the accountability of businesses and governments and reduces information asymmetry between market participants when it is independent, it provides good-quality information and it has a broad reach. In most countries, press serves as an information intermediary in capital markets, and there is evidence that a greater press coverage shrinks information asymmetries around earnings announcements, leading to more accurate forecasts (Ying et al. 2014). However, there is also evidence suggesting that in countries with a high level of corruption, press freedom might serve for opportunistic behaviour by mimicking the voice of powerful corporations connected to them (Mullainathan and Shleifer 2005; Chen et al. 2010).

Given this evidence, it would be of interest to examine whether country freedom can affect analysts' forecast accuracy when corruption is present. Our focus on the interaction between corruption and country freedom variables aims to examine whether the latter

[48] Montimola and Jackman (2002) employ two measures of corruption. First, the average score of three indicators obtained from Business International (BI) which are: (i) legal system and judiciary, (ii) bureaucracy and red tape, and (iii) business transactions that involve corruption or questionable payments. As a second measure, they use the Corruption Perception Index from Transparency International. Furthermore, the authors account for the democratization using a measure developed by Bollen (2001) obtained from the Interuniversity Consortium for Political and Social Research (ICPSR). This measure is the average of the following indicators: (i) freedom of group oppositions, (ii) political rights, (iii) effectiveness of the legislative body and (iv) an indicator of voter turnout. Regarding Sung (2004), the author accounts for the democratization through the Political Rights Index taken from Freedom House, while as corruption indicator he employs Corruption Perception Index from Transparency International.

lessens the effect of corruption on analysts' forecast accuracy. For this reason, in this analysis we predict a positive sign both for the individual impact of country freedom variables and their interaction terms with corruption (see Table 1). Thus, our third hypothesis is stated as follows:

Hypothesis 3: Country freedom could ease the adverse effect of corruption on analysts' forecast accuracy.

Table 1: Predicted sign for the variables employed in the analysis

Variable	Predicted sign		
	Advanced countries	*Emerging countries*	*Developing countries*
Country-level variables			
CPI	-	-	-
CONT_CORR	+	+	+
DA	-	-	-
WF	+	+	+
PR	+	+	+
CL	+	+	+
PFI	+	+	+
Interaction terms			
CPI×NUMANA	-/+	-/+	-/+
CONT_CORR×NUMANA	-/+	-/+	-/+
CPI×DA	-	-	-
CONT_CORR×DA	+	+	+
CPI×WF	+	+	+
CONT_CORR×WF	+	+	+
CPI×PR	+	+	+
CONT_CORR×PR	+	+	+
CPI×CL	+	+	+
CONT_CORR×CL	+	+	+
CPI×PFI	+	+	+
CONT_CORR×PFI	+	+	+
Other variables			
L.ACCURACY	+	+	+
NUMANA	-/+	-/+	-/+
DISP	-	-	-
ROE	+	+	+
LOSS	-	-	-
GDP	+	+	+

Notes: the table reports the predicted sign of the variables. A negative (positive) predicted sign corresponds to a decrease (increase) in analysts' forecast errors. Finally, when either a positive or a negative relationship is equally likely, both signs are reported.

4.3. Data Section

We employ the Institutional Brokers' Estimate System (I/B/E/S) Summary History file to obtain annual data on analysts' earnings forecasts and actual earnings. I/B/E/S provides the actual earnings, announce date of actual earnings, corresponding consensus forecast, forecast period end and analysts' identity codes. For each year, analysts can make many and different forecasts until the end of forecast period. The consensus earnings forecast for each firm-year is the mean of the multiple analysts' earnings forecasts for the specific firm and year. The main advantage of using I/B/E/S as our source for actual and forecast earnings is that I/B/E/S forecasts exclude extraordinary items and other special items and therefore, we ensure higher consistency in our data. Furthermore, we opt for Compustat Global and North America to obtain firm-specific financial data. For consistency, we drop firms with missing actual and consensus forecast earnings and firms with less than three consecutive observations. Using a wide range of datasets allows us to ensemble a comprehensive sample that includes 102,188 firm-year observations for 14,449 firms in 71 counties including both North America and international firms covered by I/B/E/S database from 2000 to 2014. Given the variability of the many countries in our sample, we account for differences in the level of economic development and thereby, select three groups: advanced, emerging and developing economies according to IMF World Economic Outlook April 2014.[49]

[49] The group of advanced countries consists of 83,380 firm-year observations and a total of 10,996 firms for the following 33 countries: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom and United States. The emerging countries group includes 27 countries with 18,368 firm-year observations and a total of 3,340 firms from Argentina, Bahrain, Brazil, Bulgaria, Chile, China, Colombia, India, Indonesia, Kuwait, Malaysia, Mexico, Nigeria, Oman, Pakistan, Peru, Philippines, Poland, Qatar, Romania, Russia, Saudi Arabia, South Africa, Thailand, Turkey, United Arab Emir and Venezuela. Finally, developing countries consists of 11 countries with 440 observations and 113 firms from Botswana, Croatia, Egypt, Ghana, Jordan, Kenya, Lebanon, Morocco, Sri Lankan, Ukraine and Zimbabwe. All available data have been used.

4.3.1. Measuring analysts' forecast accuracy

Following O'Brien (1990), we opt for the absolute forecast error as a measure of forecast accuracy (ACCURACY thereafter). Specifically, for each firm-year, we estimate ACCURACY as the absolute value of the difference between mean earnings forecast and actual earnings for a year multiplied with minus one. By multiplying the absolute forecast error with minus one, we obtain a measure that increases with higher forecast accuracy, and thus, larger errors correspond to a lower level of accuracy. Finally, consistent with the prior literature (Duru and Reeb 2002; Hope 2003; Bhat et al. 2006) that use stock price as a deflator of analysts' forecast errors to facilitate comparisons across countries, we scale the accuracy measure with the stock price of firm *j* one year before the forecast period ends. Hence, forecast accuracy is defined as:

$$ACCURACY_{it} = (-1) * \frac{|FCASTit - ACTUAL_{it}|}{PRICE_{i,t-1}} * 100 \quad (1)$$

where $FCAST_{it}$ is the consensus forecast of the firm's earnings for year *t* made at year *t-1* and $ACTUAL_{it}$ represents the actual earnings for firm *i* in year *t*. Finally, $PRICE_{j,t-1}$ is the stock price of firm *i* one year before the forecast period end. ACCURACY is negative by construction and values closer to zero indicate more accurate forecasts.[50]

[50] In line with Chapter 3, in this chapter we employ analysts' accuracy as minus one times the absolute value of the difference between mean earnings forecast and actual earnings for a year. By employing this measure of accuracy, we focus on the absolute value (magnitude) of analysts' forecast errors and not whether the latter are optimistic (positive forecast errors) or pessimistic (negative forecast errors) which was the case in Chapter 2. However, estimated results using the FE variable (Chapter 2) are similar to those obtained in this chapter.

4.3.2. Measuring corruption

We account for corruption by employing the Corruption Perception Index (CPI thereafter) obtained from the Transparency International Organisation (Transparency International 2014). The Corruption Perception Index ranks countries based on how corrupt their public sector is perceived to be. Corruption reflects illegal practices that are hidden until scandals are uncovered. Transparency International organization attempts to capture perceptions of corruption of business people and country experts who can offer assessments of the level of the public sector corruption. The index takes values from 0 to 100, where 0 is the highest level of perceived corruption, and 100 equals the lowest level of perceived corruption.[51]

In addition, we opt for the control for corruption index (CONT_CORR thereafter) provided by the World Bank as an alternative measure of corruption (Kaufmann et al. 2010). The control for corruption index obtained from World Governance Index reflects *' perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests'* (Kaufmann et al. 2010, p. 4). It takes values between -2.5 (weak) and 2.5 (strong) control for corruption.[52]

[51] For purposes of consistency with the ACCURACY measurement, we multiply the CPI index with minus one so that higher values would indicate higher degree of corruption hereafter.

