



# Does corporate governance affect financial analysts' stock recommendations, target prices accuracy and earnings forecast characteristics? An empirical investigation of US companies

Ahmed Bouteska<sup>1</sup> · Mehdi Mili<sup>2</sup>

Received: 15 October 2020 / Accepted: 18 September 2021 / Published online: 13 September 2022  
© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2022

## Abstract

This paper investigates how corporate governance quality affects the analyst's stock recommendations, forecast efficiency and target price accuracy on New York Stock Exchange. In particular, as corporate governance is often uncertain and ambiguous to investors, expert financial advisors may use transparent corporate governance information to set their recommendations and improve the level of accuracy of their earnings forecasts. According to agency and signaling theories, good governance mechanisms aim to mitigate agency conflicts and boost corporate transparency. Thus, we argue that they can serve as mediators during the forecasting process and we expect a strong significant relationship between the effectiveness of corporate governance mechanisms and analyst activity. Five hypotheses are tested with a large sample of 154 US market firms over a 17-year period (2004–2020). Our empirical findings point out some special features of US stock markets. We find evidence that analysts tend to issue favorable recommendations, more accurate, less dispersed and more optimistic earnings forecasts for most well-governed firms. Furthermore, we show that higher-quality governance transparency is an important determinant of financial analysts' behavior in the USA. The results also indicate that higher-quality governance appears valuable with financial analysts during pre- and post-crisis period, while it is not generally detected in COVID-19 times. However, we report the weakness of analysts' outputs–governance quality for small firms. Thus, our findings cast doubts over the corporate governance-based analyst practices of US small and unaffiliated firms. The main implication of

---

✉ Ahmed Bouteska  
ahmedcbouteska@gmail.com

Mehdi Mili  
milimehdi@gmail.com

<sup>1</sup> Faculty of Economics and Management of Tunis, Tunis El Manar University, Tunis, Tunisia

<sup>2</sup> Department of Economics and Finance, College of Business Administration, University of Bahrain, Zallaq, Bahrain

these findings is to improve understanding of how investors' behavioral characteristics affect the transmission mechanism of information in money market and capital market prices. This paper has important implications for the decision making of financial analysts and investors by requesting firms to significantly improve their information environments in the good and bad times. It also offers insights into how firms establishing good corporate governance mechanisms can help the analysts to predict future stock prices.

**Keywords** Financial analysts · Corporate governance · Stock recommendations · Target prices accuracy · Forecast characteristics · Global financial crisis · COVID-19 · US stock market

**JEL Classification** G14 · G17 · G32 · G34 · M41

## 1 Introduction

The behavior of financial analysts had been the main focus of financial researchers in financial and economic theories. The sharp rise in demand of information enhances their role in the functioning of financial markets. In fact, financial analysts gather and assess the available information and use several statistical models to forecast firm's future earnings, covering Price/Earnings to Growth (PEG Ratio) and residual income. These outputs are key information that help investors to set their investment or speculation strategies. Economic research has classified financial analysts' outputs into three different types, namely earnings forecasts, target prices and stock recommendations. It is obvious that forecasts are of great importance and linked with each other since earnings and target prices are related to value and recommendations reflect analysts' opinions of value relative to current stock prices. But, they may not be necessarily consistent with each other. A recommendation-forecast pair consistency, defined as an ex ante signal, reflects the informativeness of analyst research regarding firm valuation model and forecasts quality (Bradshaw et al 2012).

Financial analysts are likely to price firms' governance, since they act as information intermediaries in the financial market, and thus, it would be interesting to develop an understanding whether governance quality is reflected in the content of forecasts reports and how financial analysts' practices affect capital market efficiency in terms of corporate governance. Good corporate governance mechanisms support influences positively the degree of alignment of interests between managers and shareholders (Jensen and Meckling 1976). Specifically, strong governance activities enhance the process of information, and thus, well-governed firms tend to have less risk management policies and structures, higher future potential and higher returns for customers (Shleifer and Vishny 1997). Additionally, agency theory let us define corporate governance mechanisms as a mediator in the information process which analysts use, the signaling theory helps us also to better understand the relationship (see Wiseman et al. 2012; Lin & Tai 2013; Keay 2017; Vargas-Hernández & Cruz 2018). Corporate governance mechanisms act as a credible signal for companies' quality and analysts pay

great attention considering them as criteria of investment choice (Nurwati et al. 2010). Hence, companies' transparency in addition to information quality is improved in a good informational environment where there is no chance to manipulate accounting figures in financial statements or audit reports. Yu (2008) claims that such environment requires the setting of strong corporate governance mechanisms allowing to reduce opportunistic behavior of executives.

A great number of papers that have examined this topic focused on industrialized countries such as the USA, UK (Taylor 2007; Autore et al. 2009; Bouteska 2018) and were recently expanded to cover some emerging markets (Byard et al. 2006; Almeida and Dalmácio 2015). The literature shows conflicting results. In fact, some works confirmed this relationship between analysts' forecasts and governance quality, while some others did not. The impact of the corporate governance mechanisms on the analysts' work should be analyzed deeply, especially in some developed institutional contexts, such as in USA. Indeed, the corporate governance model in the USA is marked by ownership concentration, family control and the weak protection of outside investors. In such a strong context, the impact of corporate governance mechanisms on analysts' outputs should be more easily detected. We expect that higher-quality corporate governance positively influences the analyst of the firm. Further, there are few studies on the impact of the 2008 financial crisis on corporate governance and financial analysts. The economic meltdown from the COVID-19 epidemic is yet being evaluated. Hence, very limited work was found exploring the influence of the recent global pandemic COVID-19 on the above-mentioned relationship. This study, however, differs from other research by, first, evaluating the impact of various governance and firm characteristics on financial analyst performance of US corporates before, during, and after the 2008 crisis and during COVID-19 crisis using several analyst outputs. It also evaluated the relationship between corporate governance and analyst activity using a recent dataset as the current widespread pandemic is unfortunate but unique and offers a rare opportunity to assess governance response and performance of analysts in corporates. Our study investigates the relationship between analysts' forecasts and governance quality using a sample of US companies and a database of recommendations and earnings forecasts provided by individual analysts. We examine whether corporate governance quality matters for financial analysts when performing their forecasting in the US market. Accordingly, the objective of this paper is to extend the investigation of these studies by analyzing empirically the impact of firm governance quality on analysts' forecasts accuracy regarding stock recommendations, target price, coverage, optimism and dispersion in the USA for a large sample of 154 listed firms covering the 2004–2020 period for which the disclosure of analysts' forecasts is available. We also divide our sample in four different periods: pre- and post-crisis periods and pandemic period, thus can check how our results are sensitive to the characteristics of each period. Also, is there any difference in the quality corporate governance impact on analyst during each period. In carrying out the analysis in this paper, we aim to provide insights about whether analysts put corporate governance quality into consideration during their forecasting process in the US market during the good and bad times. As robustness checks, we attempt to run the analysis for sample splits based on firm size and type of ownership.

This paper has two main contributions to the existing literature. First, no previous studies have tested the association between analysts' forecasts and corporate governance by examining the effect of the strength of firms' government mechanisms on three dependent variables stocks' recommendations, analysts' forecasts characteristics and target price accuracy. Prior studies on the determinants of the stocks' recommendations and analysts' forecasts and characteristics are not conclusive (Bradshaw 2004; Bradshaw et al. 2013). Factors on analyst forecasting skills were examined, including the number of reports published by the analyst (Bonini et al. 2010), the collective reputation of analysts (Bonini et al. 2010) and past forecast accuracy (Bradshaw et al. 2013). Several variables were also used, namely firm leverage, liquidity, size, risk and stock price volatility (Bonini et al. 2010; Demirakos et al. 2010; Kerl 2011). The above studies neglect the effect of a fundamental determinant of analyst activity, namely corporate governance. In this study, CEO traits and compensation, ownership structure, board attributes and board diversity among others, were used as independent variables in light of the assumption that analyst outputs and governance attributes were closely related. Our finding is that governance mechanisms are major determinants of analyst's work. Our study offers new evidence of the relationship between analysts and corporate governance within the context of the US perspective. Second, it has been suggested that the COVID-19 crisis brought home in an emphatic way the centrality of risk management in strategic planning and corporate governance (Kells 2020). The study will extend the existing knowledge on the relationship between corporate governance and financial analysts in periods of crisis. This paper is among the first empirical studies in the management realm that addresses the impact of 2008 crisis and COVID-19 on analyst products and corporate governance association with cross-section empirical data. So, we test this relationship for the full sample, in the bad and good times, i.e., a pre-crisis moment, a global financial crisis, a post-crisis period and a global pandemic COVID-19 and then separately for both financial and non-financial companies as well as both small-large and unaffiliated-bigger group affiliated companies to examine its specificities. The findings show that analysts usually provide accurate recommendations, less dispersed and more optimistic earnings forecasts for most well-governed firms. We find also that higher-quality governance appears valuable with financial analysts during pre- and post-crisis period, while it is not valuable during COVID pandemic period. However, we report the weakness of analysts' outputs-governance quality relationship among the smaller sample firms and non-affiliated firms. Results are of a practical interest since understanding the forecasts and governance quality link helps us better understand how analysts behave in different market situations and how recommendations, target prices and other outputs are set for different types of corporations existing in the USA and in a context characterized by extensive investor protection laws. The results should be useful also to CEOs, managers and other financial market participants as they will assess the accuracy of analysts forecasting depending on the quality of the firms' corporate governance mechanisms. Moreover, we attempt to address the endogeneity problem and more specifically the omitted variable bias. More specifically, we attempt to overcome the endogeneity bias by using the GMM estimator model and the control function approach.

The rest of the paper is structured as follows: In Sect. 2, we make a review of the literature related to analyst's stock recommendations, forecast characteristics and target price accuracy and formulate our hypotheses. Section 3 describes the way in which we have constructed our sample and presents several descriptive statistics of that. Section 4 discusses the empirical results, while Sect. 5 reports our robustness analysis. Finally, Sect. 6 concludes and outlines the implications of my study.

## 2 Theoretical background and hypothesis development

In this section, we first review the literature related to internal corporate governance on the one hand and analysts' stock recommendations, forecast characteristics and target prices forecast accuracy, on the other hand. We then induce hypotheses on how higher-quality governance is associated with more favorable, precise and less dispersed stock recommendations of analysts, as well as higher level of analysts forecast coverage and optimism.

Most previous studies found evidence that financial analysts formulate their recommendations based on financial characteristics of the firms. Notably, Clarke et al. (2006) document that bankruptcy leads analysts to review downwards their recommendations. Despite the development of financial theory related to corporate governance, very few studies have attempted to examine to which extent analysts take into account the quality of the firm's corporate governance when formulating their recommendations. This paper makes a major contribution to the literature by testing the effect of corporate governance systems on analyst recommendations in the USA.

The link between analysts' recommendations and corporate governance goes back to the researches of Bradshaw et al. (2006) and Malmendier and Shanthi kumar (2007), who find that affiliated market analysts provide upward-bias recommendations more than unaffiliated analysts. Lim (2001) and Ljungqvist et al. (2007) suggest that financial analysts pay attention particularly to forecast accuracy when providing recommendations. The behavior of analyst had been largely studied in the literature, and most of previous researches find evidence that analysts typically provide positive recommendations on firms that are potential clients. Accordingly, we deduce that analysts' incentives to bias is sensibly related to the strength of the firm's corporate governance.

According to Lin and Tai (2013), analysts' recommendations reliability is closely related to the quality of firm governance and firms should distinguish themselves from their peers through setting strong governance, particularly in a context which is in favor of agency problem and where shareholders rights seem to be weak and not well protected. The authors examine focus on Taiwan Stock Exchange and investigate 55,652 recommendations issued over the period 196–1999. They conclude that analysts' buy recommendations on firms with poorer corporate governance are less accurate. In addition, they show that a governance system not only reduces agency problems in the firm, but it significantly improves the quality of information issued by analysts.

Chiang (2005) argues that corporate transparency is significantly associated with favorable recommendations and forecasts accuracy, respectively. Maaloul et al. (2016), by using a content analysis of annual reports of a sample of 125 US non-financial

firms, show that the extent of disclosures about relational assets and the content of human assets disclosures are positively related to average analysts' consensus recommendations. This result suggests that financial analysts need different information about intangibles in their stock recommendations. Based on this discussion, my first hypothesis is:

**Hypothesis 1** There is a positive association between US firms with high corporate governance quality and favorable analysts' recommendations.

Secondly, we test the relationship between the quality of corporate governance and the target price accuracy. Bonini et al., (2010) argue that the target price forecasts is a fundamental information in analysts' research reports, as it provides a good estimate of the future stock return. Thus, it can be considered as an important decision tool for investors.

A review of the literature shows that few studies have looked at target price forecasts. Particularly, Kerl (2011) shows that target price accuracy depends on the specific features of the company as firm size and its reputation on the market. In this paper, we make contribution to the financial literature by testing whether the analyst's target prices are more accurate for well-governed target firms. We particularly, focus on the impact of Board size, CEO Duality and institutional ownership on analysts' target prices forecasts accuracy.

Bradshaw et al. (2013) question the relevance of the target price accuracy and argue that the forecasting of future value of the target is a non-controllable activity. Chiang and Chia (2005) investigate 225 Taiwanese high-tech companies during the 2000 to 2002 period to determine whether more corporate transparency leads to more accurate forecasts. The results reveal that when a company provides more information about financial transparency, the predictions' bias decreases and their accuracy increases. Bhat et al., (2006) examine when the market analysts use the disclosures related to corporate governance in their formulations of forecasts for profits and whether the accuracy of their predictions increases with such disclosures. The results show that the dimension of corporate governance transparency is positively and significantly correlated with the accuracy of analysts' forecasts.

The theoretical background of these studies is that financial information is a key decision tool for financial markets investors (Bushman and Smith 2001; Bushman et al. 2004a, b), and the accuracy of the target price is itself dependent on the quality of the information issued by the firm. This reasoning leads us to our second hypothesis:

**Hypothesis 2** There is a positive association between US firms with high corporate governance quality and analysts' target prices forecasts accuracy.

We next examine whether the analysts' coverage depends on the quality of the corporate governance. Most previous studies on analysts' coverage insist on the monitoring role of coverage and explore to which extent the information issued by financial analysts affects corporate governance. Only few studies had examined the direct effect of corporate governance on analysts' coverage. Healy and Palepu, (2001) and Bushman et al., (2004a, b) demonstrate that a higher level of analyst coverage improves the transparency of the company through a better quality of information.

Bushman et al. (2004a, b) examined corporate transparency by identifying three types of information mechanisms: corporate reporting, private information acquisition, and information dissemination. They note that the intensity of information disclosure

is a determining factor in the quality of the firm's reporting and that close following of financial analyst, institutional holdings, and insider trading activity can be measures of private information. On the other hand, Dyck et al. (2006) show that external analysts are the most likely to detect fraud in the company.

Ali et al. (2007) the intensity of issuing information is higher among family firms, and they are more targeted by analysts. Lang et al. (2004) find opposite results. They show that family firms are less covered by analysts because they have a greater risk of information manipulation. Similarly, Boubaker and Labégorre (2008) and Schmid (2013) find evidence that family firms do not attract major interest from analysts. To our knowledge, our research is the first to examine the impact of *high corporate governance quality of US firms on the likelihood of analyst coverage*. Based on these advances, our third hypothesis is:

**Hypothesis 3** There is a positive association between US firms with high corporate governance quality and the likelihood of analyst coverage.

In this paper, we examine also the interactions of corporate governance mechanisms that characterize the US economic environment with analysts' forecast bias of optimism. The majority of previous studies show evidence of an association between the quality of corporate governance and investor optimism. In our study, we admit that investor decisions in financial markets are based primarily on the opinions of analysts. Despite the role of analysts in financial markets, the level of optimism of analysts has not been sufficiently examined by the literature. Our study fills this gap and contributes to the literature by analyzing the impact of corporate governance on the level of optimism of analysts in the USA.

Many previous researches had shown that the veiled relationships between analyst, brokerage firm, and client firm contribute to analyst forecast bias. Some of them have provided evidence of earnings management behavior. Dechow et al. (2000) show that agent of managers of equity offerings analysts provide more optimistic growth forecasts, and the decrease in firm performance after the offer is often more significant in firms with higher growth forecasts. Nevertheless, Bradshaw et al. (2006, 2012) argue that analysts issue more optimistic forecasts for firms running external financial activities. The excess of optimism of analysts had been justified by the pressure that investment banks exert on the firm. They suggest that the ability of some analysts to provide accurate forecasts over time could simply reflect their persistent differences in forecast optimism.

