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Do Analysts' Cash Flow Forecasts Improve Firm Value?

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Abstract: We examine whether analysts' cash flow forecasts improve firm value. First, we analyze whether the joint issuance of financial analysts' earnings and cash flow forecasts improve firm value. Second, we analyze whether the quality of analysts' cash flow forecasts improve firm value. The empirical results of our study are as follows. First, the joint issuance of analysts' earnings and cash flow forecasts has a significantly positive effect on firm value; providing cash flow forecasts reduces information asymmetry and increases earnings quality, thereby increasing corporate value. Second, the quality of analysts' cash flow forecasts has a significantly positive effect on firm value; the more accurate cash flow forecasts are, the higher firm value is. Our study provides empirical evidence for that the conclusion that cash flow forecasting information produced by financial analysts provides useful information for capital market participants in economic decision making.

Keywords: analysts' cash flow forecasts; analysts' earnings forecasts; firm value

1. Introduction

Recently, supporting that analysts' cash flow forecasts (ACFF) improve capital market reactions, Mohanram 2014 show that ACFF has helped mitigate accruals mispricing. This suggests that ACFF enables investors to price a firm more accurately and a relationship between ACFF and stock prices. This paper examines the relationship between ACFF and firm value. In accordance with the results of previous research that financial analysts' forecast information solves the agency problem by alleviating information asymmetry, it is judged that the provision of ACFF will not only increase firm value but will also enhance corporate sustainability. Korea is one of the leading countries with well-developed capital market and global business players, where many listed firms increasingly have ACFF. We use samples of Korean listed firms which are suitable for investigating the impact of ACFF outside of the major advanced countries such as the United States. Further, the Korean capital market has adopted International Financial Reporting Standards (IFRS) since 2011. The introduction of Korean International Financial Reporting Standards (K-IFRS) has a systematic effect on the predictive activities of financial analysts and it is likely that there is a different forecast activity than before (Lee and Park 2019). Therefore, we use only the periods since the introduction of K-IFRS as a sample.

One of the biggest characteristics of adopting K-IFRS is that the basic financial statements have been changed from individual financial statements to consolidated financial statements. This change in accounting environment has occurred. In addition, disclosure data on ACFF has been provided since 2011. The major changes with the introduction of K-IFRS are the principle-based standard system,

basic financial statements of consolidated financial statements and expansion of fair value evaluation. Due to this characteristic change in the accounting environment, it is believed that there will be changes in the analysis environment of financial analysts. The increase of managerial discretion due to the basic financial statements of the consolidated financial statements and the principle-based standard system is expected to cause a cost aspect for financial analysts who need to interpret additional information. On the other hand, the increase in disclosure of notes due to the expansion of the principle-based standard system and fair value evaluation is expected to serve as an advantage of obtaining information by providing additional information to financial analysts.

Financial analysts play a key role in alleviating information asymmetry in the capital market by providing predictive information base on multiple sources, analytical skills and forms of expertise that are useful for decision-making by capital market participants. The estimates they provide are more accurate than time-series forecast data that rely solely on past accounting figures because their analyses cover all available information, including past accounting figures, in performing forecasting activity.

In turn, capital market participants use forecast information as a valuable resource for decision making and request a wide range of forecast information from financial analysts. In response to such requests, in the past financial analysts have mainly provided sales and earnings forecasts but they have gradually come to provide a wider range of forecast information, such as target prices, stock recommendations and cash flow forecasts. The more information that is provided to capital market participants and the more accurate that information is, the less information asymmetry there will be in the capital market. Financial analysts provide additional information to capital market participants by providing cash flow forecasts (Call et al. 2009; In et al. 2017; Oh and Shin 2019).

Since the study of DeFond and Hung (2003), which looked at the determinants to provide financial analysts' cash flow forecasts, research on financial analysts' cash flow forecasts has been actively pursued. Previous studies have reported mixed research results regarding their utility. Financial analysts' cash flow forecasts play a role in compensating for low earnings quality (DeFond and Hung 2003; Shin and Oh 2014). They increase the accuracy of earnings forecasting (Call et al. 2009; Oh and Shin 2019) and their positive effects reportedly include reducing asymmetry (Call et al. 2009; Oh and Shin 2019) and capital costs (Jung 2015). On the negative side, it has been claimed that they are merely an extension of earnings forecasting and that the information they provide is of limited utility (Givoly et al. 2009; Bilinski 2014).

As such, studies of the utility of ACFF have shown mixed results. Drawing on evidence that ACFF have useful information content, this study investigated whether they do indeed lead to an increase in firm value. Financial analysts assist investors in understanding their analytical firms by performing active marketing services for them, as well as performing external monitoring services that contribute to reducing agency costs arising from information asymmetry between companies and investors. These services are known to contribute to increasing corporate value (Ahn and Chang 2006). Ahn and Chang (2006) investigated whether increasing the number of financial analysts in a company, leads to corresponding improvements in earnings quality and whether such improvements in turn lead to increased corporate value. They also examined the effectiveness of financial analysts as an external monitoring mechanism.

In other words, the provision of ACFF may help to alleviate information asymmetry and reduce capital costs. As a result, it can be expected that firm value will increase due to a reduction in capital costs. Since the study of (DeFond and Hung 2003), several previous studies have looked at the information content of ACFF but no studies have directly analyzed their relevance to and impact on firm value. Therefore, we are interested in the relationship between ACFF and firm value. This study is intended to broaden understanding of the utility of ACFF by examining the relationship between ACFF and firm value. Our results confirm that the joint issuance of analysts' earnings and cash flow forecasts has a significantly positive effect on firm value; providing cash flow forecasts reduces information asymmetry and increases earnings quality, thereby increasing corporate value. Further, the quality

of ACFF has a significantly positive effect on firm value; the more accurate cash flow forecasts are, the higher firm value is.

Our study contributes to the literature on the usefulness of ACFF by examining whether disclosing ACFF improves a firm value. Most of the previous studies focus on the accuracy and information content of ACFF but this study differs from previous studies in that it analyzes the relevance of ACFF on firm value. In addition to the empirical results that analysts' cash flow forecasting activities contribute to the mitigation of information asymmetry, it will provide additional information to capital market participants in confirming that reducing information asymmetry leads to enhancements in firm value. Finally, it is important to investigate empirically the impact of external monitoring systems on firm value by examining the relationship between ACFF and firm value.

In the analysis that follows, after the introduction provided in the preceding pages, part 2 provides an overview of previous studies and hypotheses regarding ACFF, while part 3 explains the overall design of the research. Part 4 then reports the results of the empirical analysis, while part 5 presents the results of and considers the limitations of our study.

2. Literature Review and Hypotheses Development

2.1. Analysts' Cash Flow Forecasts and Firm Value

Recently, as the number of financial analysts providing cash flow forecasts has increased, research focusing on the subject has begun to develop. Prior studies have examined the criteria and utility of providing analysts' cash flow forecasts.

DeFond and Hung (2003) found that firms that provide both earnings and cash flow forecasts have higher accruals, earnings volatility, capital intensity, market value and generally poorer financial health. In a later study, (DeFond and Hung 2007) analyzed the characteristics of different countries as an incentive for financial analysts to provide cash flow forecasts. Their results showed that financial analysts are more likely to be providing cash flow forecasts in countries that have weak investor protection and poor earnings quality. Shin and Oh (2014) have also found that financial analysts are more likely to provide cash flow forecasts when earnings quality is low. This is consistent with (DeFond and Hung 2003) findings that financial analysts tend to provide cash flow forecasts to help interpret earnings when earnings quality is low.

According to Bilinski (2014), the lower the earnings quality, the smaller the number of financial analysts providing cash flow forecasts and the lower the prediction accuracy of accruals and cash flows. Kim et al. (2014) have investigated whether financial analysts provide cash flow forecasts that take into account the quality of cash flow. They report that as cash flow persistence increases, so too does the number of financial analysts providing cash flow forecasts. Call et al. (2009) have reported that when companies use financial analysts to provide cash flow forecasts, the accuracy of earnings forecasts improves, while understanding of cash flow persistence and accruals also increases. This confirms that financial analysts who provide cash flow forecasts use more sophisticated methods in the forecasting process and that the information they provide is useful.