[52] Both the Corruption Perception and Control for Corruption indexes have been widely used in previous studies revealing the significant impact of corruption on the economy (Habib and Zurawicki 2001; Graeff and Mehlkop 2003; Akhter 2004; Shen and Williamson 2005; DiRienzo et al. 2007; Andersson and Heywood 2009; Chen et al. 2010; Méon and Weill 2010; Ngobo and Founta 2012; Petrou and Thanos 2014; Petrou 2015; Gokalp et al. 2017). However, these indexes are aggregate indexes reflecting the quality of the governance. There are studies that have questioned the reliability of these indexes arguing that while these indexes are supposed to measure distinct concepts such as the perception of corruption and the control for corruption, they essentially measure the same broad concept (Langbein and Knack 2008). Thus, aggregate indexes might fail to distinguish among various aspects of the quality of governance questioning the robustness of the models. There is also evidence arguing that the aggregate indexes such as corruption perception index lack precision as it presents the perception of corruption of a specific group of people (Knack and Manning 2000; Van de Walle 2006; Brewer et al. 2007) and thus, could lead to misinterpretation or meaningless results.

4.3.3. Measuring earnings manipulation

We account for firm engagement in earnings manipulation by employing firm's discretionary or abnormal accruals. While the normal accruals reflect fundamental performance, the discretionary accruals capture distortions due to earnings misreporting and inappropriate application of accounting rules (Leuz et al. 2003).

We use the Jones (1991) model to calculate discretionary accruals. We employ a cross-sectional model to measure the discretionary accruals for each year and each firm classified by its GIC code. This measure takes into account firm-level changes that might affect accruals and enables for time-varying coefficients. We measure discretionary accruals as:

$$\frac{TAit}{Assets_{i,t-1}} = k_1 \frac{1}{Assets_{i,t-1}} + k_2 \frac{\Delta SALES_{it}}{Assets_{i,t-1}} + k_3 \frac{PPE_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (2)$$

where *t* indexes the fiscal year and *i* the firm, TA_{it} is the total accruals defined as $TA_{it} = EBXI_{it} - CFO_{it}$, where $EBXI_{it}$ presents the earnings before the extraordinary items and discontinued operations and CFO_{it} stands for the operational cash flows as reported in the cash flow statement. Furthermore, we use total assets of the previous year ($Assets_{i,t-1}$) to deflate our variables while $\Delta SALES_{it}$ is the change in revenues. Finally, PPE_{it} represents the gross value of property, plant and equipment.

We use the estimated coefficients from equation (2) to calculate the normal accruals (NA_{it}) for each firm as:

$$NA_{it} = \hat{k}_1 \frac{1}{Assets_{i,t-1}} + \hat{k}_2 \frac{\Delta SALES_{it}}{Assets_{i,t-1}} + \hat{k}_3 \frac{PPE_{it}}{Assets_{i,t-1}} \quad (3)$$

We measure the discretionary accruals for each firm as the difference between total accruals and the estimated normal accruals based on the following equation: $DA_{it} = \left(\frac{TA_{it}}{Assets_{i,t-1}}\right) - NA_{it}$.

4.3.4. Measuring country freedom

As a first measure of country freedom, we use the World Freedom Index obtained from the Freedom House organization (Puddington 2015). For each country, the index includes one rating for political rights (PR) and one for civil liberties (CL) with 1 representing the most free and 7 the least free. While the overall index (WF) is a dummy that takes the value one for a country with status "free" and zero for "partially" or "non-free" status.[53]

Furthermore, we include the Press Freedom Index (PFI) obtained from Freedom House as an additional measure for the degree of country freedom (Puddington 2015). Press Freedom Index comprises 23 methodology questions and 132 sub-questions. For each methodology question, low numbers indicate more freedom. An aggregate score of 0 to 30 shows free press, 31 to 60 partly free and 61 to 100 not free.[54]

4.3.5. Control Variables

Concerning our control variables, we include the number of analysts following the firm (NUMANA) and the dispersion in analysts' forecasts (DISP). NUMANA is calculated as the natural logarithm of the number of distinct analysts that follow each firm for each

[53] Freedom House is an American independent organization founded in 1941 aimed to defend human rights and promote democratic change focused on political rights and civil liberties across countries. Each country score is based on two numerical ratings from 0 to 7 for political rights and civil liberties. The two ratings are based on scores assigned to 25 more detailed indicators. The average of a country or territory's political rights and civil liberties ratings determines whether it is "free", "partly free", or "not free".

[54] As lower values of the PFI indicate higher degree of freedom, we multiply the index with minus one so as higher values indicate higher degree of freedom.

year and presents a proxy for analysts' coverage. A greater number of analysts following a firm might improve information disclosure (Yu 2008), and as a result, it might enhance analysts' accuracy (Duru and Reeb 2002; Gu and Wu 2003). However, the greater number of analysts following a firm might signal higher competition among the analysts who strive for better commission fees and management relations leading them to issue less accurate forecasts (Gu and Wu 2003). Thus, a positive or a negative sign for the relationship between NUMAN and ACCURACY is equally likely as reported in Table 1. DISP stands for forecast dispersion, calculated as the standard deviation of analysts' forecasts divided by the total assets. A higher dispersion in earnings forecasts could indicate greater uncertainty in analysts' forecasts, resulting in a lower forecast accuracy (Duru and Reeb 2002; Gu and Wu 2003).

Losses in previous years might also enhance uncertainty. Abarbanell and Lehavy (2003) show that analysts' forecasts are less accurate for firms with losses than those of profitable firms. Thus, we also employ a dummy variable for years with loss (LOSS). Also, given that firm performance is a significant determinant of analysts' earnings forecasts, we account for firm profitability by including firm's return on equity (ROE). We expect that better performing firms would disclose greater amount of information leading to more accurate analysts' forecasts. Finally, since our study consists of a global sample, we include the natural logarithm of the Gross Domestic Product (GDP) for each country as a country-specific variable. Higher GDP could enhance analysts' forecast due to the greater level of country development.

Table 2 reports summary statistics for the mean analyst forecast accuracy, discretionary accruals and the number of analysts following each firm for advanced, emerging and developing countries over the period 2000 – 2014. Our global sample reveals interesting details regarding the accuracy of analysts, the use of earnings manipulation practices and

analysts' coverage across countries. The mean ACCURACY is -0.030, -0.055 and -0.050 for advanced, emerging and developing countries respectively, implying higher mean accuracy for firms located in advanced countries. Forecast accuracy for emerging and developing countries are comparable with developing countries exhibiting relatively higher accuracy. The mean use of discretionary accruals is -0.376, 0.117 and -0.491 for advanced, emerging and developing countries respectively, documenting higher earnings manipulation from firms in developing countries. Concerning analysts' coverage, the mean number of analysts following firms is around 9, 8 and 4 in advanced, emerging and developing countries respectively. Apparently, analysts prefer most following firms located in advanced countries and least firms in developing countries.

Table 2: ACCURACY, DA and NUMANA across advanced, emerging and developing countries for the period 2000 - 2014.

ACCURACY, DA and NUMANA cross advanced countries for the period 2000 – 2014							
Country	*ACCURACY*	*DA*	*NUMANA*	*Country*	*ACCURACY*	*DA*	*NUMANA*
Australia	-0.043	-0.006	6.966	Japan	-0.017	-0.023	7.859
Austria	-0.051	-0.072	7.871	Latvia	-0.036	-0.017	1.286
Belgium	-0.045	-0.019	8.056	Lithuania	-0.023	.	2.2
Canada	-0.013	0.163	7.123	Luxembourg	-0.139	-0.07	10.06
Cyprus	-0.084	0.24	7.5	Netherlands	-0.061	-0.023	15.123
Czech Republic	-0.029	-0.063	10.971	New Zealand	-0.022	-0.004	5.476
Denmark	-0.060	-0.03	8.288	Norway	-0.103	0.175	8.629
Estonia	-0.047	-0.071	2.183	Portugal	-0.039	-0.033	8.635
Finland	-0.028	-0.027	11.145	Singapore	-0.024	0.01	9.576
France	-0.033	-0.032	10.561	Slovenia	-0.035	-0.016	2.4
Germany	-0.068	-0.039	11.065	Spain	-0.084	-0.047	15.478
Greece	-0.045	0.023	9.159	Sweden	-0.046	-0.015	9.022
Hong Kong	-0.026	0.073	11.358	Switzerland	-0.027	-0.036	10.918
Iceland	-0.010	.	3.667	Taiwan	-0.016	-0.037	7.382
Ireland	-0.063	-0.038	7.524	United Kingdom	-0.040	-0.036	9.012
Israel	-0.086	-0.128	4.515	United States	-0.020	-0.73	9.523
Italy	-0.043	0.034	9.585	Mean	-0.030	-0.376	9.364
ACCURACY, DA and NUMANA cross emerging countries for the period 2000 – 2014							
Country	*ACCURACY*	*DA*	*NUMANA*	*Country*	*ACCURACY*	*DA*	*NUMANA*
Argentina	-0.070	-0.147	4.674	Pakistan	-0.017	-0.295	3.876
Bahrain	-0.022	.	1.333	Peru	-0.056	-0.526	3.339
Brazil	-0.234	-0.045	9.098	Philippines	-0.383	-0.835	7.631
Bulgaria	-0.097	.	1.556	Poland	-0.026	-0.444	7.411
Chile	-0.015	-0.01	5.218	Qatar	-0.005	0.005	6.741