Usually, managers disseminate bullish forecasts to reflect an overly optimistic image regarding firm's future earnings (Tinaikar 2012, p. 5). A good governance system in place can improve the quality of information issued by managers. For instance, Ajinkya et al.,(2005), Karamanou and Vafeas (2005) argue that higher concentration of the capital and higher percentage of independent board members reduce the bias in financial analyst forecasts in US and Canadian market.

Furthermore, Huang et al. (2012) illustrate that more insiders and more institutional shareholder improve the quality of earnings forecast in Taiwan.

In light of these empirical findings, we posit our fourth hypothesis:

**Hypothesis 4** There is a negative association between US firms with high corporate governance quality and the level of optimism of analysts' forecast consensus.

We lastly examine whether the analysts forecast dispersion is influenced by the quality of the corporate governance. Most previous researches find evidence of positive association between the quality of corporate governance and the predictability of earnings. But, no attempts had been proposed to investigate the relationship between the quality of the corporate governance of the firm and the level of dispersion of analysts' earnings forecast. This paper is the first to test this relationship for American firms.

The robustness of the governance system reduces agency conflicts in the firm between management and owners, which improve the transparency and the quality of the information issued by analysts. Such information improves investor decision making based on such information. Thus, management has no interest to manipulate information or to manage the firm earnings.

Most researches on the USA market had documented significant impact of corporate governance tools, such as ownership structure and board composition, on the accuracy of analyst forecast characteristics. In particular, Xu and Tang (2012) find that earnings' forecasts by financial analysts are usually more accurate for firms with weak internal control systems. Ali et al. (2007) argue that analysts issue more accurate forecasts on family firms. Gul et al. (2013) suggest that the degree of sex heterogeneity of the board of directors helps to improve the performance of forecasting of analysts in forecasting firms earnings. They show also that, during the forecasting period, corporate governance has significant effect on the smoothness of firms' earnings.

Prior research, such as Aboody et al. (2006) and Bartov et al. (2007), supports that management use the private information they dispose on the company to manipulate firm's earnings for their own interest. Barth et al. (1998) and Song et al. (2010) find that good corporate governance reduces information asymmetry between management and owners by improving the time of issuing information, which leads to higher relevance of firms' fair value. They deduce that good corporate governance system reduces the volatility of analysts' earnings forecast revisions.

Furthermore, Yu and Wang (2018) investigate the association between the behavior of financial analyst and the quality of firms' corporate governance. They find evidence that analysts' earnings forecast dispersion and revisions decrease in firms with good corporate governance rating. Therefore, our five hypothesis is:

**Hypothesis 5** There is a negative association between US firms with high corporate governance quality and the level of dispersion of analysts' earnings forecast.

## 2.1 Research design and data selection

We briefly describe my data sources and discuss in detail the construction of our aggregate measures for target price forecast accuracy, analyst' recommendations and governance quality. We then present my regression models and show summary descriptive statistics for the sample we use in our analyses.



## 2.2 Data selection

Various sources are used to compile this unbalanced panel dataset. We use the Thomson–Reuters Financial's Institutional Brokers' Estimate System (I/B/E/S) database to collect data on 154 US firms for the period 2004–2020. Financial firms such as banks, insurance, securities investment and real estate companies are not excluded from my main analysis. Our sample includes 154 NYSE-listed securities with a fiscal year-end of 31 December (2316 firm-year observations). Specifically, we obtain individual analyst stock recommendations from the I/B/E/S Detail file for the period 2004 to 2020. Analysts may have individual recommendation scales, but I/B/E/S standardizes recommendations as 1 (strong buy), 2 (buy), 3 (hold), 4 (sell) and 5 (strong sell). We define upgrades and downgrades using an analyst's current rating minus the prior rating by the same analyst. We collect the forecasting prices of financial analysts that are amendments to their own forecasts delivered over one week to six months earlier according to same specific US firms with a fiscal year period indicator equals one (FY1) from the I/B/E/S price target detail file during the years 2004 to 2020. The forecasts of financial analysts as well as earnings forecasts and actual earnings needed to compute analyst forecast dispersion, optimism, and data of analyst coverage for US firms were also obtained from I/B/E/S Detail History database. The daily stock prices, market capitalization and annual accounting and financial data are taken from Compustat North America database. We use a hand-collected database on corporate governance information, i.e., ownership structure, board of directors of almost all non-financial firms included in the NYSE between 2004 and 2020. Our regressions will be conducted on the whole sample period and on four subsamples: pre- and post-financial crisis, the financial crisis period and the COVID pandemic period. The different periods have been set as follows: pre-crisis, from 2004 to 2007, financial crisis ranges between 2008 and 2010, post-crisis between 2011 and 2018, and COVID-19 period,<sup>1</sup> from 2019 to 2020.

## 2.3 Variables

In this section, we present all the variables to be used in our regressions.

### 2.3.1 Dependent variables

The main dependent variables of our research are the behavior of analysts and analyst recommendations, analyst's target price accuracy, analyst coverage, analyst optimism and analyst forecast accuracy.

Generally, Analyst Recommendation (RECOMM) is in the form of text ranging from strongly buy to strongly sell (Yu 2011). In the US context, financial analysts tend to rate companies with sell, hold and buy. To facilitate my analysis of the results, we follow Yu (2011)'s work in coding recommendations with a system of point rating and

<sup>1</sup> The date December 1, 2019, corresponds to the date when (COVID-19) spread in Hubei Province and then spread to 212 countries where the United States and European Union alongside Iran are the most affected.

we obtain recommendations variables coded as follows: (1) Sell, (2) Underperform, (3) Outperform, (4) Buy. Thus, a higher value is associated with a higher firm potential, and therefore, more favorable recommendation.

Target prices are explicit reflections of the value of the stock by financial analysts over a given time horizon, usually one year. Since actual market prices are visible, target prices clearly comprise analysts' opinions. This is how any revision of forecasting reflects the opportunity to benefit from adjustments through more accurate information. To assess the target price and its forecast accuracy, we consider the target price accuracy as our dependent variable. We follow the measure used by Gregoire and Marcet (2014), Bradshaw et al. (2012) and Bonini et al. (2010)<sup>2</sup> and the accuracy measure for a target price (TPE), referred to target price error will be given by:

$$\mathbf{TPE}_{i,t} = |\mathbf{TP}_{i,t} - \mathbf{PEF}_{i,t}| / \mathbf{PF}_{i,t}$$

where target price error (TPE) our main proxy is built as the absolute value of the difference between the target price TP of firm *i* at year *t*, and PEF the current stock price observable of firm *i* at the end of the forecast horizon year *t*, scaled by PF the stock price of firm *i* issued at the forecast date year *t*.

Target price error (TPE) reflects, intuitively, the investment error for a trading strategy. When the current price is above the target price, the trader has a loss of potential income because of not holding the stock during the forecast horizon. In addition, while holding the stock, an above target price from the current price results in pay-off differences. Therefore, varying above or below the current price is equal to the inaccuracy of target price (Bilinski et al., 2013).

To conduct a robustness checks, we alternatively measure the level of target price accuracy in a USA using another proxy suggested by Kerl (2011). A measure for the target price accuracy (ACCU) is hence written as:

$$\mathbf{TPA}_{i,t} = 1 - \left| \frac{\mathbf{PEF}_{i,t}}{\mathbf{TP}_{i,t}} - 1 \right|$$

Our third explained variable of interest is a company's analyst coverage. To measure analyst coverage (COVERAGE), we follow He and Tian (2013) and, for each fiscal year and firm, calculate the average of the 12 monthly number of earnings forecasts obtained from the I/B/E/S summary file. Arithmetic mean of 12 monthly number of earnings forecasts a firm receives over the fiscal year: From I/B/E/S.

The proxy for Analyst Optimism (OPTIMISM) in consensus company earnings forecasts is similar to measures used in previous researches (Lang and Lundholm 1996; Mikhail et al. 1997; Hong and Kubik 2003; Duru and Reeb 2002; Chen et al. 2015). It is computed as the absolute value of the difference between the consensus

<sup>2</sup> The authors consider other distinct measures that seize target price accuracy. They use Metend, which is a dummy variable that is equal to one if the stock price at the end of the 6-month forecast horizon is equal to the target price and zero otherwise and Metin which is a dummy variable that is equal to one if the target price is met during the 6-month forecast horizon and zero otherwise. Both measures are less demanding since their purpose is limited to target price achievement (below or above), but do not assess the magnitude of error. In our current study, we do not use those measures because they always take the value of zero.

earnings forecast FEPS of firm  $i$  at year  $t$ , and the actual earnings EPS of firm  $i$  at the end of the forecast horizon year  $t$ , deflated by year-end  $t$  stock price PF of firm  $i$ . In a formula form, (OPTIMISM) is written as:

$$\text{OPTIMISM}_{i,t} = |\text{FEPS}_{i,t} - \text{EPS}_{i,t}| / \text{PF}_{i,t}$$

Barron et al. (1998) show that consensus among analysts' forecasts is also associated with higher-quality corporate governance. We measure Analyst Forecast Dispersion (DISPERSION), as the standard deviation of analysts' earnings forecasts deflated by the stock price at the release of the consensus forecast. Standard deviation STD (FEPS) is calculated using the standard deviation of the consensus EPS forecast of firm  $i$  at the end of the forecast horizon year  $t$ . PF is the price of a firm  $i$ 's stock prior to the earnings release. This variable is measured using the following formula:

$$\text{DISPERSION}_{i,t} = \text{STD}(\text{FEPS}_{i,t}) / \text{PF}_{i,t}$$

### 2.3.2 Independent variables

We follow the extant literature to identify and define the relevant governance quality variables that affect the analysts' forecasts for a country, in particular USA. We include a set of corporate governance mechanisms related to firm's ownership structure, board structure, and compensation and CEO incentives. The first-component ownership structure comprises ownership concentration, institutional ownership and managerial ownership. These variables are measured as follows:

(i) Ownership concentration (TOP) is the percentage of total shares held by the top shareholders; we use the Herfindahl index to measure it. It is the sum of squares of the percentages of shares held by the first, second and third largest shareholders. According to Shleifer and Vishny (1986), capital concentration is a conducive factor for shareholder effective control. In fact, it is obvious that in a dispersed ownership, any shareholder has the interest to commit resources to control management since he will bear the cost of investment, whereas other shareholders will benefit from such action. Nevertheless, when capital is concentrated, the shareholder is strongly encouraged to control management. Moreover, according to Bradshaw et al. (2012), ownership concentration may act as a proxy of information transparency. Thus, capital concentration may adversely affect analysts' forecasts, since it promotes private communication channels between shareholders and management at the expense of outsiders, e.g., analysts who have access only to public disclosure.

(ii) Institutional ownership (INST) is included as the percentage of firms' shares held by the institutional investors (Byard et al. 2006). Institutional investors can influence corporate governance policies. In fact, they may be an effective corporate governance mechanism who can monitor the management; managers are thereby more likely to disclose a high quality of information, which enhances the accuracy of analysts' forecasts.

(iii) Managerial ownership (MANAG) is measured as the percentage of shares held by all managers within the firm including the part of the CEO of the firm (Chief Executive Operator) (Byard et al. 2006). According to Jensen and Meckling (1976), making managers acting as an owner of the firm push them to concentrate more on firms' performance, which is in line with the incentive-alignment hypothesis. However, reaching a high level of managerial ownership may harm shareholders' interests following the entrenchment hypothesis proposed by Shleifer and Vishny (1997). Consequently, management reduces information disclosure and analysts' forecasts accuracy may suffer. Thus, the expected relation between managerial ownership and the quality of analysts' forecasts cannot be constructed.

For example, Byard et al. (2006) and Chou and Hou (2010) find that board structure is measured by board size, board independence, board leadership and board composition. These variables are measured as follows:

(iv) Board size (BSIZE) is measured by the natural logarithm of the total number of directors on the board. Small boards are more effective than large boards. Large boards increase managers' opportunities to extract private profits and reduce the monitoring costs (Boone et al. 2007). We expect board size to be negatively correlated with the quality of analysts' forecasts.

(v) Board independence (BIND) is calculated as the percentage of independent non-executive directors on board (Byard et al. 2006). Core et al. (1999) suggest that the less the board is independent, the poorer monitoring is. Thus, we expect a positive relationship between board independence (BIND) and the quality of analysts' forecasts in terms of favorable recommendations and accurate target prices.

(vi) CEO-chairman duality (DUAL) is used to measure board leadership. It is a dichotomous (dummy) variable which takes the value 1 if the CEO additionally occupies the position of chairman of the board, and 0 otherwise (Byard et al. 2006). Duality strengthens the CEO power, and thus, the CEO has a strong position, which increases his management discretion. In short, the presence of CEO duality is an indicator of weak corporate governance, and therefore, we expect that the CEO duality affects negatively the quality of analysts' forecasts.

(vii) Gender diversity (Gender) is also included as the percentage of woman directors on board. It is widely proved that the quality of analysts' forecasts depends highly on the quality of accounting figures, the quality of disclosures (Hope 2003c) and whether boards exert effective monitoring, which in turn are, respectively, tied to gender diversity. In other terms, gender diverse boards are less opportunistic, less likely to manage the financial and accounting statements, and are supposed to be good monitors (Adams and Ferreira 2007). Hence, gender diversity is likely to be positively related to forecasts accuracy.

In contrast to previous literature such as Byard et al. (2006) and Yu (2011), we attempt to include CEO incentives because it was suggested that CEO package serves as a complement for other governance mechanisms (Robin and Hou, 2010) and due to its ability to ensure the alignment of managers and shareholders' interests.

(viii) CEO compensation (COMP) is added as the natural logarithm of total compensation and is constituted only from cash-based compensation. According to Jensen and Meckling (1976), CEO package plan can help mitigating agency problem and is rewarded to be a good way to align shareholders and managers' interests. However,

CEO package plan is not always tied to firm performance. Thus, managers, due to the inappropriateness of their compensation, are induced to serve their interests, manipulate earnings and take risky investment projects. As a result, the accuracy of analysts' forecasts decreases.

This paper uses number of firm-specific characteristics, such as firm size, book-to-market ratio and stock return volatility as control variables<sup>3</sup> that influence stock recommendations and target price accuracy and control omitted relevant variables. These variables are presented as follows:

(IX) Firm size (FSIZE) is the logarithm of the fiscal year-end market value of equity (Byard et al. 2006). Firm size is highly tied to information asymmetry and uncertainty. By this, forecasting is easier for bigger stocks than for firms with smaller capitalization. Thus, we hypothesize a positive relation between firm size and accuracy measures.

(X) Market-to-book ratio (M/B) (also called the Price-to-book ratio—P/B ratio): we calculate the scale of firm's market value to book value of equity (Kerl 2011). (M/B) is used to differentiate between value and growth stocks. It is suggested in previous studies that high growth firms are likely to be very volatile and therefore are not likely to reach the target price (Kerl 2011). Additionally, market-to-book ratio serves as a proxy for risk. According to Fama and French (1992), stocks with low (M/B) earn higher returns than those with high (M/B). Consequently, whether analysts take the predictive ability of (M/B) ratio, we would expect that stocks with low (M/B) receive more favorable recommendations. Otherwise, Jegadeesh et al. (2004) argue that analysts are more likely to follow firms with high (M/B), referred as glamor stocks, in the goal that they may enjoy faster growth and profitability in the future.

(XI) Volatility (VOLAT) is stock price volatility measured as the standard deviation of firm stock return during the 12-month period (fiscal year) preceding the target price forecast. Some studies suggest that earnings' volatility has an impact on earnings predictability (Byard et al. 2006). Therefore, analogously to earnings' forecasts accuracy, stock price volatility may explain target price accuracy. By the way, Kerl (2011)<sup>4</sup> hypothesizes that because higher stock volatility is a proxy for higher risk, analysts seem to be unable to accurately forecast firm stock price.

## 2.4 Models' structure

To investigate how corporate governance mechanisms influence analyst stock recommendations, the ordered probit regression from McKelvey and Zavoina (1975) is employed because the dependent variable is classified into ordinal scores ranging from less to more favorable recommendation. This methodology performs the maximum likelihood explanation (MLE) to estimate the cutoff and the coefficients related to the

<sup>3</sup> Clement (1999) suggests that the forecasting experience and the number of followed firms which is a proxy of portfolio complexity to be among analyst determinants. He argues that well experienced analysts and who follow few industries are more likely to issue accurate forecasts.