On the other hand, Givoly et al. (2009) have found no significant differences between the cash flow forecasts of financial analysts and those calculated simply by deducting depreciation costs from earnings forecasts. Based on their results, they suggest that the methods used by financial analysts for predicting cash flows are relatively simple, leading to cash flow forecasts that are unsophisticated and therefore of limited utility. On the other hand, Jung (2015) has suggested that cash flow forecasts from financial analysts provide high-quality information to capital market participants. He argues that they thus help to alleviate information asymmetry and reduce capital costs. McInnis and Collins (2011) have reported that using financial analysts to provide cash flow and accrual forecasts enables capital market participants to divide non-expected earnings into non-expected cash flows and non-expected accruals. One positive result of this is a strengthening of the monitoring function for accrual-based earnings management. The authors also found that in cases where a cash flow forecast had been

provided, accrual-based earnings management decreased, while the probability of either meeting or beating the analyst's cash flow forecast was reduced. Mao and Yu (2015) suggest that the providing of cash flow forecasts may also help to relieve the burden on auditors. They argue that the cash flow forecasts provided by financial analysts lessen the need for earnings management and improve earnings quality while also reducing the burden on the auditors, resulting in lower audit fees and reporting lags. Their findings confirmed that audit fees and reporting lags decreased when cash flow forecasts were provided.

Mohanram (2014) and Radhakrishnan and Wu (2014) have examined whether the cash flow forecasts of financial analysts mitigate accrual anomalies and their results show that companies with cash flow estimates do indeed mitigate such accrual anomalies. In addition, Gordon et al. (2014) have reported on results in an international setting and have found that as financial analysts provide cash flow forecasts and the frequency of these increases, the occurrence of anomalies is reduced. Brown et al. (2011) have examined the role of analysts' cash flow forecasts as an expectation in capital markets. The findings indicated that the stock price and earnings response coefficients were larger when both cash flow and earnings forecasts were available than when earnings forecasts alone were available. In addition, future performance was better for companies with access both to cash flow forecasts and earnings forecasts. These results suggest that capital market participants are using financial analysts' cash flow forecasts as an expectation for cash flow and that cash flow forecasts provide information useful to enhancing the performance of a company.

Keung (2010) finds that earnings forecast revisions supplemented with sales forecast revisions have a greater impact on security prices than do stand-alone earnings forecast revisions, controlling for the incremental information content in sales forecasts. Jung et al. (2012) document stronger market response to stock recommendation revisions of analysts who publish accompanying long-term growth (LTG) forecasts. Song (2015) has examined whether the cash flow forecasts provided by financial analysts are reflected in stock recommendations. The results show a significant positive correlation between revisions in the cash flow forecasts and revisions in stock recommendations. The findings suggest that financial analysts are using their cash flow forecasts as important information in making stock recommendations. Ayers et al. (2018) have examined whether analysts' cash flow forecasts encourage managers to enhance a firm's cash flow position through tax avoidance activities. Consistent with the notion that ACFF encourages tax avoidance in order to enhance a firm's cash flow health, they find a negative relationship between cash tax payments and analysts' cash flow coverage. Oh and Shin (2019) have analyzed the relationship between the issuance of ACFF and accounting information. Two key points emerge from their analysis. First, the relationship between the issuance of analyst's cash flow forecasts and earnings forecast accuracy had significant positive value, while the accuracy of cash flow and earnings forecasts also had a significant positive correlation. Second, the relationship between the issuance of ACFF and buy-sell-bid spread had significant negative values. These results suggest that ACFF provide valuable information for market participants to make economic decisions.

Dhole et al. (2019) find that reported earnings are likely to be more (less) persistent and value relevant when analysts forecast relatively moderate (extreme) levels of operating cash flows, relative to earnings. They also find that the market's response to a given earnings surprise is the strongest for moderate levels of cash flow forecasts relative to earnings. The joint information role of analysts' cash flow and earnings forecasts persists even after controlling for the absolute accruals in the model (Dhole et al. 2019). Andrews et al. (2018) find that good (bad) news forecast revisions reduce (increase) investors' perception of uncertainty about firm value, analysts do not appear to use changes in implied volatilities to shade their forecast revisions to good/bad news and dispersion of forecasts are a reasonable proxy for uncertainty about firm value as indicated by their correlation with implied volatilities. Pan and Xu (2020) find that when analysts issue cash flow forecasts concurrently with earnings forecasts, their stock recommendations lead to higher profitability than when they only issue earnings forecasts, after controlling for analysts' forecast capability. Moreover, they document that the

contemporaneous positive relationship between cash flow forecasts and recommendations profitability is stronger for firms with low earnings quality than for firms with high earnings quality.

2.2. Hypotheses Development

Jensen and Meckling (1976) have discussed agency issues in the enterprise. The less ownership a company has, the more privileged consumption it can take for personal benefit. Under the principle of separation between ownership and control, management decisions may not follow the principle of maximizing corporate value. Since managers are not willing to share wealth with shareholders, a control mechanism such as effective corporate governance is essential (Fama and Jensen 1983). Effective corporate governance can serve as a safeguard to alleviate agency problems and contribute to the efficient allocation of resources while increasing firm value.

Corporate governance is a total control mechanism that can directly influence management decisions (Park 2013). Its roles are to reduce agency costs, enable efficient resource allocation and increase corporate value. Within this framework, (Yu 2008) has reported that the greater the number of financial analysts announcing earnings forecasts, the greater the effectiveness of monitoring and the lower the level of earnings management required of managers. Ahn and Chang (2006) have reported that financial analysts prefer to perform analyses for companies with high-quality accounting earnings and that the analysts contribute to improving the quality of accounting earnings. In addition, they have argued that financial analysts acting in the role of external overseer enhances firm value. Furthermore, (Degeorge et al. 2005) have reported that financial analysts function as an effective external monitoring mechanism in transparent environments in relation to national transparency and the role of financial analysts. In other words, financial analysts reduce the management's earnings management behavior and improve the quality of accounting earnings. The higher the corporate governance structure, the higher the corporate value. In this study, we conducted an analysis using a financial analyst as a substitute for corporate governance.

As mentioned above, (Jensen and Meckling 1976) have argued that analysts act as monitors of managerial performance, as a means of reducing agency costs in terms of debt and equity. Moyer et al. (1989) have presented evidence consistent with this notion, finding that in the presence of potential agency conflicts between managers and owners, analysts' earnings forecasts serve to reduce these agency costs. Similarly, (Chung and Jo 1996) have found that analyst following increases a firm's market value, presenting the activities of analysts as effectively playing a disciplinary role on managerial behavior. Recent evidence confirms that firms followed by more analysts report lower absolute levels of discretionary accruals (Yu 2008).

When analysts issue forecasts of operating cash flow, they specifically function as monitors of a firm's reported cash flow information. We argue that this monitoring role increases the salience of reported cash flow to those outside the firm, thereby disciplining managers in the reporting of operating cash flow and creating incentives for managers to report cash flow information that is as informative as possible regarding future firm prospects.

Firm value is the conversion of a firms' ability to generate future revenue into present value. In other words, it is the value calculated by discounting a firm's total earnings at the current interest rate (average capital cost). If financial analysts provide cash flow forecasts to increase earnings quality and alleviate information asymmetry, capital costs tend to decrease as a result of reduced agent costs. Therefore, reduced capital costs tend to increase corporate value. Furthermore, accurate forecasting of future cash flow will reduce the uncertainty of future cash flow. Financial analysts tend to increase the accuracy of earnings forecasts by providing cash flow forecasts, while certain cash flows tend to increase firm value in the future rather than uncertain cash flows. The preceding discussions lead to the following two hypotheses.

Hypothesis 1. *There is a significant positive relationship between the provision of financial analyst's cash flow forecasts and firm value.*

Hypothesis 2. *There is a significant positive relationship between the accuracy of financial analyst's cash flow forecasts and firm value.*

3. Research Design and Data

3.1. Empirical Models

In this study, it is predicted that the provision of cash flow forecasts by financial analysts will reduce information asymmetry and increase firm value. Therefore, the relationship between ACFF and firm value was established as in H1. The research model for verifying H1 is as shown in Equation (1), in which firm value is a dependent variable measured by Tobin's Q and the ratio of market value of equity to book value of equity. The independent variable, JOINT_DUM is a dummy variable indicating whether or not financial analysts provide cash flow forecasts. In addition, as JOINT_DUM provides a cash flow forecast, the sign of (β_1) is expected to be positive (+) just as firm value is expected to be high. For companies that provided financial analysts' cash flow forecasts, the relationship between the accuracy of ACFF and firm value was established as in H2. The research model for verifying H2 is as shown in Equation (2), in which firm value, which is a dependent variable, is measured by Tobin's Q and the ratio of market value of equity to book value of equity. The independent variable, OCF_ACC indicates the accuracy ACFF. To the extent that these forecasts are accurate, firm value is expected to increase, so the sign of (β_1) is expected to be positive.

$$\begin{aligned} FV_{it} = \beta_0 + \beta_1 JOINT\_DUM_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 INTAN_{it} \\ + \beta_6 GRW_{it} + \beta_7 AGE_{it} + \sum YD + \sum ID + \varepsilon_{it} \end{aligned} \quad (1)$$

$$\begin{aligned} FV_{it} = \beta_0 + \beta_1 OCF\_ACC_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 INTAN_{it} + + \beta_6 GRW_{it} \\ + \beta_7 AGE_{it} + \sum YD + \sum ID + \varepsilon_{it}, \end{aligned} \quad (2)$$

where the dependent variable for Equation (1) is firm value and the independent variable is the joint issuance of financial analysts' earnings and cash flow forecasts. Firm value (FV) is measured as Tobin's Q and MB. Tobin's Q is measured as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. JOINT_DUM is an indicator variable equal to 1 if the financial analyst has provided both earnings and cash flow forecasts in a given year, 0 if not. SIZE is firm size, the natural log of total assets. ROA is return on assets, the ratio of net income to total assets. LEV is firm leverage, the ratio of total debt to total assets. INTAN is the ratio of intangible assets to total assets. GRW is asset growth, measured as the total assets in year t minus total assets in $t-1$, divided by total assets in $t-1$. AGE is firm age, the natural log of the listing period. YD is year dummy and ID is industry dummy. As the variables of interest in H1, if joint issuance increases firm value, this will have a positive value.