ACCURACY, DA and NUMANA cross emerging countries for the period 2000 – 2014							
Country	*ACCURACY*	*DA*	*NUMANA*	*Country*	*ACCURACY*	*DA*	*NUMANA*
China	-0.014	0.034	6.592	Romania	-0.032	0	9.229
Colombia	-0.006	0.051	3.143	Russia	-0.160	-0.085	6.427
India	-0.020	0.109	12.256	Saudi Arabia	-0.009	-0.013	6.332
Indonesia	-0.235	-0.1	9.681	South Africa	-0.032	0.082	5.989
Kuwait	-0.014	0.188	6.085	Thailand	-0.037	-0.017	10.552
Malaysia	-0.026	0.361	8.692	Turkey	-0.050	0.092	9.342
Mexico	-0.043	-0.023	7.926	United Arab Emir	-0.053	0.084	6.468
Nigeria	-0.026	0.138	3.938	Venezuela	-0.010	.	7.2
Oman	-0.046	20.234	4	Mean	-0.055	0.117	8.16
ACCURACY, DA and NUMANA cross developing countries for the period 2000 – 2014							
Country	*ACCURACY*	*DA*	*NUMANA*	*Country*	*ACCURACY*	*DA*	*NUMANA*
Botswana	-0.057	.	1	Lebanon	-0.009	.	3.5
Croatia	-0.021	0.065	3.405	Morocco	-0.018	-0.11	4.219
Egypt	-0.026	-0.769	5.65	Sri Lanka	-0.020	.	2.071
Ghana	-0.037	.	1.444	Ukraine	-0.343	-0.204	3.318
Jordan	-0.075	-0.152	2.393	Zimbabwe	-0.015	.	2.5
Kenya	-0.027	-0.077	3.455	Mean	-0.050	-0.491	4.27

Note: Table 2 presents the mean for analysts' accuracy (ACCURACY), discretionary accruals (DA) and the number of analysts' following each firm (NUMANA) for advanced, emerging and developing countries over the period between 2000 and 2014. Accuracy is defined as the absolute value of the difference between mean earnings forecast and actual earnings for a year multiplied with minus one, while discretionary accruals are measured as the difference between total accruals and estimated normal accruals.

4.4. Methodology and Estimated Results

4.4.1. Persistence in analysts' forecast errors

In this analysis, we include the lagged value of ACCURACY ($ACCURACY_{i,t-1}$). Predominantly, there is evidence that analysts' forecast errors are positively correlated with their lagged values. This is the case as analysts do not learn instantly from previous mistakes but they need time to incorporate these mistakes in the current forecasts (Boudt et al. 2015). For this reason, we predict a positive and significant coefficient for $ACCURACY_{i,t-1}$ as reported in Table 1.

Previous studies (Duru and Reeb 2002; Hope and Kang 2005; Bhat et al. 2006; Chen et al. 2010) have not dealt with endogeneity concerns. As endogeneity is an issue that has attracted criticism, we propose to estimate using a dynamic panel analysis model. We employ the two-step system generalized method of moments (GMM) estimator of Roodman (2009) who extends Arellano and Bover (1995) estimator with biased-corrected robust standard errors.[55] The main advantage of the proposed estimation method is that it adequately deals with criticism related to endogeneity with independent variables that are not strictly exogenous.[56] Furthermore, the GMM estimator accounts for fixed effects, heteroscedasticity and autocorrelation within individuals (Rootman 2006).[57]

[55] In this analysis, we use the xtabond2 STATA command that implements the two-step system GMM estimator with the Windmeijer (2005) correction to the reported standard errors. In the one-step system GMM robust standard errors are reported which are robust to heteroscedasticity. In the two-step GMM error terms are already robust and Windmeijer (2005) correction is implemented to standard errors. The two-step system GMM estimator uses the consistent variance covariance matrix from first step GMM to reconstruct the weight matrix. Without this correction, the standard errors tend to be downward biased. It also offers forward orthogonal deviations, as an alternative to differencing that preserves sample size in panel with gaps.

[56] As exogenous variables we consider the year, country and industry variables and as endogenous the lagged dependent variable and firm-specific variables. Following Arellano and Bond (1991), the estimation results obtained from the two-step system GMM estimator are tested by (i) the Hansen's J diagnostic test concerning the instrument validity and (ii) the test for the second-order autocorrelation of the error terms.

[57] We test for multicollinearity before running the models and the results do not demonstrate high correlation within the variables.

Thus, we estimate the following model:

$$ACCURACY_{i,t} = a_0 + a_1 ACCURACY_{i,t-1} + a_2 CORRUPTION_{j,t} + a_3 CORRUPTION \times NUMANA_{i,t} + a_4 NUMANA_{i,t} + a_5 DISP_{i,t} + a_6 ROE_{i,t} + a_7 LOSS_{i,t} + a_8 GDP_{i,t} + firm\ effects + year\ effects + country\ effects + industry\ effects + \varepsilon_{i,t} \quad (4)$$

where *t* indexes the year and *i* the firm, $ACCURACY_{i,t-1}$ is the lagged value of forecast accuracy. The lagged value of analysts' accuracy in equation (4) captures the persistence in analysts' forecast accuracy. $CORRUPTION_{j,t}$ stands for the level of corruption for country j in year *t*, $CORRUPTION \times NUMANA_{i,t}$ present the interaction between the level of corruption and the number of analysts' following a firm. Yu (2008) argues that analysts' coverage serves as a monitoring mechanism to managers. The author finds that firms followed by a greater number of analysts are less likely to engage in earnings management increasing the quality of financial reporting. Since a greater number of analysts following the firm can improve the quality of financial reporting, one might expect that the number of analysts can affect the impact of corruption on analysts' forecast.

Next, $DISP_{i,t}$ is the dispersion of analysts' earnings forecasts and $ROE_{i,t}$ is the return on assets for firm i in year *t*. $LOSS_{i,t}$ is a dummy for loss year, and $GDP_{j,t}$ is the natural logarithm of the Gross Domestic Product for country *j* in year *t*. Finally, besides the firm-specific effects, we further include year, country and industry-specific effects to control for any remaining variation that is not captured by the main variables (Oehmichen et al. 2016).

4.4.2. Corruption and analysts' forecast accuracy

In Table 3, Panels A, B and C report two models for the impact of Corruption Perception Index (CPI thereafter) on analysts' forecast accuracy in advanced, emerging and developing countries respectively. Model (1) shows the individual impact of CPI on accuracy and Model (2) adds the interaction term between CPI and the number of analysts following a firm (CPI×NUMANA thereafter).

Table 3 reports that the coefficient of CPI is negative and significant at 1% level for advanced and emerging countries in Model (1) of Panel A and Model (3) of Panel B respectively. These results suggest that analysts experience greater difficulty in forecasting earnings of firms in corrupted countries. Our findings complement those obtained from Chen et al. (2010). Chen et al. (2010) using the CPI index examine whether the impact of high-level political connections on analysts' forecasts strive when corruption is present in 17 countries between 1997 and 2001. Among their findings, the negative relation between analysts' forecasts and corruption is reported but not analyzed. Thus, our study contributes to this research employing a sample of 71 countries, covering the period between 2000 and 2014 and accounting for cross-country differences in development. Furthermore, to the degree that some components of institutional settings also capture the effect of corruption our results are in line with Hope (2003) and Hope and Kang (2005). It is of some interest that for developing countries, see Model (5) in Panel C, the relationship between accuracy and corruption is insignificant. For most countries, we find evidence in favour of Hypothesis 1, suggesting that corruption undermines analysts' forecast accuracy. However, given the variability across countries, Hypothesis 1 does not hold for developing economies. When it comes to the effect of corruption on analysts' accuracy, not one-size fits all cases is identified. In fact, we reveal that such relationship has underlying complexities that warrant further scrutiny.