<sup>4</sup> Kerl (2011) affirms that stock price volatility is positively associated with target price accuracy. He also explains his finding by the fact that compared to low volatile stocks, higher volatile stocks are more likely to achieve the target price during or at the end of the forecast horizon.

independent variables. The aim of the present paper is to avoid the endogeneity problem, in particular the omitted variable bias,<sup>5</sup> and at the same time providing unbiased and proper results. To do so, we will opt for the control function approach, basically named the Two-Stage Residual Inclusion (2SRI) approach to fulfill our estimation. Terza (2017) implement and discuss in depth the (2SRI) method for a very broad class of nonlinear models, and his findings seem to be helpful and useful. According to Terza (2017), the two-stage residual inclusion estimation (2SRI) outperforms the two-stage least squares particularly when dealing with limited dependent variable. This method seems to provide inconsistent marginal effects, and therefore, it is not recommended for logit or probit models, whereas the (2SRI) approach is suitable for nonlinear regression. Analogously to what just explained, we present our control function approach as follows: first, we carry out regression for the endogenous variable as function of its instruments, and then, the obtained residuals are included as an added repressors in the ordered probit, which showed our main model.<sup>6</sup> Following this procedure, I assume the existence of a continuous variable  $S_i$  that determines the score of stock recommendation in order to set an ordered probit model, as in Equation:

$$\text{Stock Recommendation Score} \begin{cases} 4 & \text{if } C_3 \leq S_i \\ 3 & \text{if } C_2 \leq S_i < C_3 \\ 2 & \text{if } C_1 \leq S_i < C_2 \\ 1 & \text{if } S_i \leq C_1 \end{cases}$$

where  $C_1, C_2$ , and  $C_3$  represent the cutoff points, and  $S_i$  is the latent variable at time  $i$  that depends on the explanatory variables in terms of corporate governance mechanisms.

We estimate the following regression models to examine how corporate governance affects analyst activities:

$$\begin{aligned} RECOMM_{i,t} = & \beta_0 + \beta_1 TOP_{i,t-1} + \beta_2 INST_{i,t-1} + \beta_3 MANAG_{i,t-1} \\ & + \beta_4 BSIZE_{i,t-1} + \beta_5 BIND_{i,t-1} + \beta_6 DUAL_{i,t-1} \\ & + \beta_7 GENDER_{i,t-1} + \beta_8 COMP_{i,t-1} + \beta_9 FSIZE_{i,t} \\ & + \beta_{10} M/B_{i,t} + \beta_{11} VOLAT_{i,t} + \beta_{12} RESID_{i,t} + F_{i,t} + \varepsilon_i \quad (1) \end{aligned}$$

$$\begin{aligned} TPE_{i,t} = & \beta_0 + \beta_1 TOP_{i,t-1} + \beta_2 INST_{i,t-1} + \beta_3 MANAG_{i,t-1} + \beta_4 BSIZE_{i,t-1} \\ & + \beta_5 BIND_{i,t-1} + \beta_6 DUAL_{i,t-1} + \beta_7 GENDER_{i,t-1} + \beta_8 COMP_{i,t-1} \\ & + \beta_9 FSIZE_{i,t} + \beta_{10} M/B_{i,t} + \beta_{11} VOLAT_{i,t} + \beta_{12} TPE_{i,t-1} + \varepsilon_i \quad (2) \end{aligned}$$

<sup>5</sup> Following Abdul Wahab et al. (2015)'s reasoning about that updating corporate governance mechanisms with each change in operating environment is not an easy matter and naturally takes time. In addition, Larcker et al. (2007) prove the difficulty of setting an optimal corporate structure and maintaining it at all times. In the light of this argument, simultaneous bias may be left away. Hence, we aim to control for omitted variable bias since we are aware of the absence of other relevant variable e.g. audit quality and audit independence.

<sup>6</sup> See Terza (2017) and Basu et al. (2018).

$$\begin{aligned}
COVERAGE_{i,t} = & \beta_0 + \beta_1 TOP_{i,t-1} + \beta_2 INST_{i,t-1} + \beta_3 MANAG_{i,t-1} \\
& + \beta_4 BSIZE_{i,t-1} + \beta_5 BIND_{i,t-1} + \beta_6 DUAL_{i,t-1} \\
& + \beta_7 GENDER_{i,t-1} + \beta_8 COMP_{i,t-1} + \beta_9 FSIZE_{i,t} \\
& + \beta_{10} M/B_{i,t} + \beta_{11} VOLAT_{i,t} + \beta_{12} COVERAGE_{i,t-1} + \varepsilon_i
\end{aligned}
\tag{3}$$

$$\begin{aligned}
OPTIMISM_{i,t} = & \beta_0 + \beta_1 TOP_{i,t-1} + \beta_2 INST_{i,t-1} + \beta_3 MANAG_{i,t-1} \\
& + \beta_4 BSIZE_{i,t-1} + \beta_5 BIND_{i,t-1} + \beta_6 DUAL_{i,t-1} \\
& + \beta_7 GENDER_{i,t-1} + \beta_8 COMP_{i,t-1} + \beta_9 FSIZE_{i,t} \\
& + \beta_{10} M/B_{i,t} + \beta_{11} VOLAT_{i,t} + \beta_{12} OPTIMISM_{i,t-1} + \varepsilon_i
\end{aligned}
\tag{4}$$

$$\begin{aligned}
DISPERSION_{i,t} = & \beta_0 + \beta_1 TOP_{i,t-1} + \beta_2 INST_{i,t-1} + \beta_3 MANAG_{i,t-1} \\
& + \beta_4 BSIZE_{i,t-1} + \beta_5 BIND_{i,t-1} + \beta_6 DUAL_{i,t-1} \\
& + \beta_7 GENDER_{i,t-1} + \beta_8 COMP_{i,t-1} + \beta_9 FSIZE_{i,t} \\
& + \beta_{10} M/B_{i,t} + \beta_{11} VOLAT_{i,t} + \beta_{12} DISPERSION_{i,t-1} + \varepsilon_i
\end{aligned}
\tag{5}$$

In my empirical section, we also present alternative model specification to predict the impact of a set of corporate mechanisms on target price accuracy, target price error, analyst coverage, optimism and dispersion such as the GMM panel estimator that controls for the endogeneity problem and provides proper estimates (Wintoki et al. 2012).

### 3 Empirical results

#### 3.1 Descriptive analyses

Table 1, Panel A, presents descriptive statistics for target price accuracy, analyst coverage, analyst forecast optimism, and analyst forecast dispersion in the USA between the years 2004 and 2020. The target price error (TPE)<sup>7</sup> has a mean and median of 0.511 and 0.394 percent, respectively. It ranges from 0.0337 to 1.142. For comparison, this feature is quite different in Marcet and Gregoire (2014) Chilean firm sample; the mean (median) target price error was 0.103 percent (0.08 percent); however, it seems to be similar in Bradshaw et al. (2012) international sample. They find an average of 0.475

<sup>7</sup> Outliers for the TPE variable are detected and because they can mislead our results, we remove TPE observations that are greater than 95th percentile and below 5th percentile. Note that we started with 99th and 1th percentile and each time we eliminate 1th percentile in both sides until the deletion of all extreme observations.

**Table 1** Summary statistics

Variable	N	Mean	Median	StdDev	Min	Max	Skew	Kurt
<i>Panel A: Dependent variables</i>								
TPE	2158	.511	.394	.3891	.0337	1.142	.595	2.01
ACCU	2149	.704	.765	.3159	− 1.024	1.0483	− 2.702	12.93
COVERAGE	2173	6.129	5.054	4.408	2.52	15.09	.767	3.214
OPTIMISM	2176	.021	.000	.094	− .0038	.0094	3.602	18.71
DISPERSION	2176	.080	.040	.111	.0057	.658	1.157	5.248
<i>Panel B: Interest variables</i>								
TOP	2142	0.315	.192	0.188	0.033	0.832	.887	2.92
INST	2183	0.2671	0	0.284	0	0.927	.899	2.44
MANAG	2316	0.136	0	0.21	0	0.538	1.46	3.31
BSIZE	2238	9.97	12	2.66	4	17	− .297	2.198
BIND	2179	0.5773	.5942	0.5688	0.4465	0.8959	.450	2.106
GENDER	2241	0.178	0	0.204	0	0.49	1.44	5.03
COMP	2015	819.35	652.459	539.67	539.616	993.748	5.453	39.32
<i>Panel C: Control variables</i>								
FSIZE	2303	769.62	405.040	838.19	135.78	1390.223	2.462	10.76
M/B	2266	2.33	1.748	1.99	0.306	14.357	3.134	15.85
VOLAT	2204	0.0165	.018	0.0059	0.0085	0.0560	2.02	11.758

This table presents the descriptive statistics for the all variables used in the study except dummy variables. Panel A reports descriptive statistics on variables referring to the target price accuracy (TPE, ACCU), analyst coverage (COVERAGE), analyst optimism (OPTIMISM) and analyst dispersion (DISPERSION). Panel B presents the descriptive statistics for the governance indicators (CG mechanisms) used in the study. Panel C reports the descriptive statistics for the firm-level control variables used in this study

in Sweden, 0.454 in Switzerland, 0.478 in the UK, 0.495 in the USA, 0.506 in Austria and 0.474 in Australia, respectively. The target price accuracy measure (ACCU) reaches the mean level of 0.704 percent, on average, in the US firms and ranges from − 1.0240 to 1.0483. This is approximately similar to Kerl (2011) results whose German firm sample has an average of 0.7364.

The sample firm receives a mean (median) of 6.123 (5.054) and average number of 12 monthly earnings forecasts (Coverage) in a year, with a minimum of two or more average analysts covering the firm. This result indicates that the number of analysts following a US firm was very high during a fiscal year. Hope (2003a, b, c) conducted a study on a sample of 20 countries and ranked France 7th with an average number of 22.4 analysts for a sample of 72 French firms. The Netherlands comes first with an average number of 29.5 analysts, followed by Germany with 28.8 analysts, Switzerland with 24.8, and Singapore, Spain, and Hong Kong with 23.4, 23.2, and 23.1, respectively. There is a small optimistic bias in analyst forecasts relative to actual EPS, with the mean bias being about 2.1 percent of the base share price. The



maximum and minimum recorded via this variable are, respectively, about 0.0094 and  $-0.0038$ . Such findings allow us to deduce that it will offer an interesting framework to isolate the governance determinants of analyst optimism. This also can contribute to the robustness of our optimism bias measure measured by the proportion of optimistic forecasts, which is in accordance with Brown (1997), Easterwood and Nutt (1999) and Duru and Reeb (2002). Regarding analyst forecast dispersion, it reveals that the mean (median) dispersion is 0.080 (0.040) and ranges from 0.0057 to 0.658 with a standard deviation of 0.111. This result is not surprising in a way that we expect USA to have less information asymmetry in comparison with other countries. Hence, it appears clear that the relatively lower level of dispersions in the forecast earnings during our sample period implies the effectiveness of US governance reforms in reducing information asymmetries among stock market participants. This is consistent with prior literature that, in countries with stronger investor protection, analyst forecast accuracy is higher (Hope 2003a, b, c) and analysts have more incentives to improve their forecasts (Barniv et al. 2005). All of these dependent variables possess a great deal of variability.

Table 1, Panel B, gives summary statistics of the governance variables. Ownership concentration (TOP) has a mean of 31.5% and a median of 19.2%. The average of institutional ownership is about 26.71%, which is considerably lower than the 66.64% reported by Byard et al. (2006) for 1279 firms selected from I/B/E/S. The weak presence of large institutional shareholders makes us doubt about the strength of firms' governance, since financial institutions are more demanding for information and answer to their inquiries. Nevertheless, the small presence of institutional investors can play a crucial role within companies since they exert more control over them. Similarly to Byard et al.'s, (2006) findings, managers have a small average value (13.6%) in the company's total ownership structure which may further moderate our results. CEO compensation is dispersed. It ranges from 539.616 thousand dollars to 993.748 thousand dollars. Additionally, we have women on US corporate boards, but their presence is low (a mean of 17.8%), confirming what was found in analyses made by ERNST & YOUNG (EY) and the key findings of 2018 Gender Diversity Index for the USA. The governance indicators reveal that the average size of board of directors is almost 10 for the US firms in my study. This feature indicates that boards in US firms are relatively large and can be inefficient in a sense that larger boards may generate communication and coordination problems when taking decisions. They can also be beneficial in a sense that larger boards exert effective control and avoid making extreme decisions. Byard et al. (2006) notice that board size is fairly uniform across 1279 firms and ranges from 8 to 11 with a median of 9 in an emerging market context. Further, Most boards of directors are fully independent. The average of independence is about 57.73% close to 66.67%; the percentage was reported by Byard et al. (2006) within an emerging market context. This suggests the importance of independence of board members for US market. Also, the rate of independent directors on the board is judged to be artificial because independent boards are only set to meet legal requirements and to calm down minorities. Table 1, Panel C, reports the summary statistics for the firm-specific characteristics. First, my sample is composed on small and large companies reflected by the high spread in the firm size (FSIZE). Second, the market to book ratio (M/B) indicates that these US firms are subject to high growth and more investment opportunities. Finally, stock price volatility (VOLAT) presents a high

**Table 2** Summary statistics for dummy and ordinal variables

Variable	Frequency	Percentage
<i>RECOMM</i>		
1-Sell	576	26.67%
2- Underperform	413	18.73%
3- Outperform	388	17.46%
4-Buy	790	37.14%
FIN	945	41.18%
DUAL	1241	56.84%

This table presents the descriptive statistics for dummy and ordinal dependent variables used in this study. The Statistics consist of frequencies and percentages. Recommendation (RECOMM) variable provides 4 scores ranging from 1 (Sell), 2 (Underperform), 3 (Outperform) to 4 (Buy). FIN is equal to 1 whether a firm belongs to financial sector, 0 otherwise and DUAL is taking the value 1 if CEO additionally occupies the position of chairman of board, 0 otherwise

spread, suggesting that our sample is a mixture of high and low volatile stocks. Based on the features above, we would mention that we are getting rid of a potential problem of sample selection bias.

Table 2 presents the descriptive statistics of dummy and ordinal variables (frequencies and percentages) for our sample. A similar finding to those of Michaely and Womack (2005) and Jegadeesh and Kim (2006) has been shown; US analysts are far more likely to rate a stock a "buy" than a "sell". Buy recommendations present 37.14% (790 observations), whereas sell recommendations present 26.67% (576 observations). Damodaran (2006) stipulates that equity research analysts look for undervalued firms rather than overvalued ones and this can be related firstly to difficulties and problems that analysts face in collecting information specifically for firms presenting sell recommendations and secondly to keep relations with managers or financial institutions that are involved with the firm in question. I have 945 firm-year observations from the financial sector representing about 41% of the full sample. Also, CEO duality is a common practice in US firms since it presents about 56%, and thus, I can assume that most companies are under the one-tier board system.

Table 3 presents summary statistics of the target price accuracy measure (ACCU) following analyst recommendation levels. Panel A describes statistics of the total recommendations. The mean and median of target price accuracy measure (ACCU) are 0.6655% and 0.7240%, respectively. The summary statistics in Panel B where the sample is divided according to recommendation levels are similar to those reported in Table 2. Strong Sell and Sell recommendations have a mean of about (0.5761% and 0.7481%, respectively), whereas the mean of Strong Buy and Buy recommendations are 0.6201 and 0.8016%, respectively. Hence, compared with the values in Strong sell and Sell recommendations, target price accuracy measure (ACCU) of Strong Buy and Buy recommendations is higher and appears to be more accurate. On the basis of evidence, I assume that analysts are not very great at predictions, but they do even better with positive forecasts.