The dependent variable for Equation (2) is firm value and the independent variable is the accuracy of ACFF. The accuracy of ACFF is calculated by multiplying the absolute value of cash flow per share minus actual cash flow per share by −1 and standardized by stock price. OCF_ACC is a variable indicating the accuracy of cash flow forecasting and is a variable of interest in H2. The higher the accuracy of cash flow forecasting, the greater the firm value.

The dependent variable is firm value, interpreted as follows. The higher the Tobin's Q ratio and MB, the higher value-added to book value. The firm value regression model includes the firm's characteristic variables (firm size, total asset yield, debt ratio, intangible asset ratio, total asset growth rate and listing period) that are expected to affect corporate value as control variables. SIZE is firm size, measured by taking a natural log of total assets. Debt ratio is added to control the financial characteristics of the company and the firm size variable is added to control the size effect and the omitted variable effect. The return on assets is to control the profitability of the company. Debt ratio is expected to have a positive effect on corporate value due to financial difficulties. Firm size is expected to be positive. ROA is expected to be positive.

3.2. Samples and Data

The sample selection process is summarized in Table 1. The samples are non-financial firms listed on the Korean Exchange (KRX) from 2011 to 2019. We have excluded the quoted non-financial December firms for which financial, stock data and analysts' forecast data cannot be collected from FN Data-Guide provided by the Financial Information and Solution Co., Ltd. (Seoul, Korea). The accounting environment is different due to the different standards for applying IFRS in different countries. Therefore, this study examined the relationship between ACFF and corporate values for listed companies in Korea. Analysis was performed focusing on the period after the adoption of K-IFRS. In Korea, K-IFRS was adopted from 2011. Analysts typically issue several earnings and cash flow forecasts throughout a firm's fiscal period. This study used the forecasts of financial analysts within 3 months from the date of disclosure of financial statements. The reason for using the forecast for three months from the time of disclosure of financial statements is that as the forecast of the financial analyst approaches the end of the year, noise due to additional information other than the financial analyst information may occur. In addition, it is possible to obtain other information more easily toward the end of the year, so the impact of financial analyst forecasts on corporate value is limited. Finally, the accuracy of ACFF increases as it approaches the disclosure date of the financial statements. Therefore, the impact of ACFF on the information environment is considered to be less than that of the initial period. We have used 31 December firms and non-financial firms for fiscal years and firms for which financial data can be collected from TS-2000. Firms whose year-ends are not on 31 December are excluded because of data homogeneity. Financial firms are also excluded since the characteristics of the business are different from those of our sample. The final sample used in the analysis according to joint issuance consists of 1943 firm-year observations. The sample used to analyze the firms providing cash flow forecasts is 1802 firm-year observations. Each of the continuous variables at the 1st and 99th percentiles was winsorized to minimize the effect of outliers. The following is the distribution by year and industry according to financial analysts' cash flow forecasts.

Table 1. Sample selection.

Criteria	Firm-Year Observations
Quoted firms for fiscal years 2011–2019	6433
(less) non 31 December firms and financial firms for fiscal years	(515)
(less) Firms for which financial and stock data could not be collected from FN-Guide and TS-2000	(1047)
(less) Firms for which analysts' forecast data could not be collected from FN-Guide	(2928)
Final sample	1943

Panel A of Table 2 shows the annual distribution of financial analysts' cash flow forecasts. In the full sample, 93% of companies provided cash flow forecasts and earnings forecasts simultaneously. On the other hand, about 7% of companies provided earnings forecasts but not cash flow forecasts. Panel B of Table 2 shows the distribution of financial analysts' cash flow forecasts by industry sector. The rubber and plastic (98.11%) and retail and whole-sale (97.18%) industries provided high rates of cash flow forecasts. On the other hand, other transportation (88.41%) and metallic (89%) industries showed low rates in providing cash flow forecasts.

Table 2. Distribution during sample period.

Panel A: Distribution across Fiscal Years SS					
Year	**N**	**Firms with ACFF**	**Percent (%)**	**Firms without ACFF**	**Percent (%)**
2011	74	53	71.62	21	23.38
2012	133	126	94.74	7	5.26
2013	190	168	88.42	22	11.58
2014	236	195	82.63	41	17.37
2015	263	252	95.82	11	4.18
2016	266	255	95.86	11	4.14
2017	275	269	97.82	6	2.18
2018	281	265	94.31	16	5.69
2019	225	219	97.33	6	2.67
Total	1943	1802	92.74	141	7.26
Panel B: Industry Distribution					
Industry	**N**	**Firms with ACFF**	**Percent (%)**	**Firms without ACFF**	**Percent (%)**
Food, Beverages	110	100	90.91	10	9.09
Fiber, Clothes, Leather	66	62	93.94	4	6.06
Timber, Pulp, Furniture	24	22	91.67	2	8.33
Cokes, Chemical	258	247	95.74	11	4.26
Medical Manufacturing	76	70	92.11	6	7.89
Rubber & Plastic	53	52	98.11	1	1.89
Non-Metallic	34	31	91.18	3	8.82
Metallic	100	89	89.00	11	11.00
Pc, Medical	123	113	91.87	10	8.13
Machine & Electronic	105	98	93.33	7	6.67
Other Transportation	164	145	88.41	19	11.59
Construction	82	77	93.90	5	6.10
Retail & Whole-sale	177	172	97.18	5	2.82
Transportation Service	79	73	92.41	6	7.59
Publishing, Broadcasting	96	89	92.71	7	7.29
Professional Services	210	192	91.43	18	8.57
Other	186	170	91.40	16	8.60
Total	1943	1802	92.74	141	7.26

4. Empirical Results

4.1. Descriptive Statistics

Panel A of Table 3 presents descriptive statistics for the full sample. The mean (median) of firm value (TOBIN_Q) is 1.247 (1.014) and the mean (median) of market to book ratio (MB) is 1.483 (1.032). The mean of firms that provided analysts' cash flow forecasts (JOINT_DUM) is 0.927. This means that approximately 93% of the companies in the sample receive financial analyst cash flow forecast information. The mean (median) of firm size (SIZE) is 28.48 (28.337). The mean (median) of return on assets (ROA) is 3.8% (3.5%). The mean (median) of debt ratio (LEV) is 0.487 (0.504) and the mean (median) of intangible ratio (INTAN) is 0.055 (0.024). Asset growth ratio (GRW) shows a mean of 9.1% and a median of 5.0% and listing period (AGE) presents a mean of 2.785 and a median of 2.996.

Table 3. Descriptive Statistics and Univariate tests.