The interaction term between the CPI and the number of analysts following a firm (CPI×NUMANA) is negative and significant at 1% level as presented in Model (2) in Panel A. This finding shows that with corruption present, the number of analysts following a firm would reduce accuracy. The greater number of analysts following a firm might signal higher competition among the analysts who strive for better commission fees and management relations leading them to issue less accurate forecasts (Gu and Wu 2003).

Table 3: Dynamic panel analysis results for advanced, emerging and developing countries using Corruption Perception Index as a corruption measure.

	Panel A: Advanced countries		Panel B: Emerging countries		Panel C: Developing countries	
VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
L.ACCURACY	0.008***	0.008***	0.088***	0.085***	0.373	0.652
	(0.002)	(0.001)	(0.005)	(0.005)	(0.401)	(0.428)
NUMANA	-0.012	-0.604***	-0.003	0.287***	-0.000	0.359***
	(0.012)	(0.096)	(0.010)	(0.097)	(0.009)	(0.095)
DISP	-0.041**	-0.042***	-0.111***	-0.116***	-3.789***	-3.192***
	(0.025)	(0.023)	(0.001)	(0.001)	(0.406)	(0.428)
ROE	0.003***	0.002***	0.001	0.002	0.001	0.001
	(0.001)	(0.000)	(0.000)	(0.012)	(0.015)	(0.001)
LOSS	-0.121***	-0.129***	-2.017***	-2.112***	-0.302***	-0.348***
	(0.011)	(0.007)	(0.253)	(0.282)	(0.066)	(0.070)
GDP	-0.033*	-0.045***	0.517***	0.412*	0.346	0.616**
	(0.018)	(0.013)	(0.198)	(0.231)	(0.356)	(0.311)
CPI	-0.001***	-0.003**	-0.052***	-0.043*	0.004	-0.014
	(0.001)	(0.001)	(0.018)	(0.024)	(0.015)	(0.018)
CPI×NUMANA		-0.008***		0.008***		0.012***
		(0.001)		(0.003)		(0.003)
Constant	0.869*	1.156***	-17.003***	-13.682**	-6.681	-13.006*
	(0.512)	(0.365)	(5.924)	(6.913)	(8.885)	(7.829)
Firm effects	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES
Industry effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES
Observations	65,752	65,752	12,997	12,997	228	228
Number of firms	10,482	10,482	3,003	3,003	80	80
Hansen-pvalue	0.137	0.0522	0.144	0.235	0.799	0.793
AR(2)-pvalue	0.954	0.870	0.284	0.296	0.303	0.120

Note: The table reports the dynamic panel regression results for advanced, emerging and developing countries using the Corruption Perception Index as a corruption measure. The two-step system GMM (Arellano and Bover 1995) is used with robust standard errors. We consider as exogenous country, year

and industry variables and as endogenous the lagged value of analysts' accuracy and firm-specific variables. AR(2) stands for the p-value of the second order residual autocorrelation test. Hansen test stands for the p-value of Hansen's J diagnostic test for instrument validity. The dependent variable is the ACCURACY which presents the analysts' earnings forecast accuracy and is measured as the absolute value of the difference between mean earnings forecast and actual earnings for a year multiplied with minus one and scaled with the stock price of the firm in the previous year, L.ACCURACY is the lagged value of analysts' accuracy, CPI is the Corruption Perception Index obtain from the Transparency International Organisation, CPI×NUMANA is the interaction term between Corruption Perception Index and the number of analysts following the firm. NUMANA is the number of analysts following each firm during each year, DISP presents analysts forecast desperation calculated as the standard deviation of analysts' forecasts divided by the total assets, ROE is the return on assets, LOSS is a dummy variable that takes the value one if the firm reports losses and zero otherwise, while GDP is the natural logarithm of the Gross Domestic Product for each country. Regression estimations account for firm-specific effects while year, country and industry effects are also included in all specifications but not reported. ***, ** and * indicate 1%, 5% and 10% significance levels respectively.

Regarding the interaction term CPI×NUMANA for emerging and developing countries, the coefficient of CPI×NUMANA is positive and significant at 1% level in Models (4) and (6) respectively. These results suggest that the impact of analysts' coverage varies across countries. For emerging and developing countries where corruption is dominant, the greater number of analysts would improve analysts' accuracy. Increasing the number of analysts the information disclosure and the quality of financial reporting would also increase (Yu 2008), and thus, one would expect that the forecast accuracy would be improved (Duru and Reeb 2002; Gu and Wu 2003).

Table 4 presents the regression results using the Control for Corruption Index (thereafter CONT_CORR) as an alternative measure of corruption. The impact of CONT_CORR on accuracy is positive and significant at 1% level for advanced and emerging countries (see Panel A and B in Table 4). These findings show that the greater control for corruption enhances analysts' forecasts accuracy confirming Hypothesis 1. Our results are in line with Hope (2003), Hope and Kang (2005) and Bhat et al. (2006) who document higher analysts' accuracy in countries with strong institutional settings. For the group of developing countries, Models (5) and (6) in Panel C show that the control for corruption

undermines analysts' forecast accuracy at 1% and 5% level respectively. Therefore, our findings provide evidence against Hypothesis 1 for the group of developing countries. These results could explain that for developing economies the *'grease the wheels'* and/or the *'income-smoothing'* hypotheses might indeed be valid (Leff 1964; Leys 1965; Bayley 1966; Méon and Weill 2010; Mendoza et al. 2015). In our analysis, the *'grease the wheels'* hypothesis would suggest that in countries with inefficient governance, corruption could improve the information exchange between firms and analysts. From another hand, the *'income-smoothing'* hypothesis would suggest that analysts' forecast accuracy should be higher in countries that are more corrupt as higher corruption could help firms smooth their earnings (Sankar and Subramanyam 2001; Tucker and Zarowin 2006; Badertscher et al. 2012).

Nevertheless, Table 4 suggests that future research in this area needs to concentrate on developing countries. Looking towards future research concerning the impact of corruption on analysts' accuracy in developing countries, we need to consider other firm and country-level factors that could affect our results. [58] Furthermore, our results as

[58] A limitation of this chapter, and thus an opportunity for further research is the role of *"crony capitalism"*. Most of the research on corporate governance examines the impact of governance structure in the U.S., which is a well-regulated country with transparent financial markets and a high degree of ownership dispersion, leaving the conflict of interests between managers and shareholders. However, in East Asia and Western Europe, the majority of the firms are controlled by a family. Worldscope database analysis reveals that in the nine most advanced East Asian and Western Europe countries, eight groups control more than one-quarter of the firms (Faccio et al. 2001). This phenomenon indicates an extraordinary concentration of control in these regions.

We recognize the significant role of ownership-control structure across countries. An extraordinary concentration could disrupt the effective competition leading to less transparent capital markets, which in turn could affect analysts' forecasts. High concentration of control would ultimately result in a systematic exportation of outside shareholders by the controlling shareholders. In this case, the agency problem is mainly the conflict of interests between majority and minority shareholders. Faccio et al. (2001) address this issue in a detailed analysis arguing that this problem should be recognized as a political, rather than pure corporate governance problem. In an earlier study, La Porta et al. (2000b) suggest that stronger legal protection of minority shareholders could eliminate the conflict of interests between majority and minority shareholders. Building on these insights, we would expect that in countries with corruption present, the agency problem between minority and majority shareholders would be more pronounced leading to less transparent markets. In countries where corruption is dominant, controlling managers' might have greater

regards the effects of corruption should be interpreted with caution. There is evidence arguing that aggregate indexes such as the Corruption Perception Index lack precision as it presents the perception of corruption of a specific group of people (Knack and Manning 2000; Van de Walle 2006; Brewer et al. 2007) and thus, could lead to misinterpretation or meaningless results.

Regarding the interaction terms, the positive coefficient of CONT_CORR×NUMANA (see Model (2) in Panel A), indicates that the number of analysts following a firm increases accuracy in advanced countries where the control for corruption is present. The greater number of analysts would lead to a greater information disclosure, enhancing forecast accuracy. On the other hand, the interaction terms CONT_CORR×NUMANA in Models (4) and (6) suggest that in emerging and developing countries where governments control more for corruption, the number of analysts following a firm would lower forecast accuracy.