**Table 3** Summary statistics for target price accuracy following analyst recommendation levels

	Mean	Median	Sd	N
<i>Panel A: Target price accuracy measure for all recommendations</i>				
All	.6655	.7240	.3008	2149
<i>Panel B: Target price accuracy measure based on recommendation levels</i>				
Strong Sell	.5761	.5890	.4126	570
Sell	.7481	.8422	.2894	411
Buy	.8016	.8168	.1252	383
Strong Buy	.6201	.6229	.2361	785

This table provides the descriptive statistics for target price accuracy measure. Panel A reports results (Mean, Median, standard deviation and number of observation) for all recommendations. Panel B presents the split of sample following recommendation levels (Sell, Reduce, Add and Buy)

### 3.2 Estimation procedure and discussion for the complete sample

In Table 4, we address the limitation by showing that multi-collinearity is not an issue in our analysis (the results of ordered probit regressions<sup>8</sup> where the dependent variable is RECOMM are presented in Table 4). We start by examining whether our models are globally significant and document an explanatory power of 56.77%, 59.20% and 66.69% for our full sample, financial and non-financial subsamples, respectively. The likelihood of getting favorable recommendation increases with institutional participation, especially within the financial sample. This finding joins the sense that US institutional investors are involved in control and are willing to help US firms by their expertise in many fields, and thus, this would improve firm performance. Another possible explanation may be presented in the sense that due to agency consideration, institutional investors avoid holding stocks of US firms surrounded by uncertainty and are more likely to prefer US firms with more transparent informational environments. Moreover, institutional investors seem to exercise actively their voting rights to monitor the US financial companies they cover in their prospective portfolios. This kind of companies is recommended by US financial analysts because they are guided by active institutional shareholders. Unsurprisingly, it can't be easy to observe such an important feature with non-financial sample because US analysts do not pay any attention to institutional participation to set their recommendations. Furthermore, the presence of women on the board boost analysts' recommendations because of the different points of view and experience they offer. This finding seems to be appropriate within the US context. In fact, the presence of women on board does necessarily mean that they are independent. I can admit that they may not have interpersonal relationships with other members or with managers. Then, gender diversity succeeds to improve firm performance and, by this, is seen as an effective governance mechanism within US companies. We find a positive and significant relationship between stock recommendations and CEO compensation in the financial companies group. Thus, analysts are

<sup>8</sup> We are using bootstrapping analysis method allowing random sampling to alleviate the small number of observations.

**Table 4** Results of ordered probit regressions

	Dependent variable: Recommendation scores		
	Full sample	Financial firms	Non-Financial firms
	(1)	(2)	(3)
TOP	12.53* [2.01]	- 7.847 [- 0.87]	15.58 [1.72]
INST	- 7.650** [- 2.43]	15.80** [2.20]	- 16.63 [- 1.02]
MANAG	- 11.266*** [- 3.73]	- 10.634 [- 0.67]	- 7.768 [- 1.47]
BFSIZE	- 3.584 [- 1.64]	- 7.411*** [- 3.55]	- 7.902** [- 2.21]
BIND	4.699 [1.19]	3.400 [0.99]	7.588 [1.64]
DUAL	- 0.981 [- 1.10]	- 9.835 [- 0.11]	0.437 [0.70]
GENDER	0.628*** [- 3.27]	8.630*** [3.68]	11.98*** [- 4.02]
COMP	0.372 [1.06]	1.071*** [3.22]	- 0.437 [- 1.80]
FSIZE	- 0.0523 [- 0.38]	- 0.615 [- 1.59]	- 0.321 [- 1.20]
M/B	- 1.028*** [- 3.97]	- 2.111*** [- 4.09]	- 0.255 [- 0.61]
VOLAT	- 51.32 [- 1.40]	- 3.748 [- 0.28]	- 82.63 [- 1.57]
RESID	2.921*** [2.84]	5.349*** [3.46]	2.057 [1.65]
Intercept cut1	- 10.606*	- 27.31	- 23.12
Intercept cut2	- 9.627*	- 26.27	- 21.02
Intercept cut3	- 8.630	- 24.88	- 20.93
Firm Dummy	Yes	Yes	Yes
N	1238	640	598

**Table 4** (continued)

	Dependent variable: Recommendation scores		
	Full sample	Financial firms	Non-Financial firms
	(1)	(2)	(3)
Log likelihood	- 191.47320	- 100.406205	- 86.704565
Pseudo R <sup>2</sup> (%)	56.77***	59.20***	66.69***

This table presents the results of ordered probit regressions on the effects of governance mechanisms on analysts' recommendations after controlling for endogeneity. In Column (1), we run the regressions on the full sample. In Column (2) (Column (3)), we exclude non-financial and financial firms from sample for higher governance quality in the USA. Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting stock recommendations. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations. Based on the Wilcoxon-rank test, we attempt to reestimate the model underlying the financial and non-financial subsamples separately

more likely to issue favorable recommendations when managers are highly rewarded. Even if previous studies find that the CEO package plan has insignificant effect on firm performance, managers from financial firms are less likely to extract rents since they are supposed to be more regulated. In terms of governance quality, this puts financial analysts in confidence with financial sector firms, which ultimately make them more attractive. Results in both financial and non-financial subsamples provide evidence that analysts seem being concerned about some ownership structure and board characteristics. The two subsamples<sup>9</sup> show that there is a negative and significant relationship between the board size of the company and its stock recommendation at 5 and 1% levels, respectively, suggesting that large board size increases the likelihood of getting unfavorable analyst recommendations. In other words, an increase of 1% in board size decreases (increases) the probability of getting buy (sell) recommendation by 0.92% (64%). As expected, these findings remain similar to those of Byard et al. (2006) and Lin et al. (2013) in an emerging markets context. This highlights the fact that smaller boards are more efficient and outperform larger ones. Also, it is clear that a smallest board size has better monitoring abilities in USA. Regarding firm-specific characteristics, the likelihood of getting favorable recommendations increases for stocks having low market-to-book ratio. This result consistent with Fama and French (1992) and Farooq (2017) shows that (M/B) has a predictive power of return and it is widely argued that it is highly related to future firm performance. That is to say, low market to book stocks, referred as value stocks, earn higher returns than those with high market to book ratio, referred as growth stocks.

<sup>9</sup> Marginal effects for the financial and non-financial sample.

Table 5 provides the empirical results of H2 and rest of the models with 2158 firm-year observations in US market. We find that the past target prices accuracy has significant positive influences on their current values, irrespective of models structure. Following the finance literature (Bilinski et al. 2013), we assume that the analysts who have issued previous accurate target price are more likely to provide accurate target price forecasts in the future and vice versa. By comparing the results of two main measures to capture analyst target price accuracy, we will focus only on robust variables. Concerning the governance variables, there is a negative and significant relation between ownership concentration (TOP) and target price accuracy (ACCU). In a context of concentrated ownership, majority shareholders are tempted to withhold or manipulate information in order to conceal their private profits. The access to information is then harder for financial intermediaries who will be less inclined to cover these firms (Boubaker and Labégorre 2008). So, it is important to mention, listed US firms show concentration shareholdings and such situation affects disclosure practices which, in return, weakens the quality of forecasts. Additionally, Table 5 reports that an increase of 1 point in institutional ownership (INST) increases the target price error (TPE) by 0.938, which seems contrary to finding in previous published literature that forecasts accuracy increases with institutional shareholding. However, the significant negative relationship may have two possible explanations. Firstly, institutional investors may be unmotivated to make an effective control on firm management due to their low participation within the company (Taylor 2007). We recall that institutional ownership in our sample presents a mean value of 26.71%. Secondly, information disclosure is not required by institutional investors, given they can have access to information thanks to their informal channels, and thus, are subject to superior information environment compared to outsiders. This argument supports that information asymmetry problems are strongly related to the decision to invest in USA, and hence, analysts cannot ensure the relevancy of firm disclosure. In the same vein, according to Mitra et al. (2007), there is a negative and significant relationship between institutional ownership and audit quality, since the increased scrutiny exercised by institutional investors is likely to discourage managers to deliver a high-quality audit. This may cause errors in the forecasts of financial analysts. CEO duality (DUAL) is positively and significantly related to target price error (TPE). CEO duality (DUAL) is a common practice within US firms and contributes, thus, to reduce the role of independent directors within boards. Also, the results show a negative and significant association between CEO compensation (COMP) and target price error (TPE). CEO compensation (COMP) appears to enhance the informational environment and by the way promotes the accuracy of analysts' target price forecasts. This is not a surprising result, given that talented executives of a US firm's management team are hired and highly rewarded to get out of bad economic situation when faced it. Thus, consistent with prior studies, our results appear to support the argument that cheap directors are ineffective contributors in the decision-making process and hence they underperform well-compensated ones. Let us discuss the results on the control variables. We find that firm size (FSIZE) is negatively associated with target price accuracy, consistent with Bradshaw and Brown (2006). It is more difficult to predict the prices of larger firms, perhaps because these firms are more complicated to analyze (Cohen and Lou 2012). Moreover, it is shown that stock return volatility (VOLAT) affects negatively

**Table 5** Results of dynamic panel data (GMM) estimation

	TPE	ACCU	COVERAGE	OPTIMISM	DISPERSION
	(1)	(2)	(3)	(4)	(5)
Constant	0.516 [1.53]	0.760*** [- 5.40]	0.412 [1.49]	- 0.656*** [- 5.30]	- 0.807*** [- 7.51]
TOP	0.933** [2.83]	- 0.856*** [- 3.01]	- 0.829*** [3.89]	- 0.652*** [- 4.06]	- 1.170** [- 2.89]
INST	0.938*** [5.31]	- 0.759*** [- 3.97]	0.834*** [5.22]	- 0.653*** [- 3.90]	- 0.669*** [- 3.32]
MANAG	0.548 [1.07]	- 0.399 [- 1.84]	0.454*** [3.95]	- 0.306*** [- 3.10]	- 1.122*** [- 3.63]
BSIZE	- 0.308 [- 1.60]	- 0.431*** [- 5.62]	0.204*** [3.16]	0.327*** [4.70]	0.274*** [3.41]
BIND	0.788*** [4.99]	0.363 [1.70]	0.696*** [5.12]	- 0.270** [2.15]	- 0.345** [- 2.39]
DUAL	0.276*** [3.97]	- 0.240** [- 2.55]	- 0.287*** [- 3.06]	0.252** [2.30]	0.858*** [4.01]
GENDER	1.0850** [2.12]	0.413** [2.25]	0.991** [2.36]	- 0.313*** [- 3.75]	- 0.526*** [- 3.82]
COMP	- 0.0479** [- 2.31]	0.320*** [5.54]	0.0373** [2.47]	- 0.216*** [- 5.86]	- 0.270** [- 2.50]
FSIZE	- 0.0914*** [5.17]	- 0.0336 [- 1.61]	0.0801*** [4.11]	- 0.0217 [- 1.50]	- 0.329*** [- 3.74]
M/B	- 0.00358 [- 1.15]	0.0852*** [3.72]	- 0.00346 [- 1.04]	0.0840*** [3.71]	0.975 [1.69]
VOLAT	- 12.260*** [- 3.50]	17.06*** [3.37]	- 11.105*** [- 3.35]	- 15.91*** [- 3.22]	13.974*** [4.08]
TPE	0.290*** [8.77]	0.348*** [8.54]	0.280*** [8.65]	0.339*** [8.44]	0.303*** [8.92]
N	2158	2149	2173	2176	2176
Number of Firms	154	154	154	154	154
Hansen Test	55.99	49.52	47.70	40.21	45.39
Pvalue	0.843	0.944	0.841	0.932	0.948

**Table 5** (continued)

	TPE (1)	ACCU (2)	COVERAGE (3)	OPTIMISM (4)	DISPERSION (5)
Arellano–Bond Test for AR(2)	0.960	0.260	0.950	0.267	0.281

This table presents the regression results of dynamic panel data using (GMM) (Dependent variables: Target price error (TPE) and Target price accuracy (ACCU), analyst coverage (COVERAGE), analyst optimism (OPTIMISM) and analyst dispersion (DISPERSION)). Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting target prices accuracy. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations

target price error (TPE), consistent with Kerl (2011) who admit that compared to low volatile stocks, higher volatile stocks are more susceptible to reach the target price during or by the end of the forecast horizon.

The results of regression in Model 3 provide evidence for the hypothesis H3. First of all, ownership concentration (TOP) variable is negative and significant, meaning that ownership concentration reduces the likelihood of analyst coverage (Frankel et al. 2006). This can be explained by the fact that strong insiders, e.g. families and founders, are more susceptible to give advantage to private information as well as inside monitoring. But, model 3 evidences that the increase in institutional ownership (INST), i.e., American and foreign ones, leads to an increase in analyst coverage. One possible explanation is that US institutional investors are always been considered as active participants within corporate by providing both external financing and internal monitoring. Aggarwal et al., (2011) and Antonczyk et al. (2014) demonstrate that there is a preference by US companies for bank financing based on relation, there is a need sometimes that these banks pay the financed companies in order to collect private information from them, and also the companies under best corporate governance practices from well-known countries in terms of strong protection for investor as the US, represent the ones where foreign institutional investors invest the most. Similarly, Managerial ownership (MANAG) do seem to positively and significantly influence analyst following which comply with the prior results that indicate that managers' participation in the capital has a positive impact in requesting the services of analysts (Morck et al. 1988; and McConnell and Servaes 1990). Secondly, Aste (1999) find that companies containing two-tier boards are usually composed of small entities, which include entrenched directors and strong insiders. Thus, we may think that board structure, a key corporate governance quality, can affect significantly analyst following. That is to say, firms fostering private information channels, inside monitoring and limited financial disclosure, will be disadvantage and not advised for the follow of analysts. The board size (BSIZE) is positively and significantly related to analysts' coverage at the 1% level. The result shows that analysts prefer to follow firms with a large board. According to previous literature on board size, Boone et al. (2007) conclude that board structure is determined by a firm's competitive environment and



managerial team. The board independence (BINDP) is strongly and positively correlated at the 1% level with analysts' coverage. Examining a sample of European IPOs, the study of Bertoni et al., (2014) proves that the most critical factor in their firm valuations is board independence, as the external members make the task easier to collect firm data by reducing the information asymmetry between insiders and outsiders, and so they have a positive effect on analysts following. The coefficient on duality of CEO (DUAL) is negatively and statistically significant. This suggests that if we separate the roles of CEO and chairman, we will be promoting in significant manner the analyst coverage. In this context, the previous literature is asking for the separation between CEO and chairman as they have different roles, and emphasizes about the board of directors' need to operate independently from CEO. Also, the mix of both roles represents a great concentration of power, which is badly seen, since the separation of roles can a reference to the board's independence (see Viénot 1995, 1999). Gender diversity (Gender) variable is positive and significant, consistent with the hypothesis that gender diversity on the board results in higher analyst coverage. Gender diversity serves as a signal of good corporate governance practices, which, in turn, is useful for analysts who follow the firms to judge the quality of financial information and issue more accurate forecasts. Over recent years the majority of firms in most industries in the USA have female directors and female non-executive directors (Rose 2007). In addition, proponents of board reform worldwide have argued that gender diversity improves board effectiveness and have therefore called for more female directors to be appointed to boards (Higgs 2003; Tyson 2003). Executive/Leadership compensation (COMP) is positively and significantly associated with analyst coverage. This evidence generally indicates high executive and leadership compensation in US reduces agency conflict and increases information transparency which in turn increases analyst following. Consistent with the argument put forth by Chung et al., (2015) that firms which pay higher executive compensation may also be subject to higher market scrutiny to increase disclosure in order to avoid investor adverse selection. To note, the control variable firm size (FSIZE) is discovered to be positive and significant relative to the analyst following. A plausible explanation of this finding may well reside in the fact that large firms usually aim at disclosing reliable and accurate information, likely to help reflect the company's economic reality, in a bid to maintain and safeguard an impressively positive image for financial analysts. Stock volatility (VOLAT) affects negatively analysts' choice to follow a firm. In more recent studies, Piotroski and Roulstone (2004) show evidence that stock volatility is negatively related to analyst coverage. Schutte and Unlu (2009) suggest also that analyst coverage reduces noise in stock prices. Thus, there is evidence that greater analyst coverage is likely to be related to more information availability about firms and consequently less uncertainty. In this context, we suggest that greater analyst coverage decreases information asymmetry and accelerates information incorporation into prices. Hence, stock volatility will be reduced.