Panel A: Full Sample for H1 (N = 1943)							
Variable	**Mean**	**Std.**	**Min**	**25%**	**Median**	**75%**	**Max**
TOBIN_Q	1.247	0.686	0.549	0.868	1.014	1.345	4.431
MB	1.483	1.456	−4.012	0.691	1.032	1.683	16.018
JOINT_DUM	0.927	0.259	0.000	1.000	1.000	1.000	1.000
SIZE	28.480	1.575	25.536	27.310	28.337	29.551	32.739
ROA	0.038	0.048	−0.117	0.011	0.035	0.063	0.198
LEV	0.487	0.188	0.106	0.339	0.504	0.628	0.897
INTAN	0.055	0.087	0.000	0.009	0.024	0.060	0.805
GRW	0.091	0.245	−0.388	−0.003	0.050	0.119	1.875
AGE	2.785	0.891	0.000	2.303	2.996	3.466	4.159
Panel B: Firm Samples with ACFF Data for H2 (N = 1802)							
Variable	**Mean**	**Std.**	**Min**	**25%**	**Median**	**75%**	**Max**
TOBIN_Q	1.260	0.700	0.549	0.869	1.020	1.366	4.431
MB	1.511	1.495	−4.012	0.700	1.045	1.720	16.018
OCF_ACC	0.045	0.092	0.000	0.013	0.029	0.055	2.115
SIZE	28.558	1.572	25.536	27.378	28.408	29.616	32.739
ROA	0.039	0.048	−0.117	0.012	0.035	0.064	0.198
LEV	0.488	0.188	0.106	0.340	0.506	0.628	0.897
INTAN	0.056	0.088	0.000	0.009	0.025	0.061	0.805
GRW	0.090	0.237	−0.388	−0.002	0.051	0.120	1.875
AGE	2.784	0.891	0.000	2.303	2.996	3.466	4.159
Panel C: Firm Samples with Only Earnings Forecasts (N = 141)							
Variable	**Mean**	**Std.**	**Min**	**25%**	**Median**	**75%**	**Max**
TOBIN_Q	1.081	0.430	0.549	0.841	0.966	1.216	3.842
MB	1.123	0.711	0.191	0.655	0.935	1.477	4.542
SIZE	27.485	1.245	25.536	26.675	27.443	28.129	31.523
ROA	0.030	0.051	−0.117	0.008	0.031	0.052	0.198
LEV	0.474	0.182	0.114	0.333	0.484	0.610	0.850
INTAN	0.044	0.077	0.001	0.008	0.018	0.041	0.610
GRW	0.092	0.336	−0.388	−0.010	0.033	0.105	1.875
AGE	2.796	0.886	0.000	2.565	2.996	3.367	4.025
Panel D: Univariate Tests for JOINT_DUM Versus non-JOINT_DUM Firms							
Variable	**JOINT_DUM = 1**	**JOINT_DUM = 0**	***t*-Value**	**Wilcoxon *z*-Value**			
	Mean	**Median**	**Mean**	**Median**			
TOBIN_Q	1.260	1.020	1.081	0.966	4.52 ***	2.459 **	
MB	1.511	1.045	1.123	0.935	5.58 ***	2.408 **	
SIZE	28.558	28.408	27.485	27.443	9.651 ***	7.947 ***	
ROA	0.039	0.035	0.030	0.031	2.06 **	1.780 **	
LEV	0.488	0.506	0.474	0.484	0.86	0.851	
INTAN	0.556	0.025	0.044	0.018	1.77 *	2.127 **	
GRW	0.091	0.051	0.092	0.033	0.04	1.714 *	
AGE	2.784	2.996	2.796	2.996	0.15	0.079	

Note: This table shows descriptive statistics for the variables used in the regression analyses. Tobin's Q is measured as total debt plus market value of equity divided by book value of total assets; MB is the ratio of market value of equity to book value of equity; JOINT_DUM is the joint issuance dummy variable, an indicator equal to 1 if the financial analyst has provided both earnings and cash flow forecasts in a given year, 0 if not; OCF_ACC is the accuracy of financial analysts' cash flow forecasts, −1×|analysts' cash flow forecasts per share – actual cash flow per share|/lagged stock price for firm *i* in year *t*; SIZE is firm size, a natural log of total assets; ROA is return on asset, the ratio of net income to total assets; LEV is firm leverage, the ratio of total debt to total assets; INTAN is the ratio of intangible assets to total assets; GRW is asset growth, measured as the total assets in year t minus total assets in $t-1$ divided by total assets in $t-1$; AGE is firm age, the natural log of listing period. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively.

Panel B of Table 3 presents descriptive statistics for the sample for firms that provide both analysts' earnings and cash flow forecasts. The mean (median) of firm value (TOBIN_Q) is 1.260 (1.020) and the mean (median) of market to book ratio (MB) is 1.511 (1.045). The mean (median) of analysts' cash flow forecast accuracy (OCF_ACC) is 0.018 (0.013). The mean (median) of firm size (SIZE) is 28.558 (28.408). The mean (median) of return on asset (ROA) is 3.9% (3.5%). The mean (median) of debt ratio (LEV) is 0.488 (0.506) and the mean (median) of intangible ratio (INTAN) is 0.056 (0.025). Asset growth ratio (GRW) show a mean of 9.0% and a median of 5.1% and listing period (AGE) presents a mean of 2.784 and a median of 2.996.

Panel C of Table 3 presents descriptive statistics for the sample only for firms that provide analysts' earnings forecasts. The mean (median) of firm value (TOBIN_Q) is 1.081 (0.966), while the mean (median) of market to book ratio (MB) is 1.123 (0.935). The mean (median) of firm size (SIZE) is 27.485 (27.443). The mean (median) of return on asset (ROA) is 3.0% (3.1%). The mean (median) of debt ratio (LEV) is 0.474 (0.484) and the mean (median) of intangible ratio (INTAN) is 0.044 (0.018). Asset growth ratio (GRW) show a mean of 9.2% and a median of 3.3%, while listing period (AGE) presents a mean of 2.796 and a median of 2.996.

Panel D of Table 3 presents the univariate tests for the dependent variables and control variables. We tested the mean and the median for the firm value variable between firms with JOINT_DUM and non-JOINT_DUM. The difference was statistically significant in both cases at the 1% level, providing support for our first hypothesis and suggesting that JOINT_DUM firms have greater firm value than non-JOINT_DUM firms.

4.2. Pearson Correlations

Panel A of Table 4 presents the results of Pearson correlations of major variables for full samples. The ratio of market value of equity to book value of equity (MB), analysts' cash flow forecast dummy variables (JOINT_DUM), return on assets (ROA), ratio of intangible assets to total assets (INTAN) and growth rate (GRW) show a significant positive correlation with firm value (FV). This means that firm value is higher for firms with the ACFF data; the higher the profitability and the higher the intangible assets, the larger the growth rate. By contrast, firm size (SIZE), debt ratio (LEV) and listing period (AGE) show a significant negative correlation with firm value (FV). This means that firm value increase in proportion to firm size, debt ratio and listing period duration.

Table 4. Pearson Correlations.

Panel A: H1								
	MB	**JOINT_DUM**	**SIZE**	**ROA**	**LEV**	**INTAN**	**GRW**	**AGE**
(1) TOBIN_Q	0.919 ***	0.068 ***	−0.196 ***	0.447 ***	−0.168 ***	0.047 **	0.143 ***	−0.187 ***
(2) MB		0.069 ***	−0.197 ***	0.345 ***	−0.065 ***	0.038 *	0.146 ***	−0.178 ***
(3) JOINT_DUM			0.177 ***	0.047 **	0.019	0.036 *	−0.001	−0.003
(4) SIZE				−0.127 ***	0.316 ***	0.104 ***	0.015	0.201 ***
(5) ROA					−0.485 ***	−0.019	0.116 ***	−0.068 ***
(6) LEV						0.031	0.026	0.029
(7) INTAN							0.100 ***	−0.114 ***
(8) GRW								−0.161 ***
(9) AGE								
Panel B: H2								
	MB	**OCF_ACC**	**SIZE**	**ROA**	**LEV**	**INTAN**	**GRW**	**AGE**
(1) TOBIN_Q	0.919 ***	0.074 ***	−0.215 ***	0.461 ***	−0.171 ***	0.043 *	0.142 ***	−0.192 ***
(2) MB		0.077 ***	−0.216 ***	0.353 ***	−0.065 ***	0.033	0.148 ***	−0.183 ***
(3) OCF_ACC			−0.102 ***	−0.098 ***	0.037	−0.060 **	−0.011	−0.046 **
(4) SIZE				−0.151 ***	0.319 ***	0.105 ***	0.014	0.213 ***
(5) ROA					−0.496 ***	−0.024	0.133 ***	−0.072 ***
(6) LEV						0.031	0.022	0.025
(7) INTAN							0.117 ***	−0.114 ***
(8) GRW								−0.143 ***
(9) AGE								

This table presents Pearson correlations for the variables used in the regression analyses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

Panel B of Table 4 shows Pearson correlations for firms with analysts' cash flow forecast data. The ratio of market value of equity to book value of equity (MB), analysts' cash flow forecast accuracy (OFF_ACC), return on assets (ROA), the ratio of intangible assets to total assets (INTAN) and growth rate (GRW) show a significant positive correlation with firm value (FV). This means that firm value increases in proportion to accuracy of ACFF, profitability, intangible assets and growth rate. By contrast, firm size (SIZE), debt ratio (LEV) and listing period (AGE) show a significant negative correlation with firm value (FV). This means that firm value increases in proportion to firm size, debt ratio and listing period duration.

4.3. Multivariate Results

From [Model 1] to [Model 4] of Table 5 show the regression analysis for H1. The analysis shows the F value is significant at the 1% level, so the regression model is appropriate. The variance inflation index (VIF) of the independent variable used in the regression analysis for this study was less than 2 and not more than 10, indicating that multicollinearity is not a serious problem. The regression coefficient values (β_1) of JOINT_DUM, which show the relationship between joint issuance and firm value, were respectively 0.197, 0.188, 0.491 and 0.428, a significantly positive value at 1% level. It means that companies that provide both earnings forecasts and cash flow forecasts have high corporate value. These results show that analysts that provide both earnings forecasts and cash flow forecasts simultaneously produce more structured and accurate forecasts than when estimating earnings forecasts alone, thus supporting H1 (Call et al. 2009; In et al. 2017; Oh and Shin 2019).