Overall, results in Tables 3 and 4 shed new light and reveal the complexities involved as we accept Hypothesis 1 for advanced and emerging countries, demonstrating that corruption undermines analysts' forecast accuracy, but for developing economies there is no significant relationship. We also find that when corruption is present in advanced countries, greater analysts' coverage undermines forecast accuracy. On the other hand, analysts' coverage enhances forecast accuracy in emerging and developing countries where corruption exists. Our results in Table 4 also propose that in advanced countries where the control for corruption is promoted, the greater number of analysts following firms can improve accuracy. Apparently, the findings of this analysis suggest that this is

incentives to engage in earnings manipulation providing further support for the *"income-smoothing hypothesis"* in developing countries. Unfortunately, data availability issues restrict our choice of variables, recommending a new area for future research.

an important area for future research. Given the complexities, we shall proceed with a further analysis where firm-level evidence of financial reporting manipulation would be introduced.

Table 4: Dynamic panel analysis results for advanced, emerging and developing countries using Control for Corruption Index as a corruption measure.

	Panel A: Advanced countries		Panel B: Emerging countries		Panel C: Developing countries	
VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
L.ACCURACY	0.009***	0.008***	0.088***	0.157***	0.407	0.168
	(0.002)	(0.001)	(0.005)	(0.002)	(0.439)	(0.553)
NUMANA	-0.013	-0.235***	-0.005	-0.037***	-0.039***	-0.154**
	(0.015)	(0.022)	(0.012)	(0.015)	(0.016)	(0.065)
DISP	-0.033**	-0.019**	-0.119***	-0.055***	-3.519***	-3.316***
	(0.019)	(0.011)	(0.001)	(0.001)	(0.463)	(0.440)
ROE	0.003***	0.002***	0.0016	0.008	0.001	0.001**
	(0.001)	(0.000)	(0.001)	(0.006)	(0.001)	(0.001)
LOSS	-0.119***	-0.126***	-2.426***	-0.374***	-0.301***	-0.287***
	(0.011)	(0.008)	(0.310)	(0.108)	(0.063)	(0.083)
GDP	-0.035**	-0.049***	0.190	-0.145	0.561	0.353
	(0.018)	(0.014)	(0.209)	(0.112)	(0.374)	(0.408)
CONT_CORR	0.018***	0.085***	0.549***	1.279***	-0.955***	-0.638**
	(0.006)	(0.017)	(0.210)	(0.225)	(0.174)	(0.314)
CONT_CORR×NUMANA		0.139***		-0.073**		-0.206*
		(0.017)		(0.028)		(0.105)
Constant	1.023*	1.354***	-5.332	4.490	-11.937	-6.101
	(0.539)	(0.406)	(6.047)	(3.267)	(9.229)	(9.977)
Firm effects	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES
Industry effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES
Observations	65,752	65,752	12,997	12,997	228	228
Number of firms	10,482	10,482	3,003	3,003	80	80
Hansen-pvalue	0.150	0.0732	0.713	0.103	0.791	0.799
AR(2)-pvalue	0.944	0.939	0.291	0.236	0.280	0.174

Note: The table reports the dynamic panel regression results for advanced, emerging and developing countries using the Control for Corruption Index as a corruption measure. The two-step system GMM (Arellano and Bover 1995) is used with robust standard errors. We consider as exogenous country, year and industry variables and as endogenous the lagged value of analysts' accuracy and firm-specific variables. AR(2) stands for the p-value of the second order residual autocorrelation test. Hansen test stands for the p-value of Hansen's J diagnostic test for instrument validity. The dependent variable is the ACCURACY which presents the analysts' earnings forecast accuracy and is measured as the absolute value of the difference between mean earnings forecast and actual earnings for a year multiplied with minus one and scaled with the stock price of the firm in the previous year, L.ACCURACY is the lagged value of analysts'

accuracy, CONT_CORR is the Control for Corruption Index as obtained from the World Bank. CONT_CORR×NUMANA is the interaction term between Control for Corruption Index and the number of analysts' following the firm. NUMANA is the number of analysts following each firm during each year, DISP presents analysts forecast desperation calculated as the standard deviation of analysts' forecasts divided by the total assets, ROE is the return on assets, LOSS is a dummy variable that takes the value one if the firm reports losses and zero otherwise, while GDP is the natural logarithm of the Gross Domestic Product for each country. Regression estimations account for firm-specific effects while year, country and industry effects are also included in all specifications but not reported. ***, ** and * indicate 1%, 5% and 10% significance levels respectively.

4.4.3. Earnings manipulation, corruption and analysts' forecast accuracy

In this section we examine whether corruption would make more pronounced the impact of firms' engagement in earnings manipulation practices on analysts' accuracy by estimating the following equation:

$$ACCURACY_{i,t} = a_0 + a_1 ACCURACY_{i,t-1} + a_2 CORRUPTION \times DA_{i,t} + a_3 CORRUPTION_{j,t} + a_4 DA_{i,t} + a_5 NUMANA_{i,t} + a_6 DISP_{i,t} + a_7 ROE_{i,t} + a_8 LOSS_{i,t} + a_9 GDP_{j,t} + firm\ effects + year\ effects + country\ effects + industry\ effects + \varepsilon_{i,t} \quad (5)$$

where *t* indexes the year and *i* the firm. The new variable introduced in this model is the $DA_{i,t}$ which stands for the level of discretionary accruals used by firm *i* during year *t*. The interaction term $CORRUPTION \times DA_{i,t}$ presents the interaction between corruption and the discretionary accruals.

Estimation results of equation (5) are presented in Tables 5. Models (1) and (2) show results for advanced countries, Models (3) and (4) for emerging and Models (5) and (6)

refer to developing countries. The Corruption Perception Index continues to assert a significantly negative effect on accuracy for advanced and emerging countries as reported in Model (1) and Model (3). Similarly, the effect of Control for Corruption Index is positive and significant at 5% level in Model (2) and Model (4), suggesting that when we account for earnings manipulation, control for corruption maintains its positive impact on accuracy. Both the individual impact of DA and that of the interaction between corruption and discretionary accruals (thereafter CPI×DA) are insignificant in Model (1).

Interestingly, the coefficient of DA is negative and significant at 1% level for emerging countries (see Models 3 and 4). Our findings imply that firms' engagement in earnings manipulation practices undermines analysts' accuracy. What is more interesting is that the interaction term CPI×DA is significantly negative at 1% level in Model (3). Thus, our findings conform to Hypothesis 2 according to which corruption exacerbates the impact of earnings manipulation on analysts' forecast accuracy for firms in emerging countries. These results could be compared with prior research (Kimbro 2002; Riahi-Belkaoui 2004; Wu 2005; Riahi-Belkaoui and Al Najjar 2006; Malageño et al. 2010) which finds that countries with a lower quality of financial reporting exhibit a higher level of perceived corruption. Moreover, the interaction term between the control for corruption and discretionary accruals (thereafter CONT_CORR×DA) in Model (4) is positive and significant at 5% level indicating that in emerging countries greater control of corruption curbs the negative effect of earnings manipulation on accuracy. This result shows that firms' engagement in earnings manipulation would increase the incentives for stronger control of corruption leading to higher accuracy for analysts.

Results in Model (5) in Table 5 report a positive coefficient for the CPI, suggesting that corruption would enhance analysts' forecast accuracy for firms in developing countries. This result is in agreement with the *'grease the wheel'* and/or the *'income-smoothing'*

hypotheses. Regarding the impact of discretionary accruals, DA exerts a negative impact on accuracy implying that firms' involvement in earnings manipulation undermines accuracy. The interaction term CPI×DA carries a negative sign and is significant at 1% level indicating that corruption in parallel with earnings manipulation has a negative impact on accuracy. The positive and significant at 1% level coefficient of the interaction term between the control for corruption and discretionary accruals (CONT_CORR×DA) in Model (6) is in line with Hypothesis 2 according to which corruption enhances the effect of earnings manipulation on forecast accuracy.

Our findings presented in Table 5 suggest that, although firms' engagement in earnings manipulation does not exert a significant impact on forecast accuracy in advanced countries, eliminating the use of discretionary accruals can directly increase analysts' accuracy in emerging and developing countries. Furthermore, the interaction analysis shows that when corruption and earnings manipulation coexist in emerging and developing countries, the former augments the impact of the latter on analysts' accuracy.