The Model 4's empirical results approve the hypothesis H4. We can say that the US economic environment is characterized by good interaction among the corporate governance mechanisms that significantly influence the optimism of analyst. Firstly, our results document that the ownership structure variables present a negative effect on the optimism of analyst. For example, ownership concentration (TOP) is negatively

and significantly associated with analysts' optimism in forecasts and this is in line with the fact that ownership concentration is viewed as mechanism helping to resolve agency problems among investors and executives, while at the same time, improving the credibility and trust in the reports of analysts. Controlling the managers' decision and choices is imposed by ownership concentration, i.e., managers will be often not in relaxing state as they go through control and in this way ownership concentration may diminish optimism in analyst because it is the only source that pushes to install a highly effective system of control. The negative coefficient on institutional ownership (INST) confirms the role of institutional in the firm's policy of voluntary disclosure and in reducing earnings management, and notes that analyst forecasts are less optimism biased when institutional ownership is high. Institutional investors are susceptible to lower optimism in analyst forecasts when their interests are aligned with owners. Our results suggest that optimism decreases with increases in institutional ownership. We predict that the presence of institutional in the structure of ownership is seen as a reliability factor around the analysts' forecasts and such shareholders insure the credibility for managers' supervision, which diminishes all the types of intervention on analysts by their corporate employers. This finding corroborates Song and Zheng (2014)' study results, in which he shows that Chinese analyst behavior and independence are fairly influenced by the concentration of institutional shareholdings. The coefficient for the variable Managerial ownership (MANAG) is negative and significant at the 1% level of statistical significance, demonstrating that the rise in CEO's ownership leads to attenuate optimism of analysts within the future earnings forecasts. Jensen and Meckling (1976) find that managerial ownership can help to mitigate the agency costs by aligning the interests of managers and shareholders. With the increase of managerial ownership, managers would bear more of the economic consequences of their actions, such as squandering shareholders/corporate wealth. Also, when the interests of managers and shareholders are effectively aligned, managers are less likely to withhold their private information and engage in earnings and disclosure management. Nasir and Abdullah (2004) support this view by documenting that a high level of managerial ownership leads to improved voluntary disclosure in Malaysia. Second, board structure members may release signals with negative indication to general public if they see that there is no strong control for managers and by the way it influences in negative manner the analysts' optimism. The board size (BSIZE) is positively and significantly linked with optimism of analyst because many cooperative and synergy issues arise among various administrators sitting in large boards. It is widely held that a small board is more effective in monitoring a firm's activity (Coles et al. 2008). Prior studies suggest that a smaller board is favorable to an increase in a firm's governance processes (Yermack 1996; Core et al. 1999; Hoitash et al. 2009). Karamanou and Vafeas (2005) address the relationship that exists among board attributes and quality of management earnings forecasts in USA during the 1995–2000 period and conclude that the more conservative earnings forecasts are, the smaller are the boards. However, board independence (BIND) variable negatively affects the optimism under analyst in regression 4, suggesting that the presence of a board which is clearly independent may result in large fall into the optimism bias of financial analysts. In other words, the higher percentage of independent directors is, the greater quality earnings forecasts are. Prior corporate finance studies (Fama 1980; Fama and Jensen 1983; Eisenherdt 1989) provide several

proofs that independent directors can play well and efficiently the role of CEOs, especially in monitoring tasks. Thus, the board independence gives an effective sign about the performance of firm. We can assert that it influences the optimism of analyst as he puts strong supervision on the elaborated plan used to understand the firm decisions and strategies. The joined role of CEO-chairman (DUAL) exerts a positive and significant influence on the optimism of analysts. Like the board size, analysts' forecast optimism is higher when the CEO also serves as board chairman. Hence, theoretical and empirical literature suggests separating the duties between general manager and chairman inside firms because this is a key important mechanism of good governance. Studies like Jensen (1993) and Bebchuk et al. (2009) confirm that if we distinguish the functions of CEO and chairman, it will be possible the improvement of effective control among directors. Conversely, they note that if the CEO is either the chair on the board, we will have conflicts of interests and obtain a weak board of directors. The increase in optimism of analyst is mainly related to combining both functions as management and supervision when making decisions. A clear justification of this matter rely on the fact that duality in functions offers the opportunity to CEO to make decision while controlling himself and this can lead to rise the optimism bias hidden in analyst. Concerning the variable, gender diversity (Gender), which appears affect negatively analyst's optimism bias, one possible explanation is that the diversity of the board improves the transparency of the firm's financial statements, which makes the estimation of the results more accurate. As suggested by Higgs (2003), board diversity reduces the optimism of financial analysts. However, he shows that gender diversity improves board effectiveness. In the same context, Srinidhi et al. (2011) show that gender diversity improves firm results by improving revenues and reducing costs. They suggest that CEO compensation is negatively associated with optimizing the published analyst forecasts. This means that firms offering more compensation to managers do not necessarily have higher information asymmetry as expected by the optimism of consensus analysts.

Firth et al., (2006) recognize the use of cash incentive-based bonus pay and CEO compensation as means of minimizing conflict of interest between managers and shareholders for listed firms in China. Our findings indicate that executive/director compensation provides sufficient incentives for information disclosure by US firms and thus lower optimism bias in analysts' earnings forecasts. Last, control variables are almost significant and show that forecast optimism is positively related to the book-to-market ratio (M/B) and negatively related to the volatility of returns (VOLAT). When forecasting a firm, the analyst's decision may depend on several characteristics of the target firm, including its stock volatility. In other words, stock volatility can influence the analyst's optimism, and this impact may be negative. Stocks with high volatility indicate greater information asymmetry. Investors give more importance to private information of these riskier stocks and can pay more to obtain it. So, the value of this specific information increases. In this context, investors can demand more accuracy for analyst services (Schutte and Unlu 2009).

Finally, the findings of our hypothesis (H5) testing whether the dispersion of analysts' forecasts depends on the quality of the corporate governance of the firm are consistent with those of models 1 through 4, except for one or two variables. First,

the dispersion of analysts' forecasts is negatively associated with ownership concentration, which is a relevant governance mechanism that improves analysts' forecasts. Thus, to protect their interest, majority shareholders prefer to be active on the financial markets. Agency theory states that concentration of ownership is attractive to analysts as it reduces the dispersion of their forecasts.

Similar to our expectations, institutional ownership (INST) is found to be negatively associated with the analyst forecast dispersion, which appears to be conforming to the presumed predictions. This finding is in line with previous results supporting that the presence of institutional investors reduces agency conflict in firms as it improves information transparency. In this context, Chung and Zhang (2011) demonstrate that the presence of institutional investors improves the disclosure policy in the company, which leads to more accuracy in the forecasting of market analysts. In another research, Ajinkya et al. (2005) show that institutional investors have a negative effect on the optimism of managers and a positive effect on the monitoring of analysts and the estimation of financial results.

Thus, managerial ownership negatively affects the dispersion of analysts' forecasting as the efficiency in forecasting the firm's earnings improves with the portion of capital owned by managers. This can be explained by the arguments of Jensen and Meckling (1976) who suggest that management ownership reduces the accuracy of reports published by market analysts. It means that manager owning large portion of the capital have less interest in increasing their own wealth by manipulating the statements of the firm mainly those available for market analysts.

In line with agency theory, Byard et al., (2006) suggest that reducing conflicts of interest between owners and managers reduces information asymmetries and has a positive impact on the quality of information disclosed to the audience. This improves the accuracy of forecasting of analysts and reduces the dispersion of forecasts.

Second, the board structure variables such as the variable board size (BSIZE) are positively associated with dispersed forecasts, harmoniously confirming the idea that the number of administrators reduces the forecasting performance of analysts. In this vein, Lipton and Lorsch (1992) find that increasing the number of the board reduces the efficiency of decision making in the company. Small boards can perform better and reduce free-rider problems (Yermack 1996; Loderer and Peyer 2002) and improve the quality of the firms' reports (Vafeas 2000; Alonso et al. 2000; Nguyen and Faff 2007). De sa part, Vafeas (2000).

Within the same framework, the coefficients for board independence (BIND) and CEO duality (DUAL) variables are statistically negative (positive) coefficients in model 5. This result supports the findings of Byard et al. (2006) who argues that board independence has positive impact on the quality analyst forecasting, while CEO duality has negative impact on analyst forecasting.

Miletkov et al., (2014) argue that investor protection is relevant, and firms majority-owned by institutional investors operate with independent boards. Xie et al. (2003) show that the independence of the board of directors reduces the manipulation of the financial statements of the firm. They suggest that the presence of independent directors improves the governance of the firm and reduces the dispersion of the forecasts. In the same context, Beasley (1996) and Abbott et al., (2000) find that the independence of board members reduces the risk of manager fraud. Other studies (Carcello and Neal

2003; Xie et al. 2003; Be´dard et al. 2004; Kao and Chen 2004; Kent et al. 2010) support that board independence reduces manager opportunism. Carcello and Nagy (2004a) and Carcello and Nagy (2004b) find evidence of a significant relationship between CEO duality and earning management.

The impact of gender diversity (GENDER) is significantly negative when combined with analysts' earnings forecasts dispersion, indicating that analysts welcome the observable features of board diversity, gender diversity. Gender diversity on the board results leads to lower forecast dispersion. This finding is in line with the results of (Abarbanell and Bushee 1997; Adams and Ferreira 2009; Yu 2010 and Gul et al. 2013) who show that gender diversity enhances firm's corporate governance and improve the quality of financial disclosure and the accuracy of financial analyst forecasting.

Furthermore, model 5 shows a negative significant association between CEO compensation and analysts' earnings forecast dispersion. US firms, which pay higher compensation to executives and directors, are associated with weaker agency problems, lower information asymmetry and thus should result in lower dispersion in analysts' forecasts. This might be due to the fact that CEO compensation is determined based on long-term performance. Another plausible explanation may be that the high compensation granted to directors encourages them to exert more control over managers and reduces their entrenchment. This improves the disclosure of the company and reduces the dispersion of market analysts' forecasting.

Last, the control variable, firm size (FSIZE) is a potential factor positively affecting analyst earnings forecast quality. Firm size still indicates a negative impact on forecast dispersion. Both Lang and Lundholm (1996) and Brown (1997) demonstrated that larger firms have greater forecast accuracy, perhaps because of increased public scrutiny. Hagerman and Ruland (1979) and Firth and Smith (1992) show that financial analyst provides more accurate forecasting about large firms because they are more diversified and they face less systematic risk. Cox (1985) and Pedwell et al. (1994) suggest that larger firms often generate sustained and low-volatile cash flows, which makes it easier for financial analysts to forecast the earnings of these large firms. Similar results had been found by Clarkson (2000) and Firth et al. (1995) on the Canadian and Singaporean markets, respectively.

The table shows also that forecasted firms' stock volatility (VOLAT) affects positively analysts' earnings forecast dispersion. Such finding can be explained by two different ways: On the one hand, high levels of specific risks, analysts' estimations are lower, probably for the elevated costs of specific information on firms. In this case, we think that the cost of acquiring information on private firms, and also reducing information asymmetry exceeded possible benefits resulting from the possession of this specific information. Analysts are discouraged to put precision in forecasting these firms with important specific risk, which may explain the positive relation revealed. On the other hand, financial analysts have the resources and necessary experience to gather and analyze firms' information. Their purpose is to collect the best quality and quantity of information on the firms that they forecast. So firms that have less analyst dispersion generally present less information asymmetry and consequently show reduced price changes. In this case, analyst dispersion will be associated with high stock volatility.

### 3.3 Estimation procedure and discussion for the good and bad times

Knowing the possible impact of the financial crisis and the COVID-19 Health Crisis that devastated the US markets, we divide our sample in four different periods: pre-crisis, from 2004 to 2007, financial crisis that ranges between 2008 and 2010, post-crisis between 2011 and 2018, and COVID-19 period, from 2019 to 2020. We estimate several regressions to analyze the crisis effect on the relationship between each explanatory governance variable and the analyst characteristic dependent variable in Tables 6, 7, 8, 9 and 10. The tables show that the results hold for the two periods of pre-crisis and post-crisis since the increase in corporate governance quality is an improving effect that is observed during financial analysts' prediction of information about firms in USA. However, there is no relationship during the financial crisis, but during the pandemic period the relationship becomes especially weak between several governance mechanisms and financial analysts' outputs, and disappears for others. Our findings show relatively different results between the crisis period and the COVID pandemic period in terms of corporate governance impact on the behavior of financial analysts. In fact, each period has specific characteristics and different economic and financial effects. This justifies the differences in the psychological behavior of financial analysts during these two periods.

## 4 Robustness analysis

In this section, we conduct additional tests to examine the robustness of our main results.

### 4.1 Sample splits based on firm size

The literature shows that the financial analysts' outputs are affected by the firms' governance quality, which in turn is affected by the firm size. Such an impact may be apparent among the firms operating in US markets. Firms with larger size, given their market reputation, are expected to have greater diligence in their governance practices when compared to the smaller firms. In this section, we try to empirically test the analysts' outputs–governance quality relationship by classifying the firm-year observations based on the firms' size and examine whether the results change. We use the market capitalization of each firm to classify the sample firms. A high market capitalization represents a large firm size and a low market capitalization represents a small firm size. We separately estimate our five equations using both the small and large firms. Tables 11, 12, and 13 present the results. From Tables 11, 12 and 13, it is clear that the impact of high-quality governance in analyst activity exists across the sample firms irrespective of their size as we document that analysts' various outputs to public information are influenced by the effective and transparent corporate governance mechanisms. We find strong significant analysts' outputs–governance quality relationship among the US larger sample firms, and the analysts' outputs–governance quality relationship seems to be weak among the US smaller sample firms. Further,

**Table 6** Results of ordered probit regressions for sample splits

	Dependent variable: Recommendation scores			
	Pre-crisis (1)	Crisis (2)	Post-crisis (3)	COVID-19 (4)
TOP	4.303*** [3.36]	3.811 [- 0.29]	7.593** [2.60]	2.910* [1.75]
INST	2.705*** [- 5.46]	- 4.139 [0.99]	5.289** [- 2.60]	3.796* [1.84]
MANAG	- 3.935*** [- 4.90]	- 2.668 [- 1.40]	- 8.109** [- 2.46]	- 4.706 [- 1.55]
BSIZE	- 2.561*** [- 3.28]	- 1.778 [- 1.12]	- 6.260** [- 2.87]	- 1.884 [- 1.03]
BIND	2.241 [0.56]	1.662 [0.35]	4.170 [1.21]	2.010 [0.78]
DUAL	- 0.468 [- 1.30]	- 2.103 [- 0.84]	3.915 [1.47]	1.136 [1.62]
GENDER	0.599*** [- 3.91]	0.346 [1.15]	0.716** [- 2.74]	0.521* [2.00]
COMP	0.243*** [5.65]	0.156 [1.07]	0.404** [2.33]	0.128 [1.68]
FSIZE	- 0.0612 [- 0.80]	- 0.0340 [- 1.61]	- 0.0884 [- 1.41]	- 0.0211 [- 1.70]
M/B	- 0.923*** [- 4.70]	- 0.418 [- 1.35]	- 1.313** [- 2.10]	- 0.597* [- 1.95]
VOLAT	- 43.78 [- 1.25]	- 28.16 [- 0.90]	- 49.23 [- 1.64]	- 26.50 [- 1.38]
RESID	2.061*** [4.46]	1.868 [1.20]	6.346*** [3.91]	1.778 [1.62]
Intercept cut1	- 12.101*	- 10.65	- 21.15*	- 9.518
Intercept cut2	- 7.044*	- 13.76	- 19.03*	- 6.685
Intercept cut3	- 6.234*	- 11.87	- 17.96*	- 5.311
Firm Dummy	Yes	Yes	Yes	Yes
N	292	218	583	145
Log likelihood	- 52.61363	- 47.21544	- 72.46129	- 41.36602
Pseudo R <sup>2</sup> (%)	20.68***	13.99***	32.89***	10.22***

This table presents the results of ordered probit regressions for sample splits based on crises about the effects of governance mechanisms on analysts' recommendations after controlling for endogeneity. In Columns (1, 2, 3 and 4), we run the regressions on the full sample for the pre-crisis, crisis, post-crisis and the COVID-19 periods, respectively. Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting stock recommendations. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations. Based on the Wilcoxon-rank test, we estimate the model underlying the pre-crisis, crisis, post-crisis and COVID-19 subsamples separately