Table 5. Analysts' cash flow forecasts issuance and firm value.

Variables	Model 1		Model 2		Model 3		Model 4	
	Coef.	*t*-Value	Coef.	*t*-Value	Coef.	*t*-Value	Coef.	*t*-Value
INTERCEPT	2.961	11.670 ***	3.161	5.210 ***	5.679	9.990 ***	6.461	4.860 ***
JOINT_DUM	0.197	3.750 ***	0.188	3.550 ***	0.491	4.170 ***	0.428	3.690 ***
SIZE	−0.064	−6.750 ***	−0.070	−4.760 ***	−0.176	−8.270 ***	−0.192	−6.000 ***
ROA	6.199	19.720 ***	5.830	18.350 ***	11.312	16.070 ***	10.265	14.740 ***
LEV	0.411	4.750 ***	0.358	4.000 ***	1.561	8.050 ***	1.334	6.790 ***
INTAN	0.339	2.110 **	0.490	2.920 ***	0.543	1.510	0.870	2.370 **
GRW	0.124	2.290 **	0.120	2.190 **	0.349	2.890 ***	0.352	2.940 ***
AGE	−0.077	−4.910 ***	−0.085	−5.370 ***	−0.143	−4.100 ***	−0.171	−4.940 ***
IMR			−0.243	−0.320			−1.135	−0.690
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	35.44 ***		31.32 ***		24.75 ***		22.33 ***	
Adj.R^2	32.38%		32.18%		24.83%		25.03%	

Note: This table presents regression results for the relationship between analysts' cash flow forecast issuance and firm value. Models 1 and 2 show results of the regression analysis measured as Tobin's Q for the dependent variable. Models 3 and 4 show the results of the regression analysis measured as MB for the dependent variable. Models 2 and 4 show the results of the regression analysis that re-verifies H1 regarding analysts' cash flow forecast issuance and firm value by controlling sample selection bias of (Heckman 1979). Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. JOINT_DUM is joint issuance dummy variable, an indicator variable equal to 1 if the financial analyst has provided both earnings and cash flow forecasts in a given year, 0 if not. **, *** represent significance at the 5% and 1% levels, respectively. All variables are defined in Appendix A.

From [Model 1] to [Model 2] of Table 6 shows the results of the regression analysis for H2. As a result of the regression analysis, the F value is significant at the 1% level, so the regression model is appropriate. The regression coefficient values (β_1) of OCF_ACC, which indicate the relationship between cash flow forecast accuracy and firm value, were respectively 0.742 and 1.426, which was a significantly positive value at 1% level. In other words, the empirical results show that the firm that accurately predicts cash flow forecasts has higher firm value than those that do not. These results show that the higher the accuracy of cash flow forecasts, the higher the firm value, while the better the quality of cash flow forecasts, the more accurate earnings forecasts will be, thus supporting H2 (Call et al. 2009; In et al. 2017; Oh and Shin 2019).

Table 6. Analysts' cash flow forecasts accuracy and firm value.

Variables	Model 1		Model 2	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	2.945	10.830 ***	5.803	9.410 ***
OCF_ACC	0.742	4.980 ***	1.426	4.230 ***
SIZE	−0.058	−5.870 ***	−0.167	−7.450 ***
ROA	6.787	20.210 ***	12.416	16.310 ***
LEV	0.440	4.840 ***	1.654	8.030 ***
INTAN	0.412	2.450 **	0.670	1.760 *
GRW	0.110	1.880 *	0.356	2.680 ***
AGE	−0.080	−4.930 ***	−0.150	−4.060 ***
YD	Included		Included	
ID	Included		Included	
F-value	35.71 ***		24.41 ***	
Adj.R^2	34.22%		25.98%	

This table presents regression results for the relationship between analysts' cash flow forecast accuracy and firm value. Model 1 shows results of the regression analysis measured as Tobin's Q for dependent variable. Model 2 shows results of the regression analysis measured as MB for the dependent variable. Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. OCF_ACC is the accuracy of financial analysts' cash flow forecasts, −1× |analysts' cash flow forecasts per share—actual cash flow per share|/lagged stock price for firm *i* in year *t*. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

5. Additional Tests

5.1. Re-Verification after Controlling Time Series and Cross Sectional Dependency

From [Model 1] to [Model 4] of Table 7 presents the results of the regression analysis for H1 by modifying the t value using the methodology of Gow et al. (2010) to control for time series and cross-sectional dependency. The regression coefficient values (β_1) of JOINT_DUM, which shows the relationship between analysts' cash flow forecasts and firm value, were respectively 0.175, 0.183, 0.429 and 0.425, a significantly positive value at 1% level.

Table 7. Analysts' cash flow forecasts issuance and firm value.

Variables	Model 1		Model 2		Model 3		Model 4	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	2.928	7.688 ***	2.678	5.859 ***	5.586	6.619 ***	4.986	4.322 ***
JOINT_DUM	0.175	5.923 ***	0.183	5.591 ***	0.429	5.957 ***	0.425	6.367 ***
SIZE	−0.062	−4.339 ***	−0.059	−4.080 ***	−0.170	−5.002 ***	−0.161	−4.328 ***
ROA	6.260	7.488 ***	5.860	7.191 ***	11.467	5.973 ***	10.336	5.765 ***
LEV	0.422	2.849 **	0.348	2.313 *	1.586	3.673 ***	1.299	2.936 **
INTAN	0.330	0.803	0.482	1.041	0.523	0.676	0.855	0.967
GRW	0.123	2.228 *	0.116	1.702	0.350	2.381 *	0.343	2.114 *
AGE	−0.078	−3.110 **	−0.085	−3.137 **	−0.148	−2.374 *	−0.170	−2.490 **
IMR			0.397	0.943			0.807	0.762
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	33.22 ***		33.18 ***		16.52 ***		26.07 ***	
Adj.R^2	22.48%		19.68%		25.72%		16.01%	

Note: This table shows regression results after controlling for time series and cross-sectional dependency in accordance with (Gow et al. 2010) to determine the relationship between analysts' cash flow forecasts and firm value. Models 1 and 2 show results of the regression analysis measured as Tobin's Q for the dependent variable. Models 3 and 4 show results of the regression analysis measured as MB for the dependent variable. Models 2 and 4 shows results of the regression analysis that re-verifies H1 by controlling sample selection bias in accordance with (Heckman 1979). Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets; MB is the ratio of market value of equity to book value of equity; JOINT_DUM is joint issuance dummy variable, an indicator variable equal to 1 if the financial analyst has provided both earnings and cash flow forecasts in a given year, 0 if not. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

From [Model 1] to [Model 2] of Table 8 shows the results of the regression analysis for H2 by modifying the t value using the methodology of Gow et al. (2010) to control time series dependency and cross-sectional dependency. The regression coefficient values (β_1) of OCF_ACC, which show the relationship between analysts' cash flow forecasts accuracy and firm value, were respectively 0.750 and 1.456, a significantly positive value at 1% level.

Table 8. Analysts' cash flow forecasts accuracy and firm value.

Variables	Model 1		Model 2	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	2.915	7.340 ***	5.703	6.362 ***
OCF_ACC	0.750	5.779 ***	1.456	4.842 ***
SIZE	−0.057	−3.770 ***	−0.163	−4.517 ***
ROA	6.827	7.146 ***	12.519	5.785 ***
LEV	0.447	2.788 **	1.673	3.519 ***
INTAN	0.404	0.940	0.650	0.802
GRW	0.109	1.446	0.357	1.894
AGE	−0.081	−3.142 **	−0.153	−2.397 **
YD	Included		Included	
ID	Included		Included	
F-value	35.16 ***		16.29 ***	
Adj.R^2	22.03%		27.01%	

Note: This table shows regression results after controlling for time series and cross-sectional dependency in accordance with (Gow et al. 2010) to determine the relationship between analysts' cash forecasts accuracy and firm value. Model 1 shows results of the regression analysis measured as Tobin's Q for the dependent variable. Model 2 shows results of the regression analysis measured as MB for the dependent variable. Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. OCF_ACC is the accuracy of financial analysts' cash flow forecasts, −1× |analyst' cash flow per share forecasts—actual cash flow per share|/stock price for firm *i* in year *t*. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

5.2. Re-Verification after Controlling for Firm-Fixed Effects

From [Model 1] to [Model 4] of Table 9 presents results of the regression analysis for H1 by a firm-fixed model to control firm-fixed effects. The regression coefficient values (β_1) of JOINT_DUM, which show the relationship between ACFF and firm value, were respectively 0.095, 0.076, 0.300 and 0.243, a significantly positive value at 1%, 5%, 1% and 1% level. This supports the hypothesis even by applying clustering analysis by company and is a statistically robust empirical result.