Table 5: Dynamic panel analysis results for advanced, emerging and developing countries for the impact of earnings manipulation.

	Panel A: Advanced countries		Panel B: Emerging countries		Panel C: Developing countries	
VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
L. ACCURACY	0.090***	0.111***	0.959***	0.960***	0.585*	0.536*
	(0.025)	(0.030)	(0.001)	(0.001)	(0.313)	(0.316)
NUMANA	0.008**	0.004	-0.002***	-0.002**	-0.008**	-0.010*
	(0.003)	(0.005)	(0.001)	(0.001)	(0.003)	(0.005)
DISP	-0.005***	-0.004***	-0.035***	-0.033***	-0.273	-0.508**
	(0.001)	(0.001)	(0.000)	(0.007)	(0.218)	(0.206)
ROE	0.005***	0.005***	0.021***	0.012*	-0.039***	-0.026*
	(0.001)	(0.001)	(0.006)	(0.007)	(0.013)	(0.014)
LOSS	-0.042***	-0.042***	-0.130***	-0.126***	-0.027*	-0.028*
	(0.011)	(0.013)	(0.013)	(0.012)	(0.015)	(0.016)
GDP	0.001	-0.001	-0.028*	-0.035**	-0.012	0.153
	(0.004)	(0.004)	(0.016)	(0.014)	(0.174)	(0.108)
DA	-0.054	-0.041	-0.343***	-0.017***	-0.631**	-0.377***
	(0.047)	(0.067)	(0.060)	(0.006)	(0.312)	(0.039)
CPI	-0.002***		-0.006***		0.019**	
	(0.000)		(0.001)		(0.009)	
CPI×DA	-0.007		-0.007***		-0.023***	
	(0.006)		(0.001)		(0.007)	
CONT_CORR		0.014**		0.038**		-0.061
		(0.006)		(0.015)		(0.130)
CONT_CORR×DA		0.010		0.034**		0.383***
		(0.041)		(0.015)		(0.139)
Constant	-0.172	-0.030	0.636	0.994***	1.216	-3.829
	(0.133)	(0.124)	(0.428)	(0.386)	(4.499)	(2.580)
Firm effects	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES
Industry effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES
Observations	49,658	49,658	6,921	6,921	136	136
Number of firms	9,135	9,135	1,943	1,943	50	50
Hansen-pvalue	0.147	0.495	0.210	0.232	0.798	0.798
AR(2)-pvalue	0.173	0.115	0.103	0.123	0.365	0.332

Note: The table reports the dynamic panel regression results for advanced, emerging and developing countries using the discretionary accruals as a proxy for firms' engagement in earnings manipulation practices. The two-step system GMM (Arellano and Bover, 1995) is used with robust standard errors. We consider as exogenous country, year and industry variables and as endogenous the lagged value of analysts' accuracy and firm-specific variables. AR(2) stands for the p-value of the second order residual autocorrelation test. Hansen test stands for the p-value of Hansen's J diagnostic test for instrument validity. The dependent variable is the ACCURACY which presents the analysts' earnings forecast accuracy and is measured as the absolute value of the difference between mean earnings forecast and actual earnings for a year multiplied with minus one and scaled with the stock price of the firm in the previous year, L.ACCURACY is the lagged value of analysts' accuracy, CPI is the Corruption Perception Index obtain from the Transparency International Organisation, DA stands for the use of discretionary accruals, CPI×DA presents the interaction term between Corruption Perception Index and discretionary accruals, CONT_CORR×DA presents the interaction term between Control for Corruption Index and discretionary accruals, NUMANA is the number of analysts following each firm for each year, DISP presents analysts forecast desperation calculated as the standard deviation of analysts' forecasts divided by the total assets,

ROE is the return on assets, LOSS is a dummy variable that takes the value one if s firm reports losses and zero otherwise, while GDP is the natural logarithm of the Gross Domestic Product for each country. Regression estimations account for firm-specific effects while year, country and industry effects are also included in all specifications but not reported. ***, ** and * indicate 1%, 5% and 10% significance levels respectively.

4.4.4. Country freedom, corruption and analysts' forecast accuracy

We examine the interaction of country freedom and corruption for the relationship between the latter and analysts' accuracy by estimating the following equation:

$$ACCURACY_{i,t} = a_0 + a_1 ACCURACY_{i,t-1} + a_2 CORRUPTION \times FREEDOM_{j,t} + a_3 CORRUPTION_{j,t} + a_4 FREEDOM_{j,t} + a_5 NUMANA_{i,t} + a_6 DISP_{i,t} + a_7 ROE_{i,t} + a_8 LOSS_{i,t} + a_9 GDP_{j,t} + firm\ effects + year\ effects + country\ effects + industry\ effects + \varepsilon_{i,t} \quad (6)$$

where *t* indexes the fiscal year and *i* the firm. $CORRUPTION \times FREEDOM_{j,t}$ presents the interaction between corruption and the degree of freedom for country *j* in year *t*. In our analysis, we use four indexes as proxies of country freedom. These are the overall index of freedom (WF thereafter), the political rights (PR thereafter), the civil liberties (CL thereafter) and the press freedom index (PFI thereafter).

Estimated results for equation (6) are presented in Table 6. Panels A and B of Table 6 report results for the group of advanced, emerging and developing countries using the CPI and CONT_CORR indexes respectively. Results show that corruption is a significant determinant of accuracy after controlling for different proxies of country freedom. In

Model (1) of Table 6, the impact of WF on accuracy as well as the interaction term between WF and Corruption Perception Index (thereafter CPI×WF) are positive. These results imply that in advanced countries where corruption exists the greater freedom would improve accuracy, conforming to Hypothesis 3. The interaction terms between Corruption Perception Index and Political Rights (thereafter CPI×PR) and between Corruption Perception Index and Press Freedom Index (thereafter CPI×PFI) in Model (1) are negative and significant at 10% and 1% level respectively. Our findings suggest that stronger political rights and greater freedom of the press would impair accuracy in advanced countries with corruption present. There is some evidence suggesting that in countries where corruption is present, press freedom would serve opportunistic behaviours by mimicking the voice of the underlying powerful vested interests and enhancing rent-seeking activities (Mullainathan and Shleifer 2005).

Next, we turn to the emerging countries. Model (2) in Table 6 reports positive coefficients for both the individual impact of WF and the interaction term CPI×WF at 1% level, in line with Hypothesis 3. The interaction term CPI×CL in Model (2) shows that in emerging countries where corruption is present, stronger civil liberties deteriorate analysts' accuracy. This finding could be compared with those obtained from Montimola and Jackman (2002) and Sung (2004) who demonstrate that democratic practices might increase corruption.

What is interesting is that greater freedom harms analysts' accuracy for firms in developing countries as reported by the negative and at 1% level significant coefficient of WF variable in Model (3). It might be the case that in countries with weak institutional settings, greater freedom enhances the incentives for corrupted practices reducing analysts' forecast accuracy. Furthermore, Model (3) reports a negative coefficient for the

interaction term CPI×WF at 1% significance level suggesting that the greater country freedom vitiates forecast accuracy in developing countries when corruption is present.

In Model (3) the effect of the interaction term CPI×CL carries a negative sign, indicating that civil liberties impair forecast accuracy in developing countries where corruption exists. On the other hand, the interaction terms CPI×PR and CPI×PFI have positive coefficients and are significant at 5% and 1% level respectively, showing that stronger political rights and freedom of the press when coexist with corruption improve analysts' accuracy in developing countries. The positive coefficient of CPI×PR for developing countries is in line with Montimola and Jackman (2002) and Sung (2004) who state that stronger political rights would curb corruption. Our findings reveal the complexities regarding the interaction between corruption and country freedom for the group of developing countries. Therefore, an imperative goal for future research in this area could be the investigation of these relationships paying attention to the measurement of corruption and freedom indicators. Also, other corporate governance factors in developing countries, such as the ownership-control structure, could shed further light on the above complexities.