**Table 7** Results of dynamic panel data (GMM) estimation for the pre-crisis period

	TPE	ACCU	COVERAGE	OPTIMISM	DISPERSION
	(1)	(2)	(3)	(4)	(5)
Constant	0.323 [0.95]	- 0.476*** [- 3.38]	0.258 [0.93]	- 0.411*** [- 3.22]	- 0.505*** [- 4.70]
TOP	0.584*** [4.51]	- 0.536*** [- 4.80]	- 0.519*** [6.20]	- 0.408*** [- 6.47]	- 0.733*** [- 4.60]
INST	0.588*** [8.46]	- 0.475*** [- 6.33]	0.522*** [8.32]	- 0.409*** [- 6.22]	- 0.419*** [- 5.30]
MANAG	0.343 [0.67]	- 0.250 [- 1.15]	0.284** [2.47]	- 0.191*** [- 3.04]	- 0.703*** [- 3.27]
BFSIZE	- 0.193 [- 1.01]	- 0.270*** [- 3.52]	0.128*** [2.98]	0.205*** [3.96]	0.171** [2.13]
BIND	0.494*** [3.12]	0.227 [1.05]	0.436*** [3.20]	- 0.169*** [2.97]	- 0.216*** [- 3.11]
DUAL	0.173** [2.48]	- 0.150*** [- 2.95]	- 0.179*** [- 3.18]	0.157** [2.66]	0.538*** [3.51]
GENDER	0.680*** [3.38]	0.259*** [3.43]	0.621*** [3.76]	- 0.196** [- 2.35]	- 0.330*** [- 3.40]
COMP	- 0.0300** [- 2.68]	0.201*** [3.47]	0.0233*** [2.93]	- 0.135** [- 2.67]	- 0.169* [- 1.88]
FSIZE	- 0.0573*** [8.24]	0.0210* [1.90]	0.0502*** [6.55]	- 0.0136 [- 1.77]	- 0.206** [- 2.34]
M/B	- 0.00540* [- 1.83]	0.0935*** [5.33]	- 0.00551 [- 1.65]	0.0972*** [5.91]	1.1552* [1.96]
VOLAT	- 7.686*** [- 5.58]	10.69*** [5.03]	- 6.962*** [- 4.80]	- 9.97*** [- 6.16]	8.760*** [6.50]
TPE	0.181*** [5.49]	0.217*** [5.35]	0.175*** [5.42]	0.212*** [5.29]	0.189*** [5.59]
N	508	505	511	513	513
Number of Firms	154	154	154	154	154
Hansen Test	35.10	31.04	29.90	25.20	28.45
Pvalue	0.528	0.591	0.523	0.584	0.597
Arellano-Bond Test for AR(2)	0.601	0.414	0.695	0.425	0.448

This table presents the pre-crisis, regression results of dynamic panel data using (GMM) (Dependent variables: Target price error (TPE) and Target price accuracy (ACCU), analyst coverage (COVERAGE), analyst optimism (OPTIMISM) and analyst dispersion (DISPERSION)). Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting target prices accuracy. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations



**Table 8** Results of dynamic panel data (GMM) estimation for the financial crisis period

	TPE	ACCU	COVERAGE	OPTIMISM	DISPERSION
	(1)	(2)	(3)	(4)	(5)
Constant	0.221 [0.65]	- 0.326** [- 2.31]	0.176 [0.85]	- 0.281** [- 2.27]	- 0.346*** [- 3.22]
TOP	0.400 [1.21]	- 0.367 [- 1.29]	- 0.355 [1.66]	- 0.279 [- 1.74]	- 0.502 [- 1.24]
INST	0.403 [1.52]	- 0.325 [- 1.70]	0.358 [1.80]	- 0.280 [- 1.42]	- 0.287 [- 1.13]
MANAG	0.235 [0.45]	- 0.171 [- 0.78]	0.194 [1.69]	- 0.131 [- 1.33]	- 0.481 [- 1.56]
BFSIZE	- 0.122 [- 0.68]	- 0.185** [- 2.41]	0.087 [1.35]	0.140 [1.02]	0.117 [1.46]
BIND	0.338** [2.14]	0.155 [0.72]	0.298 [1.19]	- 0.116 [1.35]	- 0.148 [- 1.02]
DUAL	0.118 [1.70]	- 0.103 [- 1.09]	- 0.123 [- 1.31]	0.108 [0.98]	0.369* [1.92]
GENDER	0.465 [0.91]	0.177 [0.96]	0.425 [1.01]	- 0.134* [- 1.90]	- 0.225 [- 1.64]
COMP	- 0.0205 [- 1.00]	0.138** [2.27]	0.0160 [1.06]	- 0.092** [- 2.51]	- 0.115 [- 1.08]
FSIZE	- 0.0392** [2.21]	- 0.0144 [- 0.69]	0.0343 [1.76]	- 0.0093 [- 0.64]	- 0.140 [- 1.60]
M/B	- 0.00153 [- 0.49]	0.0365 [1.59]	- 0.00148 [- 0.45]	0.0360* [1.95]	0.418 [0.72]
VOLAT	- 5.263 [- 1.50]	7.323*** [4.46]	- 4.767*** [- 4.13]	- 6.829 [- 1.38]	5.997* [1.85]
TPE	0.124*** [3.76]	0.150*** [3.66]	0.120*** [3.71]	0.145*** [3.62]	0.130*** [3.89]
N	381	379	380	383	383
Number of Firms	154	154	154	154	154
Hansen Test	24.03	21.25	20.47	17.26	19.49
Pvalue	0.361	0.405	0.359	0.401	0.407
Arellano – Bond Test for AR(2)	0.412	0.211	0.407	0.215	0.220

This table presents the financial crisis regression results of dynamic panel data using (GMM) (Dependent variables: Target price error (TPE) and Target price accuracy (ACCU), analyst coverage (COVERAGE), analyst optimism (OPTIMISM) and analyst dispersion (DISPERSION)). Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting target prices accuracy. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations

**Table 9** Results of dynamic panel data (GMM) estimation for the post-crisis period

	TPE	ACCU	COVERAGE	OPTIMISM	DISPERSION
	(1)	(2)	(3)	(4)	(5)
Constant	0.634* [1.88]	− 0.941 [− 1.63]	0.622* [1.83]	− 0.806*** [− 6.51]	− 0.992*** [− 9.23]
TOP	1.146** [2.47]	− 1.052** [− 2.69]	− 1.019** [2.78]	− 0.801*** [− 2.99]	− 1.438** [− 2.55]
INST	1.152** [2.24]	− 0.932** [− 2.17]	1.024** [2.41]	− 0.802** [− 2.79]	− 0.821** [− 2.07]
MANAG	0.673 [1.31]	0.490** [2.26]	0.557*** [2.85]	− 0.375* [− 1.80]	− 1.378** [− 2.46]
BFSIZE	− 0.374 [− 1.30]	− 0.529*** [− 6.90]	0.250*** [3.88]	0.401** [2.77]	0.336** [2.19]
BIND	0.968** [2.13]	0.446** [2.09]	0.855** [2.30]	− 0.331* [1.87]	− 0.423* [− 1.94]
DUAL	0.340* [1.88]	− 0.290** [− 2.17]	− 0.352** [− 2.75]	0.309** [2.28]	1.054*** [4.92]
GENDER	1.333** [2.60]	0.507** [2.76]	1.217* [1.89]	− 0.384** [− 2.60]	− 0.646** [− 2.69]
COMP	− 0.0588* [− 1.83]	0.393* [1.81]	0.0458** [2.03]	− 0.265** [− 2.20]	− 0.314** [− 2.07]
FSIZE	− 0.1123** [2.35]	− 0.0412* [− 1.97]	0.0984** [2.04]	− 0.0266* [− 1.84]	− 0.405*** [− 4.59]
M/B	− 0.00439 [− 1.41]	0.1046** [2.57]	− 0.00425 [− 1.28]	0.1032*** [4.55]	1.197** [2.08]
VOLAT	− 15.063** [− 2.30]	20.961** [2.14]	− 13.644** [− 2.10]	− 19.548* [− 1.95]	17.169*** [5.01]
TPE	0.356** [2.75]	0.427** [2.49]	0.344** [2.62]	0.416** [2.37]	0.372*** [2.96]
N	1016	1010	1022	1024	1024
Number of Firms	154	154	154	154	154
Hansen Test	68.79	60.84	58.60	49.41	55.76
Pvalue	0.903	0.987	0.901	0.954	0.919
Arellano–Bond Test for AR(2)	0.979	0.519	0.967	0.528	0.545

This table presents the post-crisis regression results of dynamic panel data using (GMM) (Dependent variables: target price error (TPE) and target price accuracy (ACCU), analyst coverage (COVERAGE), analyst optimism (OPTIMISM) and analyst dispersion (DISPERSION)). Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting target prices accuracy. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations

**Table 10** Results of dynamic panel data (GMM) estimation for the COVID-19 period

	TPE	ACCU	COVERAGE	OPTIMISM	DISPERSION
	(1)	(2)	(3)	(4)	(5)
Constant	0.164 [0.48]	- 0.242 [- 1.27]	0.131 [0.40]	- 0.209* [- 1.89]	- 0.257** [- 2.39]
TOP	0.299* [1.90]	- 0.273 [- 1.59]	- 0.262 [1.24]	- 0.207 [- 1.30]	- 0.373** [- 2.29]
INST	0.301* [1.96]	- 0.235 [- 1.26]	0.266* [1.84]	- 0.202 [- 1.35]	- 0.213 [- 1.06]
MANAG	0.175 [0.34]	- 0.127 [- 0.58]	0.144 [0.52]	- 0.108* [- 1.98]	- 0.357 [- 1.61]
BFSIZE	- 0.097 [- 0.36]	- 0.131* [- 1.87]	0.065* [1.99]	0.104* [1.90]	0.088 [1.79]
BIND	0.250* [1.85]	0.115 [0.54]	0.221** [2.67]	- 0.086** [2.01]	- 0.119 [- 1.01]
DUAL	0.193 [1.26]	- 0.176* [- 1.91]	- 0.105 [- 1.13]	0.180 [1.37]	0.372** [2.27]
GENDER	0.345 [1.66]	0.131 [1.70]	0.315* [1.95]	- 0.199 [- 1.20]	- 0.180** [- 2.14]
COMP	- 0.0152 [- 0.76]	0.102* [1.86]	0.0118 [0.50]	- 0.169* [- 1.94]	- 0.100 [- 1.45]
FSIZE	- 0.0290** [2.65]	- 0.0107 [- 0.52]	0.0255 [1.30]	- 0.0190 [- 0.47]	- 0.104*** [- 2.88]
M/B	- 0.00123 [- 0.36]	0.0270*** [3.28]	- 0.00110 [- 0.33]	0.0269* [1.84]	0.309 [1.51]
VOLAT	- 3.896** [- 2.12]	5.422 [1.71]	- 3.529 [- 1.60]	- 5.056 [- 1.32]	4.443*** [2.96]
TPE	0.129*** [2.78]	0.111** [2.42]	0.108** [2.22]	0.104** [2.60]	0.120*** [2.83]
N	253	255	260	256	256
Number of Firms	154	154	154	154	154
Hansen Test	17.80	15.73	15.16	12.78	14.43
Pvalue	0.267	0.301	0.265	0.296	0.303
Arellano-Bond Test for AR(2)	0.305	0.182	0.312	0.184	0.191

This table presents the COVID-19 regression results of dynamic panel data using (GMM) (Dependent variables: target price error (TPE) and target price accuracy (ACCU), analyst coverage (COVERAGE), analyst optimism (OPTIMISM) and analyst dispersion (DISPERSION)). Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting target prices accuracy. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations

**Table 11** Results of ordered probit regressions based on firm size

	Dependent variable: Recommendation scores	
	Small firms (1)	Large firms (2)
TOP	5.435 [1.18]	13.781** [2.64]
INST	13.310* [1.88]	14.78** [2.12]
MANAG	- 5.854 [- 0.61]	- 8.319** [- 2.51]
BSIZE	- 5.181** [- 2.34]	- 5.149*** [- 3.82]
BIND	1.778 [0.39]	5.268 [1.22]
DUAL	- 0.724 [- 0.52]	- 7.631 [- 0.20]
GENDER	7.162* [2.00]	10.650*** [4.06]
COMP	0.162* [1.94]	0.829** [2.39]
FSIZE	- 0.108 [- 0.48]	- 0.303 [- 1.60]
M/B	- 0.985*** [- 3.94]	- 1.900*** [- 3.85]
VOLAT	- 2.532 [- 0.07]	- 87.98 [- 1.19]
RESID	1.008** [2.32]	4.130** [2.71]
Intercept cut1	- 20.210	- 24.215*
Intercept cut2	- 19.023	- 23.146*
Intercept cut3	- 18.044	- 21.890
Firm Dummy	Yes	Yes
N	315	923
Log likelihood	- 59.49873	- 77.462861
Pseudo R <sup>2</sup> (%)	34.56***	44.15***

This table presents the firm size results of ordered probit regressions on the effects of governance mechanisms on analysts' recommendations after controlling for endogeneity. In Columns (1) and (2), we run the regressions on the small and large firms' sample (i.e., market capitalization), respectively. Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting stock recommendations. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations. Based on the Wilcoxon-rank test, we attempt to estimate the model underlying the small and large subsamples separately

**Table 12** Results of dynamic panel data (GMM) estimation for small firms

	TPE	ACCU	COVERAGE	OPTIMISM	DISPERSION
	(1)	(2)	(3)	(4)	(5)
Constant	0.105 [0.031]	- 0.156* [- 1.98]	0.084 [0.30]	- 0.134 [- 1.08]	- 0.165** [- 2.52]
TOP	0.191 [0.60]	- 0.175 [- 1.03]	- 0.169* [1.79]	- 0.128* [- 1.83]	- 0.240 [- 0.59]
INST	0.199 [1.06]	- 0.155* [- 1.76]	0.175 [0.84]	- 0.133 [- 1.08]	- 0.147 [- 0.67]
MANAG	0.112 [0.22]	- 0.081** [- 2.12]	0.093* [1.74]	- 0.062 [- 1.04]	- 0.229*** [- 3.63]
BFSIZE	- 0.078 [- 0.40]	- 0.109 [- 1.43]	0.052* [1.80]	0.083 [1.20]	0.070 [0.87]
BIND	0.200* [1.72]	0.092 [0.43]	0.177* [1.93]	- 0.068 [0.55]	- 0.098 [- 0.60]
DUAL	0.071** [2.01]	- 0.112 [- 1.64]	- 0.091* [- 1.80]	0.064 [0.58]	0.218 [1.24]
GENDER	0.276 [1.53]	0.413* [1.85]	0.252 [1.60]	- 0.107 [- 1.55]	- 0.143* [- 1.97]
COMP	- 0.0122 [- 0.88]	0.081** [2.40]	0.0100* [1.94]	- 0.105 [- 1.63]	- 0.133 [- 0.95]
FSIZE	- 0.0232* [1.92]	- 0.0155 [- 0.41]	0.0204** [2.17]	- 0.0056 [- 0.38]	- 0.138* [- 1.95]
M/B	- 0.00091 [- 0.30]	0.0216 [0.97]	- 0.00088 [- 0.26]	0.0213 [0.84]	0.248 [1.35]
VOLAT	- 3.122* [- 1.89]	4.345* [1.85]	- 2.828** [- 2.10]	- 4.051** [- 2.00]	13.974 [1.39]
TPE	0.090** [2.23]	0.086** [2.05]	0.073** [2.19]	0.075** [2.05]	0.099** [2.37]
N	650	647	654	655	655
Number of Firms	154	154	154	154	154
Hansen Test	14.26	12.61	12.14	10.24	11.56
Pvalue	0.816	0.937	0.802	0.902	0.921
Arellano-Bond Test for AR(2)	0.244	0.172	0.230	0.168	0.207

This table presents the small firms regression results of dynamic panel data using (GMM) (Dependent variables: target price error (TPE) and target price accuracy (ACCU), analyst coverage (COVERAGE), analyst optimism (OPTIMISM) and analyst dispersion (DISPERSION)). Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting target prices accuracy. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations

**Table 13** Results of dynamic panel data (GMM) estimation for large firms

	TPE	ACCU	COVERAGE	OPTIMISM	DISPERSION
	(1)	(2)	(3)	(4)	(5)
Constant	0.647* [1.92]	- 0.953*** [- 6.77]	0.517* [1.86]	- 0.823*** [- 4.49]	- 1.012*** [- 4.22]
TOP	1.170* [1.98]	- 1.073*** [- 4.65]	- 1.040*** [4.55]	- 0.816*** [- 5.09]	- 1.467* [- 1.90]
INST	1.176*** [3.66]	- 0.952*** [- 2.98]	1.046*** [4.49]	- 0.820* [- 1.89]	- 0.669* [- 1.83]
MANAG	0.687 [1.53]	- 0.500*** [- 3.20]	0.569*** [4.88]	- 0.384* [- 1.95]	- 1.406* [- 1.75]
BFSIZE	- 0.387* [- 1.81]	- 0.541** [- 2.50]	0.260*** [4.96]	0.410*** [3.37]	0.343** [2.27]
BIND	0.990** [2.26]	0.455 [1.13]	0.873*** [3.42]	- 0.338** [2.69]	- 0.432** [- 2.98]
DUAL	0.346** [2.40]	- 0.301*** [- 3.19]	- 0.360* [- 1.89]	0.314* [1.85]	0.1065** [2.30]
GENDER	1.361** [2.05]	0.518* [1.88]	1.243*** [3.91]	- 0.392** [- 2.20]	- 0.660*** [- 4.79]
COMP	- 0.0600** [- 2.16]	0.401*** [3.90]	0.0469** [2.08]	- 0.271** [- 2.52]	- 0.338** [- 2.22]
FSIZE	- 0.1164*** [4.86]	- 0.0421** [- 2.02]	0.1005*** [4.11]	- 0.0273 [- 1.25]	- 0.412* [- 1.79]
M/B	- 0.00450 [- 1.62]	1.0693*** [4.67]	- 0.00443 [- 1.66]	0.1054*** [5.48]	1.223 [1.40]
VOLAT	- 16.382*** [- 4.39]	21.404*** [4.22]	- 14.933*** [- 4.31]	- 20.961*** [- 4.04]	18.532*** [5.20]
TPE	0.363*** [6.35]	0.437*** [6.71]	0.351*** [6.85]	0.425*** [6.48]	0.380*** [6.97]
N	1508	1502	1519	1521	1521
Number of Firms	154	154	154	154	154
Hansen test	70.24	62.13	59.84	50.45	56.94
Pvalue	0.887	0.958	0.854	0.949	0.960
Arellano-Bond Test for AR(2)	0.973	0.274	0.961	0.278	0.290

This table presents the large firms regression results of dynamic panel data using (GMM) (Dependent variables: target price error (TPE) and target price accuracy (ACCU), analyst coverage (COVERAGE), analyst optimism (OPTIMISM) and analyst dispersion (DISPERSION)). Board structure, firm ownership variables and CEO compensation are measured by the end of previous year, while firm-specific characteristics are measured by the current year, when setting target prices accuracy. The numbers in brackets are z-statistics. \* indicates 10% significance level, \*\* indicates 5% significance level and \*\*\* indicates 1% significance level. N is the number of observations

the magnitude of the estimates is relatively smaller among our US small sample firms. This may be due to the fact that larger US firms are actively more followed by the analysts and their corporate governance practices are more intensively monitored. The small US firms do not attract similar adequate attention in US markets.

#### 4.2 Sample splits based on type of ownership

The literature shows that the financial analysts' outputs are affected by the firms' governance quality, which in turn is affected by the type of ownership. Such an impact may be apparent among the firms operating in US markets. While bigger groups with their internal capital markets assist their affiliates to navigate the developed financial markets and regulatory mechanisms as well as to strengthen the governance mechanisms, the unaffiliated firms with their necessity to deal with the financial markets are expected to be more cautious and prudent in their corporate governance practices. Consistent to the reputation argument, we expect that the analysts' outputs–governance quality relationship would be stronger among the bigger group affiliated firms than their unaffiliated peers. In this section, we try to empirically test the analysts' output–governance quality relationship by classifying the firm-year observations based on their type of ownership and see whether the results hold. In the sample firms, 38.46% are bigger group affiliated firms and the rest 61.54% are non-affiliated firms. We separately estimate our five equations using both the affiliated and non-affiliated firms. The results<sup>10</sup> are not significantly different from those in first robustness test. It is clear from tables that the analyst activity is significantly influenced by the high-quality governance across both the non-affiliated and bigger group-affiliated firms. We find that analysts' output–governance quality relationship is strongly significant among bigger group-affiliated US firms. Analysts' various outputs to public information are weakly influenced by effective and transparent corporate governance mechanisms among the unaffiliated US firms. This can be explained by prevalent owner–manager practices among unaffiliated US firms. This finding throws bleak light on the corporate governance practices of non-affiliated US firms, which make them not as much attractive target as bigger group-affiliated US firms for financial analysts.

### 5 Conclusion

The behavioral corporate finance literature is still silent about the ability of corporate governance mechanisms to affect the analysts' behavior. In this empirical study, we provide strong evidence that corporate governance mechanisms affects the properties of analysts' forecasts in USA. The sample includes 2316 firm-year observations for the period 2004–2020 and concentrates on the specificities and quality of the coverage, dispersion, stock recommendations, target prices and earnings forecasts made by financial analysts of US firms. Our main results deal with analysts' recommendations and target price forecast accuracy bring out that US analysts recommend: the low board size companies because smaller boards are more effective and outperform

<sup>10</sup> We don't report empirical results to conserve place. However, they are available under request.

larger ones, the companies having high CEO compensation because CEO remuneration plans tend to reduce agency problems between managers and shareholders on the basis of managerial incentives which could play a role of an efficient corporate governance mechanism, the companies with high gender diversity because women succeed to improve firm performance, their board presence is high and, by this, is seen as an effective governance mechanism within US non-financial firms and financial firms with high institutional ownership. Our results dealing with analysts' target prices forecast accuracy indicate that among the above governance attributes, CEO duality, institutional ownership, CEO fees and ownership concentration remain significant for both measures of target price accuracy. However, CEO compensation, on the one hand, affects negatively (positively) the target price error (the target price accuracy) but, on the other hand, affects positively stock recommendation in the financial sector. CEO compensation represents an efficient mechanism on which analysts can rely on, especially for the financial firms. In fact, it seems clear that CEOs in the non-financial firms enjoy their opportunities of extracting rents from shareholders. CEOs may be well paid and receive some extra perks that are hidden to surpass the outrage constraint. Consequently, financial intermediaries are conscious of such behavior and are reluctant to recommend those firms to their clients especially when the insignificant pay-performance relationship is confirmed. Another argument can be suggested, given that CEOs' salaries are set through interpersonal negotiation between powerful CEOs and weak boards' members. From another perspective, CEOs and board members maybe tend to compromise on decisions and strategies and their interests are likely to be aligned. Weak board' members behave as followers but not as effective monitors. CEOs do not need to manage profits, and thus, this would probably explain the accuracy of target price forecasts. In comparison with financial firms, by setting up the committees for instance the remuneration committee, regulators would make financial firms under pressure. In other words, CEOs' compensations are structured and are driven by companies' performance what firstly encourages financial analysts to recommend them and secondly help increase analysts' trust toward the quality of accounting and financial statements they publish. Institutional ownership as a signal used by analysts to recommend companies, especially the financial ones, generates significant positive relationship with target price error. In our case, this result does not allow us to support clearly the idea whether the increasing of institutional ownership is really a good governance attribute in US firms. The Institutional shareholding is a signal used by analysts to recommend securities, probably because they use the services of their own employees who refer them to undervalued securities, and not because it corresponds to an effective mechanism of control. There is no need for transparency and information disclosure for institutional investors, since they can access information about a firm thanks to the informal channels. We also present evidence that analysts' target price error depends on both CEO duality and ownership concentration. CEO duality is an indicator of weak governance quality at firm, and thus as predicted, it affects negatively the quality of analysts' target price forecasts. Ownership concentration, as well, adversely affects the target price accuracy.

Also our results dealing with analysts' biases of coverage, optimism and dispersion show that ownership characteristics have a significant impact on analyst attributes in all models. However, this association is not always positive, therefore following



the findings of existing studies. Ownership structure can be a key to improve analyst following and avoid analysts' irrationalities that derive from their optimism bias and dispersion in forecasts since our results indicate that analyst coverage increases while optimism and dispersion decrease with the managers' ownership and the institutional holding in their firms. This finding suggests that analysts see managers and institutional investors as promoters of good corporate governance mechanisms, especially in USA where protection of minority shareholders is strong. Second, good corporate governance leads to less agency problem through the separation of ownership and management, which enhances the communication between managers and investors through public disclosures. Firms still have a strong tool to deal with this problem; it is the board of directors' characteristics. It will be an easy task now that firms can adopt effective boards that are able to reduce the negative impact of corporate policies on financial analysts' information about firms' earnings. The regression results generate a positive and significant association between board size, analyst coverage, analyst forecast optimism and dispersion, which supports existing studies, indicating that analysts are usually not reluctant to follow large firms but they may be biased in their decisions to forecast them. Firms should advance the independence of their board in a special manner in order to guarantee their performances and so they will be able to align the interest of managers to that of shareholders. Our results imply that independent boards are able to increase the level of analyst coverage and reduce analyst optimism bias and dispersion in forecasts so they may reduce also its undesirable effects. In contrast, firms have to overcome the negative effect when the CEO also serves as chairman of the board on analyst following and the measures of analyst prediction quality. This study also argues that separation of the CEO and board chairman function can influence the emergence of analyst optimism bias as well. We also explore the effect of CEO's compensations on the emergence of analyst following and the quality of financial reporting of market intermediaries. We find strong evidence concerning the positive effect of executive and leadership compensation as good quality of internal governance on the analysts' follow and forecast opinions on firm. Finally, we show that board gender diversity makes a difference to analysts' behavior based from the positive role of gender diversity on firm performance and earnings quality by improving corporate governance and the literature on risk aversion and leadership style of women. This evidence is available in the literature which demonstrates the benefits of having female directors because they are likely to demand higher-quality corporate disclosures and hence can improve the analyst coverage and the accuracy of analyst forecasts.

In summary, the analyses and results of our study provide support to the view that the quality of analyst information gathering and monitoring, as reflected in their earnings forecasts, can be enhanced by firms' governance quality. We also highlight the importance of analyzing quality corporate governance impact on financial analysts in different market situations, as we were unable to detect this effect in the crisis period. Our results show that governance quality effects on analysts are present in entire sample, but differences are observed regarding the subsamples analyzed. Higher-quality governance is found to influence analyst information and behavior in all but the 2008 crisis and the restriction days of the COVID-19 period. In this sense, pandemics and financial crisis can have similarities. While there is no relationship

between various analysts' outputs and governance quality during the financial crisis, in the COVID-19 period the relationship reappears to become especially very weak. These results suggest that in times of crisis analysts would be negotiating following their own information and also highlight the differences between analyst response to the turmoil caused by the outbreak of a global financial crisis and that initiated by a global pandemic. Further, as robustness tests, we report the weakness of analysts' outputs–governance quality relationship among the small and unaffiliated US firms, whereas their large and bigger group-affiliated peers report strong significant relationship. This evidence also casts doubts over the corporate governance-based analyst practices of US small and non-affiliated firms. The findings of this study suggest several paths for future research. First, additional data on financial analyst affiliation could further explain the relationship between analyst properties and US institutional ownership. Analysts may choose to follow and provide forecasts for firms only because they are affiliated with the US banks providing shareholdings and underwriting activities for these specific firms. Second, this study did not establish any connection between blockholder ownership, family ownership, bank ownership, audit committee characteristics and analyst outputs.

This research design helps us to reconcile contradictory evidence presented in prior studies on the validity of the flight to key parameters that underlay governance quality and the arguments of behavior of financial analysts. But like all research, this current study undoubtedly displays limits. Indeed, it is important to mention that my results can be considered also as slightly mixed probably because of the presence of nonlinear relationships between corporate governance variables and dependent variables of US analysts.

## References

- Abbarbanell JS, Bushee BJ (1997) Fundamental analysis, future earnings and stock prices. *J Account Res* 35(1):1–24
- Abbott LJ, Park Y, Parker S (2000) The effect of audit committee activity and independence on corporate fraud. *Manag Financ* 26(11):55–67
- Abdul Wahab E, Pitchay AA, Ali R (2015) Culture, corporate governance and analysts forecast in Malaysia. *Asian Rev Account* 23(3):232–255
- Abdullah SN, Nasir NM (2004) Accrual management and the independence of the board of directors and audit committees. *IJUM Int J Econ Manag Account* 12:49–80
- Aboody D, Barth M, Kasznik R (2006) Revaluations of fixed assets and future firm performance: evidence from UK. *J Account Econ* 26(1/3):149–178
- Adams R, Ferreira D (2007) A theory of friendly boards. *J Financ* 62(1):217–250
- Adams R, Ferreira D (2009) Women in the boardroom and their impact on governance and performance. *J Financ Econ* 94(2):291–309
- Aggarwal R, Erel I, Ferreira M, Matos P (2011) Does governance travel around the world? evidence from institutional investors. *J Financ Econ* 100(1):154–181
- Ajinkya B, Bhojraj S, Sengupta P (2005) The association between outside directors, institutional investors and the properties of management earnings forecasts. *J Account Res* 43(3):343–376
- Ali A, Chen TY, Radhakrishman S (2007) Corporate disclosures by family firms. *J Account Econ* 44(1–2):238–286
- Almeida JEF, Dalmácio FV (2015) The effects of corporate governance and product market competition on analysts' forecasts: evidence from the Brazilian capital market. *Int J Account* 50(3):316–339

- Alonso P, Palenzuela V, Iturriaga F (2000) Managers' discretionary behavior, earnings management and corporate governance: an empirical international analysis Working Paper Universidad de Valladolid
- Antonczyk R, Breuer W, Saltzmann A (2014) Long-term orientation and relationship lending: a cross-cultural study on the effect of time preferences on the choice of corporate debt. *Manag Int Rev* 54(3):381–415
- Aste LJ (1999) Reforming french corporate governance: a return to the two-tier board? *George Wash J Int Law Econ* 32:1–72
- Autore D, Kovacs T, Sharma V (2009) Do analyst recommendations reflect shareholder rights? *J Bank Finance* 33:193–202
- Barniv R, Myring M, Thomas W (2005) The association between the legal and financial reporting environments and forecast performance of individual analysts. *Contemp Account Res* 22(4):727–758
- Barron O, Stuerke P (1998) Dispersion in analysts' earnings forecasts as a measure of uncertainty. *J Acc Audit Financ* 13(Summer):245–270
- Barron O, Byard D, Kile C, Riedl E (2002) High-technology intangibles and analysts' forecasts. *J Acc Res* 40(2):289–312
- Barth M, Landsman W, Rendleman R (1998) Option pricing-based bond value estimates and a fundamental components approach to account for corporate debt. *Account Rev* 73(1):73–102
- Bartov E, Mohanram P, Nissim D (2007) Managerial discretion and the economic determinations of the disclosure volatility parameter for valuing ESOs. *Rev Acc Stud* 12(1):155–179
- Basu A, Coe NB, Chapman CG (2018) 2SLS vs 2SRI: Appropriate methods for rare outcomes and/or rare exposures. *Health Econ* 27:937–955
- Be´ard J, Chtourou SM, Courteau L (2004) The effect of audit committee expertise, independence, and activity on aggressive earnings management *Audit J Pract Theory* 23(2): 13–35
- Beasley MS (1996) An empirical analysis of the relation between the board of director composition and financial statement fraud. *Account Rev* 71(4):443–465
- Bebchuk L, Cohen A, Ferrell A (2009) What matters in corporate governance? *Rev Financial Stud* 22(2):783–827
- Bertoni F, Meoli M, Vismara S (2014) Board independence, ownership structure and the valuation of IPOs in continental Europe. *Corp Gov* 22(2):116–131
- Bhat G, Hope OK, Kang T (2006) Does corporate governance transparency affect the accuracy of analyst forecasts? *Account Finance* 46(5):715–732
- Bilinski P, Lyssimachou D, Walker M (2013) Target price accuracy: international evidence. *Account Rev* 88:825–851
- Bilinski P, Lyssimachou D, Walker M (2011) Target price optimism around the world: International evidence. Working paper, University of Manchester
- Bonini S, Zanetti L, Bianchini R, Salvi A (2010) Target price accuracy in equity research. *J Bus Financ Acc* 37(9–10):1177–1217
- Boone AL, Field LC, Karpoff JM, Raheja CG (2007) The determinants of corporate board size and composition: an empirical analysis. *J Financ Econ* 85:66–101
- Boubaker S, Labegorre F (2008) Ownership structure, corporate governance and analyst following: a study of French listed firms. *J Bank Finance* 32(6):961–976
- Bouteska A (2018) The influence of corporate governance mechanisms on the behavior of financial analysts of US Firms: an empirical analysis. *Advances in financial economics*. In: John K, Makhija AK, Ferris SP (eds) *International corporate governance and regulation*, vol. 20, pp. 131–172
- Bradshaw MT (2004) How do analysts use their earnings forecasts in generating stock recommendations? *Account Rev* 79:25–50
- Bradshaw MT, Richardson SA, Sloan RG (2006) The relation between corporate financing activities, analysts' forecasts and stock returns. *J Account Econ* 42(1–2):53–85
- Bradshaw MT, Brown L, Huang K (2012) Do sell-side analysts exhibit differential target price forecasting ability? *Rev Acc Stud* 18(4):930–955
- Bradshaw MT, Brown LD, Huang K (2013) Do sell-side analysts exhibit differential target price forecasting ability? *Rev Acc Stud* 18:930–955
- Bradshaw MT, Huang K, Tan H (2019) The effects of analyst-country institutions on biased research: evidence from target prices. *J Account Res* 57(1):85–120
- Brown LD (1997) Analyst forecasting errors: additional evidence. *Financ Anal J* 53(6):81–88
- Bushman R, Smith A (2001) Financial accounting information and corporate governance. *J Account Econ* 32:237–333