From [Model 1] to [Model 2] of Table 10 shows results of the regression analysis for H2 by a firm-fixed model to control firm-fixed effects. The regression coefficient values (β_1) of OCF_ACC, which show the relationship between the accuracy of ACFF and firm value, were respectively 0.238 and 0.574, a significantly positive value at 5% level. This supports the hypothesis even by applying clustering analysis by company and is a statistically robust empirical result.

Table 9. Analysts' cash flow forecasts issuance and firm value.

Variables	Model 1		Model 2		Model 3		Model 4	
	Coef.	*t*-Value	Coef.	*t*-Value	Coef.	*t*-Value	Coef.	*t*-Value
JOINT_DUM	0.095	2.820 ***	0.076	2.240 **	0.300	3.760 ***	0.243	3.200 ***
SIZE	−0.299	−8.020 ***	−0.282	−6.780 ***	−0.792	−8.890 ***	−0.737	−7.900 ***
ROA	3.294	14.140 ***	3.118	13.170 ***	6.539	11.780 ***	5.765	10.850 ***
LEV	0.999	7.130 ***	0.988	6.880 ***	3.437	10.280 ***	3.270	10.150 ***
INTAN	−1.454	−5.250 ***	−1.787	−6.340 ***	−3.342	−5.070 ***	−4.171	−6.600 ***
GRW	−0.088	−2.410 **	−0.077	−2.100 **	−0.115	−1.330	−0.113	−1.360
AGE	−0.207	−4.980 ***	−0.213	−4.980 ***	−0.371	−3.750 ***	−0.431	−4.490 ***
IMR			−0.799	−1.530			−1.146	−0.980
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	21.08 ***		20.27 ***		16.02 ***		17.04 ***	
Adj.R^2	85.67%		85.61%		81.95%		83.34%	

Note: This table shows regression results after controlling for firm-fixed effect for the relationship between ACFF and firm value. Models 1 and 2 show the results of the regression analysis measured as Tobin's Q for the dependent variable. Models 3 and 4 show the results of the regression analysis measured as MB for the dependent variable. Models 2 and 4 show the results of the regression analysis that re-verifies H1 about analysts' cash flow forecast issuance and firm value by controlling sample selection bias in accordance with Heckman (1979). Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets; MB is the ratio of market value of equity to book value of equity. OCF_ACC is the accuracy of financial analysts' cash flow forecasts, −1× |analysts' cash flow per share forecasts—actual cash flow per share|/stock price for firm *i* in year *t*. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

Table 10. Analysts' cash flow forecasts accuracy and firm value.

Variables	Model 1		Model 2	
	Coef.	*t*-Value	Coef.	*t*-Value
OCF_ACC	0.238	2.300 **	0.574	2.340 **
SIZE	−0.327	−8.360 ***	−0.866	−9.360 ***
ROA	3.305	13.000 ***	6.434	10.700 ***
LEV	1.129	7.560 ***	3.640	10.310 ***
INTAN	−1.431	−4.810 ***	−3.292	−4.680 ***
GRW	−0.119	−3.000 ***	−0.116	−1.240
AGE	−0.219	−4.860 ***	−0.397	−3.730 ***
YD	Included		Included	
ID	Included		Included	
F-value	21.34 ***		16.78 ***	
Adj.R^2	86.35%		83.27%	

Note: This table shows regression results after controlling for firm-fixed effects for the relationship between the accuracy of ACFF and firm value. Model 1 shows results of the regression analysis measured as Tobin's Q for the dependent variable. Model 2 shows the results of the regression analysis measured as MB for the dependent variable. Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets; MB is the ratio of market value of equity to book value of equity. OCF_ACC is the accuracy of financial analysts' cash flow forecasts, −1× |analyst' cash flow per share forecasts—actual cash flow per share|/stock price for firm *i* in year *t*. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

5.3. Analysis by Classifying Groups According to Number of Financial Analysts

Financial analysts contribute to alleviating information asymmetry between firms and investors by interpreting and predicting information about companies with professional insight. They act as information intermediaries who produce and disseminate information about the intrinsic value of a company with a more professional understanding of accounting information (Schipper 1989). Many informational risks can be avoided if they accurately interpret the quality of accounting earnings and provide them to the capital market. For this reason, the role of financial analysts is very important and numerous studies examining their role have been conducted to date. The number of financial analysts is generally used as an indicator of the amount of publicly available information for a company but also of the amount of personally collected information.

Therefore, we conducted additional analysis on the group that divided the number of financial analysts into the median in Table 11. Panel A of Table 11 shows the result of regression analysis for groups that includes a higher number of financial analysts than the median. Panel B of Table 11 shows the result of regression analysis for groups that includes a lower number of financial analysts than the median. As a result of the analysis, more statistically significant results were found in groups with fewer financial analysts than the median. This shows that financial analysts' cash flow forecasting information is more effective in groups with a poor information environment.

Table 11. Analysts' cash flow forecast issuance and firm value.

Panel A: Analyst Coverage > Median								
Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	6.868	9.290 ***	4.709	4.000 ***	14.378	8.290 ***	7.235	2.690 ***
JOINT_DUM	0.239	0.420	0.212	0.390	0.456	0.340	0.428	0.340
SIZE	−0.192	−11.950 ***	−0.152	−6.880 ***	−0.468	−12.430 ***	−0.336	−6.690 ***
ROA	7.213	15.040 ***	6.783	13.730 ***	14.902	13.250 ***	13.329	11.830 ***
LEV	0.434	3.220 ***	0.321	2.270 **	2.357	7.450 ***	1.732	5.390 ***
INTAN	0.193	0.980	0.448	2.190 **	−0.030	−0.070	0.479	1.030
GRW	0.105	1.420	0.084	1.110	0.448	2.600 ***	0.410	2.380 **
AGE	−0.054	−2.320 **	−0.066	−2.780 ***	−0.129	−2.340 **	−0.176	−3.260 ***
IMR			3.107	1.840 *			10.749	2.800 ***
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	34.21 ***		28.98 ***		25.90 ***		22.42 ***	
Adj.R^2	47.02%		46.34%		39.95%		39.80%	
Panel B: Analyst Coverage < Median								
Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	4.104	8.830 ***	4.516	3.750 ***	7.520	7.860 ***	9.038	3.620 ***
JOINT_DUM	0.091	2.210 **	0.092	2.190 **	0.240	2.610 ***	0.236	2.600 ***
SIZE	−0.111	−6.330 ***	−0.120	−3.540 ***	−0.248	−6.840 ***	−0.284	−4.050 ***
ROA	3.744	9.970 ***	3.737	9.720 ***	5.396	6.980 ***	5.338	6.700 ***
LEV	0.406	4.070 ***	0.390	3.500 ***	1.038	5.060 ***	1.054	4.570
INTAN	0.200	0.760	0.175	0.620	0.403	0.750	0.470	0.800
GRW	0.145	2.090 **	0.142	2.020 **	0.249	1.750 *	0.256	1.750 *
AGE	−0.059	−3.180 ***	−0.067	−3.460 ***	−0.070	−1.860 *	−0.079	−1.990 ***
IMR			−0.381	−0.370			−1.391	−0.650
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	15.08 ***		14.21 ***		10.81 ***		9.99 ***	
Adj.R^2	28.20%		28.82%		21.49%		21.62%	

Note: This table shows regression results for the relationship between ACFF and firm value in relation to analyst coverage. Models 1 and 2 show the results of the regression analysis measured as Tobin's Q for the dependent variable. Models 3 and 4 show the results of the regression analysis measured as MB for the dependent variable. Models 2 and 4 show the results of the regression analysis that re-verifies H1 by controlling sample selection bias in accordance with (Heckman 1979). Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

5.4. Analysis by Classifying Groups According to Firm Size

As firm size increases, both the number of stakeholders and the pressure for information disclosure also increase. Therefore, there is more reason to disclose information since the benefits of doing so outweigh the necessary costs (Jensen and Meckling 1976; Diamond and Verrecchia 1991; Ho and Wong 2001; Watson et al. 2002). Consequently, we conducted an additional analysis on groups that whose firm size was classified as the median in Table 12. Panel A of Table 12 shows the result of the regression analysis for groups with a firm size greater than the median. Panel B of Table 12 shows the result of the regression analysis for groups whose firm size is lower than the median. As a result of the analysis, the most statistically significant results were found in groups whose firm size was smaller than the median. This indicates that financial analysts' cash flow forecasting information is more effective in groups with a poor information environment.

Table 12. Analysts' cash flow forecast issuance and firm value.