Regarding the effect of control for corruption on accuracy, Models (4) and (5) in Table 6 report negative and significant at 5% and 1% level coefficients respectively for the interaction term between country freedom and control for corruption (CONT_CORR×WF thereafter). These findings suggest that a greater degree of freedom undermines analysts' accuracy in advanced and emerging countries where control for corruption is stronger. Greater freedom might reduce the incentives for control of corruption inducing degraded practices through the process of further liberalization (Cohen 1995; Mullainathan and Shleifer 2005) and this, in turn, renders the detection of corruption more difficult (Williams and Beare 1999).

Table 6: Dynamic panel analysis results for the impact of country freedom on analysts' forecast accuracy for advanced, emerging and developing countries.

	Panel A: Perception of corruption			Panel B: Control for corruption		
	Advanced	Emerging	Developing	Advanced	Emerging	Developing
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
L.ACCURACY	0.001	0.141***	0.882	0.005***	0.129***	0.652
	(0.001)	(0.011)	(0.891)	(0.001)	(0.004)	(0.734)
NUMANA	-0.034	-0.221***	-0.030**	-0.011	-0.026**	-0.024**
	(0.025)	(0.080)	(0.014)	(0.010)	(0.011)	(0.012)
DISP	-0.001**	-0.062***	-4.116***	-0.092**	-0.118***	-3.909***
	(0.000)	(0.002)	(0.408)	(0.040)	(0.001)	(0.431)
ROE	0.037***	-0.022	0.011	0.037***	0.006	0.005
	(0.006)	(0.031)	(0.015)	(0.003)	(0.010)	(0.012)
LOSS	-0.227***	-2.234***	-0.070	-0.074***	-0.830***	0.010
	(0.029)	(0.503)	(0.123)	(0.007)	(0.216)	(0.093)
GDP	0.006	0.102	1.083	-0.056	0.142	0.960
	(0.006)	(0.753)	(0.799)	(0.043)	(0.162)	(0.700)
CPI	-0.266**	-1.319***	2.785***			
	(0.121)	(0.354)	(1.011)			
CPI×WF	0.190*	0.494***	-0.425***			
	(0.103)	(0.041)	(0.137)			
CPI×PR	-0.023*	0.017	0.071**			
	(0.013)	(0.013)	(0.032)			
CPI×CL	0.004	-0.150***	-0.100**			
	(0.005)	(0.023)	(0.042)			
CPI×PFI	-0.020***	-0.161	0.676***			
	(0.007)	(0.104)	(0.247)			
CONT_CORR				1.671*	1.727	-3.321***
				(1.003)	(1.840)	(1.198)
CONT_CORR×WF				-2.246**	-1.030***	5.773***
				(0.918)	(0.362)	(1.918)
CONT_CORR×PR				0.271***	-0.717***	-0.990*
				(0.088)	(0.246)	(0.590)
CONT_CORR×CL				0.004	1.262***	0.405
				(0.044)	(0.211)	(0.605)
CONT_CORR×PFI				-0.315***	-0.221	-7.158***
				(0.094)	(0.616)	(2.568)
WF	14.665*	15.986***	-12.485***	4.009**	0.790***	4.424
	(7.941)	(1.018)	(4.461)	(1.594)	(0.252)	(2.718)
PR	-1.345*	0.838	2.312**	-0.166*	-0.320*	-0.604*
	(0.809)	(0.559)	(1.049)	(0.092)	(0.182)	(0.358)
CL	0.297	-6.611***	-3.417***	-0.078	-1.268***	0.524
	(0.372)	(0.773)	(1.217)	(0.070)	(0.210)	(0.559)
PFI	-1.577***	-3.170	19.364**	0.447***	2.500***	-5.269**
	(0.583)	(3.534)	(7.771)	(0.142)	(0.502)	(2.214)
Constant	-20.582**	-39.879	54.013	-1.410	-1.760	-45.799*
	(9.147)	(26.328)	(33.330)	(1.989)	(5.135)	(24.256)
Firm effects	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES
Industry effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES
Observations	65,752	12,997	228	65,752	12,997	228
Number of firms	10,482	3,003	80	10,482	3,003	80
Hansen-pvalue	0.577	0.324	0.799	0.0731	0.160	0.780
AR(2)-pvalue	0.820	0.190	0.310	0.917	0.251	0.0587

Note: The table reports the dynamic panel regression results for advanced, emerging and developing countries using the World Freedom Index, Political Rights, Civil Liberties and Press Freedom index as

proxies of country freedom. The two-step system GMM (Arellano and Bover 1995) is used with robust standard errors. We consider as exogenous country, year and industry variables and as endogenous the lagged value of analysts' accuracy and firm-specific variables. AR(2) stands for the p-value of the second order residual autocorrelation test. Hansen test stands for the p-value of Hansen's J diagnostic test for instrument validity. The dependent variable is the ACCURACY which presents analysts' earnings forecast accuracy and is measured as the absolute value of the difference between mean earnings forecast and actual earnings for a year multiplied with minus one and scaled with the stock price of the firm in the previous year, L.ACCURACY is the lagged value of analysts' accuracy, WF stands for the freedom index obtained from the Freedom House organization, PR presents the political rights of a country with higher values indicating greater freedom in political system, CL stands for the civil liberties of a country and higher values indicate greater civil liberties . PFI stands for the Freedom of the Press Index obtained from Freedom House, CPI is the Corruption Perception Index obtain from the Transparency International Organisation, CONT_CORR is the Control for Corruption Index as obtained from the World Bank, CPI×WF is the interaction term between CPI and WF, CPI×PR and CPI×CL are the interaction terms between CPI-PR and CPI-CL respectively while CPI×PFI stands for the interaction term between CPI and PFI. CONT_CORR×WF is the interaction terms between CONT_CORR and WF, CONT_CORR×PR and CONT_CORR×CL present the interaction between CONT_CORR-PR and CONT_CORR-CL respectively while CONT_CORR×PFI stands for the interaction term between CONT_CORR and PFI. NUMANA is the number of analysts following each firm during each year, ROE is the return on assets, DISP presents analysts forecast desperation calculated as the standard deviation of analysts' forecasts divided by the total assets, LOSS is a dummy variable that takes the value one if a firms report losses and zero otherwise, while GDP is the is the natural logarithm of the Gross Domestic Product for each country. Regression estimations account for firm-specific effects while year, country and industry effects are also included in all specifications but not reported. ***, ** and * indicate 1%, 5% and 10% significance levels respectively.

The interaction term between Control for Corruption Index and Political Rights (CONT_CORR×PR thereafter) in Model (4) carries a positive and significant coefficient, implying that in advanced countries where the control for corruption and stronger political rights coexist, the latter increases forecast accuracy. However, for the same countries, the interaction term between Control for Corruption Index and Press Freedom Index (CONT_CORR×PFI thereafter) is negative and significant at 1% level as presented in Model (4). This result implies that freedom of the press in parallel with control for corruption might reduce the incentives for control of corruption and this, in turn, reduces analysts' accuracy.

Next, Model (5) reports negative coefficient for the interaction term CONT_CORR×PR at 1% significance level, suggesting that stronger political rights lower accuracy in emerging economies that control for corruption. The positive and significant at 1% level coefficient for the interaction term between Control for Corruption Index and Civil

Liberties (thereafter CONT_CORR×CL) in Model (5) suggests that stronger civil liberties in combination with control for corruption enhance analysts' accuracy in emerging countries. Finally, the interaction term CONT_CORR×WF is positive and significant in developing economies (see Model (6) in Table 6), whereas the interaction between CONT_CORR×PR is negative albeit weak indicating that stronger political rights would reduce accuracy with control of corruption present.

The impact of different proxies of country freedom varies across advanced, emerging and developing countries revealing the complexities associated with the level of country development. Overall, estimated results provide evidence in favour of Hypothesis 3 according to which country freedom could ease the adverse effect of corruption on forecast accuracy.

4.5. Conclusion

Using a unique global sample for 71 counties, our results demonstrate a strong impact of corruption on analysts' accuracy. The sign and magnitude of the relationship vary across advanced, emerging and developing countries. Results show that corruption undermines earnings forecast accuracy for firms in advanced and emerging countries, while for firms located in developing countries corruption might enhance analysts' accuracy. We also show that the engagement of firms in earnings manipulation deteriorates accuracy in emerging and developing countries when corruption is present, though earnings manipulation might increase the incentives for control of corruption and thus, would improve analysts' accuracy. Furthermore, our study suggests that greater country freedom improves analysts' accuracy with some variability in developing countries.