- Bushman R, Piotroski J, Smith A (2004a) What determines corporate transparency? *J Account Res* 42:207–252
- Bushman RM, Chen Q, Engel E, Smith A (2004b) Financial accounting information, organizational complexity and corporate governance systems. *J Account Econ* 37:167–201
- Byard D, Li Y, Weintrop J (2006) Corporate governance and the quality of financial analysts' information. *J Account Public Policy* 25(5):609–625
- Carcello JV, Nagy AL (2004a) Client size, auditor specialization and fraudulent financial reporting. *Manag Audit J* 19(5):651–668
- Carcello JV, Nagy AL (2004b) Audit firm tenure and fraudulent financial reporting. *Audit J Pract Theory* 23(2):55–69
- Carcello JV, Neal TL (2003) Audit committee characteristics and auditor dismissals following “new” going-concern reports. *Account Rev* 78:95–117
- Chen T, Harford J, Lin C (2015) Do analysts matter for governance? evidence from natural experiments. *J Financ Econ* 115:383–410
- Chiang H (2005) An empirical study of corporate governance and corporate performance. *J Law Econ* 31(1):122–140
- Chiang H-T, Chia F (2005) Analyst's financial forecast accuracy and corporate transparency. *Proc Acad Account Financial Stud Memphis* 10(1):9–14
- Chou RK and Shiah-Hou R (2010a) Quality of corporate governance, analyst coverage, and analyst forecast error: do analysts serve as external monitors to managers? Working paper series
- Chou RK, Shiah-Hou R (2010b) Quality of corporate governance, analyst coverage, and analyst forecast error: do analysts serve as external monitors to managers? Working paper
- Chung K, Zhang H (2011) Corporate governance and institutional ownership. *J Financial Quantitative Anal* 46(1):247–273
- Chung H, Judge WQ, Li Y-H (2015) Voluntary disclosure, excess executive compensation and firm value. *J Corp Finan* 32:64–90
- Clarke J, Ferris S, Jayaraman N, Lee J (2006) Are analyst recommendations biased? evidence from corporate bankruptcies. *J Financial Quantitative Anal* 41(1):169–196
- Clarkson PM (2000) Auditor quality and the accuracy of management earnings forecasts. *Contemp Account Res* 17:595–622
- Clement MB (1999) Analyst forecast accuracy: do ability, resources, and portfolio complexity matter? *J Account Econ* 27:285–303
- Cohen L, Lou D (2012) Complicated firms. *J Financ Econ* 104:383–400
- Coles J, Daniel ND, Naveen L (2008) Boards: does one size fits all? *J Financ Econ* 87(2):329–356
- Conrad J, Cornell B, Landsman W, Rountree B (2006) How do analyst recommendations respond to major news? *J Financial Quantitative Anal* 41(1):25–49
- Core JE, Holthausen RW, Larcker DF (1999) Corporate governance, chief executive officer compensation and firm performance. *J Financ Econ* 51(3):371–406
- Cox C (1985) Further evidence on the representativeness of management earnings forecasts. *Account Rev* 60:692–701
- Damodaran A (2006) *Damodaran on valuation*, 2nd edn. Wiley, New York
- Dechow PM, Sloan RG, Hutton AP (2000) The relation between analysts' forecasts of long-term earnings growth and stock price performance following equity offerings. *Contemp Account Res* 17(1):1–32
- Demirakos EG, Strong NC, Walker M (2010) Does valuation model choice affect target price accuracy? *Eur Account Rev* 19:35–72
- Duru A, Reeb D (2002) International diversification and analysts' forecast accuracy and bias. *Account Rev* 77(2):415–433
- Dyck A, Morse A, Zingales L (2006) Who blows the whistle on corporate fraud? Unpublished working paper University of Toronto, Toronto, Canada
- Eisenherdt M (1989) Agency theory: an assessment and review. *Acad Manag Rev* 14(1):57–74
- Easterwood J, Nutt S (1999) Inefficiency in analysts' earnings forecasts: systematic misreaction or systematic optimism. *J Financ* 54(5):1777–1797
- Fama EF (1980) Agency problems and the theory of the firm. *J Polit Econ* 88:288–307
- Fama EF, French KR (1992) The cross-section of expected stock returns. *J Financ* 47(2):427–486
- Fama EF, Jensen MC (1983) Separation of ownership and control. *J Law Econ* 26:301–325
- Farooq O (2017) What determines the value of recommendation change? a preliminary analysis. *J Appl Econ* 49(16):1557–1570

- Firth M, Smith A (1992) The accuracy of profits forecasts in initial public offering prospectuses. *Account Bus Res* 22:239–247
- Firth M, Kwok BCH, Liau-Tan CK, Yeo GH (1995) Accuracy of profit forecasts contained in IPO prospectuses. *Account Bus Rev* 2:55–83
- Firth M, Fung PMY, Rui OM (2006) Corporate performance and CEO compensation in China. *J Corp Finan* 12:693–714
- Frankel R, Kothari S, Weber J (2006) Determinants of the informativeness of analyst research. *J Account Econ* 41(1/2):295–327
- Gregoire J, Marcet F (2014) Analysts target price accuracy and investors' reaction: Chilean stock market evidence. *Mexican J Econ Finance* 9(2):153–173
- Gul F, Hutchinson M, Lai K (2013) Gender-diverse board and properties of analyst earnings forecasts. *Account Horiz* 27(3):511–538
- Hagerman RL, Ruland W (1979) The accuracy of management forecasts and forecasts of simple alternative models *J Econ Bus Spring*, Summer 31(3):172–179
- He J, Tian X (2013) The dark side of analyst coverage: the case of innovation. *J Financial Econ* 109:856–878
- Healy P, Palepu K (2001) Information asymmetry, corporate disclosure, and the capital markets: a review of the empirical disclosure literature. *J Account Econ* 31:405–440
- Higgs D (2003) Review of the role and effectiveness of non-executive directors Report to the UK Department of Trade and Industry, London
- Hoitash U, Hoitash R, Bedard JC (2009) Corporate governance and internal control over financial reporting: a comparison of regulatory regimes. *Account Rev* 84(3):839–867
- Hong H, Kubik JD (2003) Analyzing the analysts: Career concerns and biased earnings forecasts. *J Finance* 58:313–351
- Hope OK (2003a) Accounting policy disclosures and analysts' forecasts. *Contemp Account Res* 20(2):235–272
- Hope OK (2003b) Disclosure practices, enforcement of accounting standards, and analysts' forecast accuracy. *J Account Res* 41(2):235–272
- Hope OK (2003c) Analyst following and the influence of disclosure components, IPOs and ownership concentration. *Asia-Pac J Account Econ* 10(2):117–141
- Howe J, Unlu E, Yan X (2009) The predictive content of aggregate analyst recommendations. *J Account Res* 47(3):799–821
- Huang H-H, Chan M-L, Chang C-H, Wong J-L (2012) Is corporate governance related to the conservatism in management earnings forecasts? *Emerg Mark Finance Trade* 48(Suppl 2):105–121
- Jegadeesh N, Kim W (2006) Value of analyst recommendations: international evidence. *J Financial Mark* 9:274–309
- Jegadeesh N, Kim J, Krische SD, Lee CMC (2004) Analyzing the analysts: when do recommendations add value? *J Financ* 59(3):1083–1124
- Jensen MC (1993) The modern industrial revolution, exit, and the failure of internal control systems. *J Finance* 48(3):831–880
- Jensen MC, Meckling WH (1976) Theory of the firm: managerial behavior, agency costs and ownership structure. *J Financ Econ* 3(4):305–360
- Kao L, Chen A (2004) The effects of board characteristics on earnings management. *Corp Ownersh Control* 1(3):96–107
- Karamanou I, Vafeas N (2005) The association between corporate boards, audit committees, and management earnings forecasts: an empirical analysis. *J Account Res* 43:453–486
- Keay A (2017) Stewardship theory: is board accountability necessary? *Int J Law Manag* 59(6):1292–1314
- Kells S (2020) Impacts of COVID-19 on corporate governance and assurance, international finance and economics, and non-fiction book publishing: some personal reflections. *J Account Organ Chang* 16(4):629–635
- Kent P, Routledge J, Stewart J (2010) Innate and discretionary accruals quality and corporate governance. *Account Finance* 50:171–195
- Kerl AG (2011) Target price accuracy. *Bus Res* 4(1):74–96
- La Porta R, Lopez-de-Silanes F, Shleifer A, Vishny R (2000) Investor protection and corporate governance. *J Financ Econ* 58:3–27
- Lang MH, Lundholm RJ (1996) Corporate disclosure policy and analyst behavior. *Account Rev* 71:467–492
- Lang M, Lins K, Miller D (2004) Concentrated control, analyst following, and valuation: do analysts matter most when investors are protected least? *J Account Res* 42(3):589–623

- Larcker DF, Richardson SA, Tuna A (2007) Corporate governance, accounting outcomes, and organizational performance. *Account Rev* 82(4):963–1008
- Lim T (2001) Rationality and analysts' forecast bias. *J Financ* 56(1):369–385
- Lin JC, Tai VW (2013) Corporate governance and analyst behavior: evidence from an emerging market. *Asia Pac J Financ Stud* 42:228–261
- Lipton M, Lorsch JW (1992) A modest proposal for improved corporate governance. *Bus Lawyer* 48:59–77
- Ljungqvist A, Marston F, Starks LT, Wei KD, Yan H (2007) Conflicts of interest in sell-side research and the moderating role of institutional investors. *J Financ Econ* 85:420–456
- Loderer C, Peyer U (2002) Board overlap, seat accumulation and share prices. *Eur Financ Manag* 8:165–192
- Maaloul A, Ben Amar W, Zeghal D (2016) Voluntary disclosure of intangibles and analysts' earnings forecasts and recommendations. *J Appl Acc Res* 17(4):1–28
- Malmendier U, Shanthikumar D (2007) Are small investors naive about incentives? *J Financ Econ* 85:457–489
- McConnell JJ, Servaes H (1990) Additional evidence on equity ownership and corporate value. *J Financ Econ* 27:595–612
- McKelvey RD, Zavoina W (1975) A statistical model for the analysis of ordinal level dependent variables. *J Math Soc* 4:103–200
- Michaely R, Womack K (2005) Brokerage recommendations: stylized characteristics, market responses and biases. *Adv Behav Finance II* 389–422
- Mikhail M, Walther B, Willis R (1997) Do security analysts improve their performance with experience? *J Account Res* 35(Supplement):131–157
- Miletkov M, Poulsen A, Wintoki B (2014) The role of corporate board structure in attracting foreign investors. *J Corp Finan* 29:143–157
- Mitra S, Deis DR, Hossain M (2007) The empirical relationship between ownership characteristics and audit fees. *Rev Quant Financ Acc* 28(3):257–285
- Morck R, Shleifer A, Vishny R (1988) Management ownership and market valuation. *J Financ Econ* 20:293–315
- Muda I, Maulana W, Siregar HS, Indra N (2018) The analysis of effects of good corporate governance on earnings management in Indonesia with panel data approach. *Iran Econ Rev* 22(2):599–625
- Nazir MS, Afza T (2018) Impact of corporate governance on discretionary earnings management, a case of Pakistani firms. *Pak Econ Soc Rev* 56(1):157–184
- Nguyen H, Faff R (2007) Impact of board size and board diversity on firm value: Australian evidence. *Corp Ownersh Control* 4(2):24–32
- Nurwati A, Zaluki A, Wan-Hussin WN (2010) Corporate governance and earnings forecasts accuracy. *Asian Rev Account* 18(1):50–67
- Pedwell K, Warsame H, Neu D (1994) The accuracy of Canadian and New Zealand earnings forecasts: a comparison of voluntary versus compulsory disclosures. *J Int Account Audit Tax* 3:221–236
- Piotroski JD, Roulstone DT (2004) The influence of analysts, institutional investors, and insiders on the incorporation of market, industry, and firm-specific information into stock prices. *Account Rev* 79(4):1119–1151
- Richardson VJ (2000) Information asymmetry and earnings management: some evidence. *Rev Quantitative Finance Acc* 15(4):325–347
- Rose P (2007) The corporate governance industry. *J Corp Law* 32(4):887–926
- Schmid T (2013) Control considerations, creditor monitoring, and the capital structure of family firms. *J Bank Finance* 37(2):257–272
- Schutte M, Unlu E (2009) Do security analysts reduce noise? *Financial Anal J* 65(3):1–15
- Shleifer A, Vishny R (1997) A survey of corporate governance. *J Financ* 52(2):737–783
- Shleifer A, Vishny RW (1986) Large shareholders and corporate control. *J Polit Econ* 94(3–1):461–488
- Song X, Zheng W (2014) Ownership structure, stock volatility and analyst independence. *China Finance Rev Int* 4(2):187–208
- Song C, Thomas W, Yi H (2010) Value relevance of Fars no 157 fair value hierarchy information and the impact of corporate governance mechanisms. *Account Rev* 85(4):1375–1410
- Srinidhi B, Gul FA, Tsui JSL (2011) Female directors and earnings quality. *Contemp Account Res* 28(5):1610–1644
- Taylor S (2007) Ownership structure and analysts' earnings forecasts: UK evidence. Working paper
- Terza J (2017) Two-stage residual inclusion estimation in health services: research and health economics. *Health Serv Res* 53(3):1890–1899

- Tinaikar S (2012) Outside directors, litigation environment, and management earnings forecasts. *Account Perspect* 11(1):1–29
- Tyson L (2003) The Tyson report on the recruitment and development of non-executive directors Available at <http://www.london.edu/tysonreport>
- Vafeas N (2000) Board structure and the informativeness of earnings. *J Account Public Policy* 19:139–160
- Vargas-Hernández JG, Cruz TME (2018) Corporate governance and agency theory: megacable case. *Corp Gov Sustain Rev* 2(1):59–69
- Viénot M (1995) The Board of Directors of Listed Companies in France Report of the “Viénot Committee” Paris
- Viénot M (1999) Recommendations of the Committee on Corporate Governance (Viénot II Report) AFEP-MEDEF Committee Paris
- Wintoki MB, Linck JS, Netter JM (2012) Endogeneity and the dynamics of internal corporate governance. *J Financ Econ* 105(3):581–606
- Wiseman RM, Cuevas-Rodriguez G, Gomez-Mejia LR (2012) Towards a social theory of agency. *J Manag Stud* 49:202–222
- Xie B, Davidson WN III, DaDalt PJ (2003) Earnings management and corporate governance: the role of the board and the audit committee. *J Corp Finan* 9:295–316
- Xu L, Tang A (2012) Internal control material weakness, analysts' accuracy and bias, and brokerage reputation. *Rev Quant Financ Acc* 39(1):27–53
- Yermack D (1996) Higher market valuation of companies with a small board of directors. *J Financ Econ* 40:185–221
- Yu F (2008) Analyst coverage and earnings management. *J Financ Econ* 88(2):245–271
- Yu M (2010) Analyst forecast properties, analyst following and governance disclosures: a global perspective. *J Int Account Audit Tax* 19:1–15
- Yu M (2011) Analyst recommendations and corporate governance in emerging markets. *Int J Account Inf Manag* 19(1):34–52
- Yu M, & Wang Y (2018) Firm-specific corporate governance and analysts' earnings forecast characteristics: evidence from Asian stock markets. *International Journal of Accounting and Information Management*, 26(3), 335–361

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.