Panel A: Firm Size > Median								
Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	5.368	11.800 ***	4.826	5.850 ***	10.900	10.300 ***	8.968	5.070 ***
JOINT_DUM	0.148	1.640 *	0.124	1.450	0.396	1.890 *	0.308	1.680 *
SIZE	−0.138	−8.930 ***	−0.117	−6.730 ***	−0.339	−9.400 ***	−0.270	−7.270 ***
ROA	5.562	13.510 ***	4.824	11.960 ***	11.137	11.630 ***	8.656	10.000 ***
LEV	0.088	0.790	0.025	0.230	0.811	3.130 ***	0.341	1.470
INTAN	0.500	2.900 ***	0.692	4.140 ***	0.813	2.030 **	1.261	3.520 ***
GRW	0.039	0.630	−0.012	−0.190	0.213	1.460	0.146	1.120
AGE	−0.046	−2.360 **	−0.052	−2.810 ***	−0.074	−1.630	−0.103	−2.600 ***
IMR			−0.711	−0.500			−0.564	−0.180
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	25.45 ***		21.63 ***		18.67 ***		17.96 ***	
Adj.R^2	39.57%		38.60%		32.12%		34.07%	
Panel B: Firm Size < Median								
Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	3.863	4.780 ***	1.064	0.400	7.240	4.100 ***	3.420	0.580
JOINT_DUM	0.174	2.550 **	0.169	2.430 **	0.427	2.870 ***	0.392	2.550 **
SIZE	−0.100	−3.300 ***	−0.025	−0.330	−0.239	−3.600 ***	−0.136	−0.830
ROA	6.539	14.130 ***	6.441	13.690 ***	11.256	11.140 ***	11.191	10.770 ***
LEV	0.642	4.980 ***	0.483	3.090 ***	2.178	7.730 ***	1.914	5.540 ***
INTAN	0.099	0.310	0.072	0.210	0.056	0.080	0.087	0.110
GRW	0.219	2.470 **	0.229	2.560 **	0.492	2.550 **	0.512	2.590 **
AGE	−0.094	−3.990 ***	−0.107	−4.370 ***	−0.188	−3.650 ***	−0.217	−4.020 ***
IMR			2.626	1.200			3.612	0.750
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	16.74 ***		15.84 ***		12.03 ***		11.02 ***	
Adj.R^2	30.47%		31.54%		23.50%		23.73%	

Note: This table shows regression results for the relationship between ACFF and firm value in relation to firm size. Models 1 and 2 show the results of the regression analysis measured as Tobin's Q for the dependent variable. Models 3 and 4 show the results of the regression analysis measured as MB for the dependent variable. Models 2 and 4 show the results of the regression analysis that re-verifies H1 by controlling sample selection bias in accordance with (Heckman 1979). Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

5.5. Analysis by Classifying Groups According to Listing Period

According to previous studies (Lang 1991; Chen et al. 2002; Lundholm 2003), firm age is one of the indicators of information asymmetry. The younger a company is, the less likely investors are to have useful and historical information about it compared to older companies. Therefore, a younger company has more reason to disclose additional information about itself to investors than a long-established one. Consequently, we conducted an additional analysis on groups whose firm age was classified by the median in Table 13. Panel A of Table 13 shows the result of regression analysis for groups in which company age is higher than the median. Panel B of Table 13 shows the result of regression analysis for groups in which firm age is lower than the median. As a result of the analysis, the most statistically significant results were found in the group whose firm age was lower than the median. This indicates that financial analysts' cash flow forecasting information is more effective in groups with a poor information environment.

Table 13. Analysts' cash flow forecast issuance and firm value.

Panel A: Firm Age > Median								
Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	3.123	10.010 ***	2.316	3.480 ***	6.209	8.640 ***	4.577	2.990 ***
JOINT_DUM	0.090	1.540	0.106	1.840 *	0.281	2.090 **	0.315	2.380 **
SIZE	−0.063	−6.120 ***	−0.046	−3.080 ***	−0.152	−6.400 ***	−0.124	−3.610 ***
ROA	4.379	12.120 ***	4.093	11.460 ***	7.755	9.320 ***	7.251	8.840 ***
LEV	0.495	5.250 ***	0.449	4.700 ***	1.101	5.070 ***	0.934	4.260 ***
INTAN	1.378	5.230 ***	1.452	5.310 ***	2.089	3.440 ***	2.466	3.930 ***
GRW	−0.017	−0.220	0.015	0.190	−0.157	−0.860	−0.136	−0.760
AGE	−0.148	−2.440 **	−0.136	−2.280 **	−0.402	−2.890 ***	−0.319	−2.320 **
IMR			0.959	1.080			1.786	0.880
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	18.36 ***		18.78 ***		13.07 ***		13.35 ***	
Adj.R^2	33.47%		35.75%		25.91%		27.87%	
Panel B: Firm Age < Median								
Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	2.374	5.550 ***	3.480	3.180 ***	4.939	5.170 ***	8.013	3.380 ***
JOINT_DUM	0.296	3.580 ***	0.286	3.330 ***	0.675	3.650 ***	0.569	3.060 ***
SIZE	−0.053	−3.260 ***	−0.083	−3.030 ***	−0.183	−5.070 ***	−0.257	−4.320 ***
ROA	7.439	14.990 ***	6.906	13.250 ***	14.066	12.690 ***	12.469	11.050 ***
LEV	0.389	2.680 ***	0.316	2.040 **	2.175	6.710 ***	1.935	5.760 ***
INTAN	0.079	0.370	0.263	1.160	0.244	0.510	0.549	1.120
GRW	0.199	2.720 ***	0.186	2.440 **	0.568	3.470 ***	0.562	3.400 ***
AGE	−0.002	−0.070	−0.019	−0.640	0.023	0.360	−0.036	−0.550
IMR			−0.837	−0.680			−3.018	−1.130
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	19.01 ***		15.43 ***		13.15 ***		10.91 ***	
Adj.R^2	32.52%		31.15%		24.54%		23.71%	

Note: This table shows regression results for the relationship between ACFF and firm value in relation to listing period. Models 1 and 2 show results of the regression analysis measured as Tobin's Q for the dependent variable. Models 3 and 4 show results of the regression analysis measured as MB for the dependent variable. Models 2 and 4 show results of the regression analysis that re-verifies H1 by controlling sample selection bias in accordance with (Heckman 1979). Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

5.6. Analysis Including the Interaction Variable between Profitability and ACFF

The effect of cash flows on corporate value has an incremental effect on earnings (Bowen et al. 1987; Ali 1994; Dechow 1994). Therefore, by controlling the interaction variable between profitability and ACFF in further analysis, we examined whether companies that issue cash flow forecasts have an incremental effect compared to those that do not. From [Model 1] to [Model 4] of Table 14 presents the results of the regression analysis including the interaction variable between profitability (ROA) and financial analyst cash flow forecasts (JOINT_DUM). The regression coefficient values (β_4) of ROA*JOINT_DUM, which shows the effect of profitability and analysts' cash flow forecasts on firm value, were respectively 0.651, 0.529, 0.976 and 0.642, a significantly positive value at 1%, 1%, 1% and 5% level, respectively. Thus, financial analysts' cash flow forecasts showed an additional effect on corporate value.

Table 14. The effect of Profitability and Analysts' cash flow forecasts issuance on firm value.

Variables	Model 1		Model 2		Model 3		Model 4	
	Coef.	*t*-Value	Coef.	*t*-Value	Coef.	*t*-Value	Coef.	*t*-Value
INTERCEPT	2.972	11.820 ***	3.197	5.340 ***	5.696	10.060 ***	6.522	4.950 ***
JOINT_DUM	0.176	3.380 ***	0.171	3.240 ***	0.460	3.910 ***	0.408	3.500 ***
SIZE	−0.064	−6.760 ***	−0.070	−4.840 ***	−0.176	−8.270 ***	−0.193	−6.070 ***
ROA	5.286	15.300 ***	5.140	14.360 ***	9.943	12.790 ***	9.428	11.980 ***
ROA*JOINT_DUM	0.651	6.100 ***	0.529	4.120 ***	0.976	4.070 ***	0.642	2.270 **
LEV	0.406	4.730 ***	0.353	3.960 ***	1.554	8.040 ***	1.327	6.770 **
INTAN	0.346	2.170 **	0.498	2.990 ***	0.553	1.540	0.881	2.400 **
GRW	0.154	2.860 ***	0.138	2.530 **	0.395	3.260 ***	0.374	3.120 ***
AGE	−0.074	−4.800 ***	−0.081	−5.170 ***	−0.140	−4.010 ***	−0.166	−4.820 ***
IMR			−0.269	−0.360			−1.193	−0.730
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	36.16 ***		31.10 ***		24.66 ***		21.79 ***	
Adj.R^2	33.64%		32.79%		25.43%		25.21%	

Note: This table shows regression results including interaction variable between profitability and ACFF. Models 1 and 2 show results of the regression analysis measured as Tobin's Q for the dependent variable. Models 3 and 4 show results of the regression analysis measured as MB for the dependent variable. Models 2 and 4 shows results of the regression analysis by controlling for sample selection bias in accordance with (Heckman 1979). Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. ROA_JOINT_DUM is interaction variable between ROA and JOINT_DUM. **, *** represent significance at the 5% and 1% levels, respectively. All variables are defined in Appendix A.