Our results show that the presence of corruption necessitates greater effort, in terms of resources, in analysts' earnings forecasts. Additionally, firms' engagement in earnings manipulation is an indicator that a further vigilance is warranted. Governance is also of importance. When it comes to policy implications, therefore, we show that further investing in controlling for corruption, enhancing regulatory framework to improve the accounting information disclosure and supporting democratization would improve analysts' accuracy.

Chapter 5: Conclusion

This thesis provides a comprehensive analysis of the determinants of analysts' earnings forecasts. We examine the impact of the CEO compensation, analyst-specific characteristics, earnings management and country governability on analysts' earnings forecasts. We put particular emphasis on the impact of corruption on analysts' forecast accuracy by opting for a global sample. It has been well documented that earnings forecasts issued by financial analysts play an important role in capital markets mitigating information asymmetries between firms and investors (Loh and Mian 2006; Hall and Tacon 2010). On this ground, the contribution of this thesis could be of importance to financial analysts, investors and regulators as well.

The contribution of this thesis starts by employing forecast errors issued by individual analysts, rather than the consensus forecasts over 20 years in Chapter 2. From a methodological point of view, this thesis extends prior literature that uses consensus forecasts (Kanagaretnam et al. 2012) and corrects for aggregation bias in analysts' forecasts that could emerge from consensus forecast. We further extend the analysis beyond the impact of the CEO stock options on analysts' forecasts to cover also other forms of compensation. This thesis shows that CEO compensation such as restricted stock holdings and stock ownership could correct analysts' optimism reducing their forecast errors. Conversely, CEO cash bonus, sensitivity to changes in firm's equity value and in-the-money options could enhance analysts' optimism. Furthermore, since prior research argues that CEO option grants increase the likelihood for financial misreporting, we consider the effect of earnings management on analysts' forecasts and investigate whether this effect varies with CEO compensation. This thesis shows that earnings management increases analysts' forecast errors and that proxies of CEO compensation, such as CEO sensitivity to changes in firm's value, restricted stock holdings and stock ownership can

mitigate this effect. On the other hand, CEOs who enjoy high cash bonus can augment the above relationship. We also assume that analysts' forecasts are not the outcome of a process in a vacuum. To this end, this thesis suggests that the interaction between analysts' characteristics and CEO compensation is of high importance. To address this issue, the interaction terms between analysts' characteristics and CEO compensation variables have been employed. Estimation results indeed provide evidence for channels of interaction between CEOs and analysts with analysts' experience being the leading indicator that corrects optimism for firms where CEOs enjoy high compensation, cash bonus, are sensitive to changes in firm's value and have greater stock ownership. Multiple forecasting horizons have also been employed, reporting a stronger impact of CEO compensation on analysts' forecasts for the current year forecasts.

This thesis further provides evidence of significant interaction effects between CEO compensation and earnings management on analysts' forecasts. These interactions would mitigate the impact of CEO compensation on the forecast errors. The impacts of the Global Statement Regulation and Dodd-Frank Act on analysts' accuracy have also been examined. Estimation results show that although these regulations can reduce analysts' optimism, they do not affect the relationship between forecasts errors and analysts' characteristics/CEO compensation in the same way. Variability exists both across firms with different CEO compensation and across analysts' characteristics.

These findings could be of high interest to several groups. In particular, they could be of interest when designing compensation packages for the executives. Additionally, these findings could provide investors with valuable information when it comes to the reliability of analysts' earnings forecasts. Investors take into account analysts' forecasts when they decide on their portfolio allocation. Thus, our findings could facilitate investors' ability to assess the accuracy of analysts' earnings forecasts. This study also

provides new evidence to broker houses that employ financial analysts. We show that experienced analysts issue more optimistic earnings forecasts and thus, brokers might consider a threshold in the number of years that an analyst could follow a firm. In this way, the networking channel between analysts and firms might be mitigated. Furthermore, since forecast frequency corrects analysts' optimism, brokers should introduce a minimum number of forecasts by each analyst for each firm during the forecast period. Moreover, given the evidence that the impact of CEO compensation on analysts' forecasts varies with analysts' characteristics, brokers could enhance the forecasts of analysts' that they employ in several ways. First, by assigning relatively more experienced analysts to firms where CEOs have higher compensation. Second, reducing the forecast frequency for analysts' following firms where CEOs enjoy higher compensation and cash bonus. Finally, brokers can reduce analysts' optimism by increasing the forecast frequency for firms where CEOs are more sensitive to changes in firm's value and hold substantially higher amount of restricted stocks.

The main contribution of Chapter 3 lies on investigating the effect of governance on analysts' earnings forecast accuracy. This chapter extends the limited research on the relation between governability and analysts' accuracy for a sample of 911 firms in the Standard and Poor's EXECUCOMP database for the period 2000 – 2014. Chapter 3 also investigates the impact of corporate governance duality, as well as, their cross interaction with country governability on analysts' accuracy. Furthermore, this chapter takes into account firms' engagement in earnings management by examining the impact of abnormal accruals on analysts' forecasts. Our evidence reports that governance variables such as government effectiveness and quality of government regulations positively affect analysts' accuracy. CEO incentives such as CEO option holdings, on the other hand, assert a negative impact on accuracy. Our results further provide evidence for a positive

association between CEO power and analysts' accuracy, whilst there exists evidence of a cross-term relationship between the government effectiveness and the latter. In this chapter (Chapter 3), we report a significant negative impact of discretionary accruals on analysts' accuracy, suggesting that analysts' forecast accuracy reduces as firms engage in earnings manipulation. Panel VAR modeling enriches previous findings as it sheds new light regarding the underlying causality of the main covariates of earnings forecasting accuracy, whilst also tackling issues related to endogeneity. Given that analysts' earnings forecasts are a crucial source of information, the present analysis is of value for policymakers, investors, and academics as they clearly indicate that analysts' earnings forecast accuracy could benefit from a strong and effective governance.

Moving to Chapter 4, the contribution of this thesis is significant not only to the financial analysts' literature but also for the earnings management and corruption literature. This thesis contributes to the growing literature on analysts' forecast accuracy in several ways. First, unlike previous research (Hope 2003; Leuz et al. 2003; Hope and Kang 2005; Bhat et al. 2006; Han et al. 2010; Sáenz González and García-Meca 2014) that uses an indicator of the legal enforcement, this study sheds light on the direct relationship between corruption and analysts' accuracy.[59] Second, from a data collection point of view, this thesis opts for a unique global cross-country sample of 71 counties over the period 2000 - 2014. There are methodological advantages of employing a global sample, as it provides appropriate variability across many countries. As corruption varies from country to country, and thereby, its impact on analysts' forecasts could also vary, it is appropriate to assemble a global sample. To fully reveal the link between corruption and analysts' accuracy, we take into account the heterogeneity across countries without loss of the

[59] According to this strand of literature, the legal enforcement depends on the level of corruption, so that greater corruption can result in a weaker legal enforcement and a poor quality of financial reporting, leading to higher forecasts errors.

variability in the underlying data generating process by classifying countries into advanced, emerging and developing based on IMF World Economic Outlook. Moreover, this thesis contributes to the earnings management literature by examining whether the effect of earnings manipulation on analysts' forecasts varies with the level of corruption. To the best of our knowledge, this is the first study that considers the interaction between discretionary accruals and corruption at a global level. Finally, this thesis shows whether the degree of country freedom and anti-corruption institutional arrangements, interact with corruption and affect analysts' accuracy.

A glimpse in our results reveals that corruption negatively affects analysts' accuracy across the world, with some variability though. Analysts' forecast accuracy appears higher for firms located in less corrupt advanced and emerging countries, whereas for firms located in developing countries, results show that corruption could enhance analysts' accuracy. Further, we find that earnings manipulation can exacerbate analysts' accuracy for firms in emerging and developing countries with corruption present. Additionally, a plethora of complexities involved in the relationship between corruption and analysts' forecasts have been revealed in this study. Our results suggest that country freedom in parallel with corruption would improve forecast accuracy. This thesis shows that the presence of corruption necessitates greater effort, in terms of resources, in analysts' earnings forecasts. Additionally, firms' engagement in earnings manipulation is an indicator that further vigilance is warranted. When it comes to policy implications, therefore, we show that further investing in controlling for corruption, enhancing regulatory framework to improve the accounting information disclosure and supporting democratization would improve analysts' accuracy.

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