5.7. Analysis by Classifying Groups According to Earnings Quality

Analysts are more likely to provide cash flow forecasts for firms with high earnings quality and are unwilling to disclose cash flow forecasts when the quality of earnings is low (Bilinski 2014). On the other hand, (Call et al. 2009) reported that when earnings quality is low, financial analysts issue cash flow forecasts as a means to supplement earnings forecasts. Bilinski (2014) is a study result from the perspective of suppliers providing cash flow forecasts and (Call et al. 2009) is a study result from the perspective of demanders who need cash flow forecasts. In other words, research results are mixed according to the perspective on the quality of earnings. Accordingly, the sample was classified according to the quality of earnings and further analyzed. Panel A of Table 15 shows the result of the regression analysis for groups with earnings quality lower than the median. Panel B of Table 15 shows the result of the regression analysis for groups whose earnings quality is greater than the median. As a result of the analysis, the most statistically significant results were found in groups whose earnings quality was smaller than the median. In other words, financial analysts' cash flow forecasts were found to have a more significant effect on corporate value when the quality of earnings is low. This is an additional empirical result of previous studies from the perspective of demanders.

Table 15. Analysts' cash flow forecast issuance and firm value.

Panel A: Earnings Quality < Median								
Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	2.613	6.400 ***	2.713	2.610 **	5.019	5.280 ***	5.434	2.320 **
JOINT_DUM	0.148	1.820 *	0.131	1.710 *	0.479	2.530 **	0.401	2.170 **
SIZE	−0.041	−2.600 ***	−0.046	−1.750 **	−0.142	−3.900 ***	−0.152	−2.580 **
ROA	5.443	11.270 ***	5.222	10.350 ***	10.627	9.450 ***	9.687	8.500 ***
ROA*JOINT_DUM	0.637	5.610 ***	0.532	3.510 ***	1.005	3.500 ***	0.698	2.040 **
LEV	0.267	1.950 *	0.238	1.660 *	1.698	5.330 ***	1.440	4.450 ***
INTAN	0.103	0.430	0.308	1.150	0.167	0.300	0.523	0.860
GRW	0.171	2.220 **	0.151	1.910 *	0.529	2.960 ***	0.519	2.900 ***
AGE	−0.095	−4.030 ***	−0.103	−4.350 **	−0.191	−3.490 ***	−0.224	−4.160 ***
IMR			−0.138	−0.120			−0.686	−0.250
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	20.96 ***		16.56 ***		13.57 ***		11.04 ***	
Adj.R^2	36.55%		33.95%		26.63%		24.90%	
Panel B: Earnings Quality > Median								
Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Coef.	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**	**Coef.**	***t*-Value**
INTERCEPT	2.817	9.020 ***	2.640	3.640 ***	5.416	8.070 ***	5.628	3.670 ***
JOINT_DUM	0.212	3.220 ***	0.220	3.190 ***	0.471	3.330 ***	0.433	2.960 ***
SIZE	−0.070	−6.160 ***	−0.066	−3.910 ***	−0.182	−7.430 ***	−0.182	−5.100 ***
ROA	5.060	8.440 ***	4.949	8.240 ***	9.609	7.460 ***	9.477	7.450 ***
ROA*JOINT_DUM	0.171	0.500	0.218	0.640	−0.265	−0.360	−0.162	−0.230
LEV	0.468	4.410 ***	0.382	3.420 ***	1.320	5.790 ***	1.104	4.670 ***
INTAN	0.702	3.390 ***	0.759	3.670 ***	1.226	2.760 ***	1.410	3.220 ***
GRW	0.050	0.660	0.053	0.700	0.027	0.170	0.034	0.210
AGE	−0.035	−1.780 *	−0.041	−1.970 **	−0.045	−1.040	−0.064	−1.450
IMR			0.282	0.300			−0.472	−0.230
YD	Included		Included		Included		Included	
ID	Included		Included		Included		Included	
F-value	14.54 ***		13.90 ***		10.96 ***		10.77 ***	
Adj.R^2	28.08%		29.13%		22.32%		23.75%	

Note: This table shows regression results for the relationship between ACFF and firm value in relation to earnings quality. Models 1 and 2 show results of the regression analysis measured as Tobin's Q for the dependent variable. Models 3 and 4 show results of the regression analysis measured as MB for the dependent variable. Models 2 and 4 show results of the regression analysis that re-verifies H1 by controlling sample selection bias in accordance with Heckman (1979). Tobin's Q is calculated as total debt plus market value of equity divided by book value of total assets. MB is the ratio of market value of equity to book value of equity. Earnings quality is measured as modified Jones model (1995). *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

6. Conclusions

This study analyzed the relationship between financial analysts' cash flow forecasts and firm value using as a sample 1943 firm-year observations from 2011 to 2019. In addition, we examined the relationship between the quality of financial analysts' cash flow forecasts and firm value. Firm value was calculated using Tobin's Q and MB.

Previous research results have thus been mixed in their evaluation of the role played by financial analysts. Although numerous studies have been made of financial analysts' cash flow forecasts, little is known about the relationship between financial analysts' cash flow forecasts and firm value. Accordingly, this study has sought to gain a better understanding of the role of financial analysts' cash flow forecasts.

Financial analysts provide useful information about the market and suggest directions for investment. Their activities alleviate information asymmetries between firms and investors in the market and enhance market efficiency by acting as information intermediaries (Healy and Palepu 2001). Information they provide, including earnings forecasts, target prices and stock recommendations, is estimated to be useful in the capital market. Recently, the number of financial analysts providing

cash flow forecasts about companies has begun to increase and a wide range of research results have been reported. The purpose of this study was to analyze whether financial analysts' cash flow forecasts increase corporate value as a result of its governance structure.

Our empirical analysis found that cash flow forecasts have a positive effect on firm value. Providing cash flow forecasts reduces information asymmetry and increases the quality of earnings, thereby increasing corporate value. The accuracy of cash flow forecasting was also found to have a positive effect on firm value; the higher the quality of the cash flow forecast, the higher the firm value that results.

Through further analyses, our hypotheses were lent additional support by controlling time series and cross-sectional dependency. In addition, statistical significance was maintained even though the firm fixed effect was controlled. As additional variables, we selected number of financial analysts, company size and company age as representative of the overall information environment in a company and subjected them to further analysis. Analysis of the results showed that the poorer the information environment, the more significant is the statistical effect of financial analysts' cash flow forecasts. Our empirical results demonstrated that the cash flow forecast information provided by financial analysts can be used as a supplement when the information environment is poor.

While previous studies have focused on the determinants of cash flow forecasts and information effects, research on the implications of these information effects for corporate value has to date been insufficient. For that reason, this study focused specifically on how the information provided by financial analysts' cash flow forecasting affects firm value. We have argued here that financial analysts provide useful evidence in the decision making of stakeholders in the capital market, providing empirical evidence that cash flow forecasting information contributes to increased firm value.

Our study contributes to the understanding of link between ACFF disclosures and a firm value. ACFF can be a sophisticated process, including the application and interpretation of financial information. Studying the implications of ACFF is essential to understanding how analysts perform their job of information intermediaries to the capital market. Our results confirm that ACFF ultimately help improve shareholder's wealth. Thereby, we suggest an empirical basis for analysts to encourage issuing cash flow forecasts in terms of information disclosure. Also, our findings suggest that cash flow forecasts issued by analysts in response to market demand likely play a more important role in firm valuation than cash flow forecasts issued by analysts mainly because of supply-side considerations (Pan and Xu 2020).

With regard to the limitations of our study, we were unable to consider many other variables that determine firm value. In addition, since financial analysts' cash flow forecasts are processed based on the quality of profits of a company, it may indicate internal problems related to the quality of profits. We have tried to control such internal problems through the analytical method employed but the possibility of other internal problems not considered here remains. We used the heckman model to control endogeneity in this study and in Hypothesis 2, endogeneity was partially controlled by analyzing only samples with ACFF. In addition, there is a time difference by analyzing the data on ACFF disclosed within 3 months after the financial statements are disclosed. Thus, endogeneity was controlled through a time difference model. Despite the various analyzes to control endogeneity, limits on endogeneity still exist. We look forward to future studies due to the increase in analysis period and the number of sample. It is necessary to examine the use of additional control variables and the incremental effect of cash flow forecasts according to prior research. In this study, in order to improve the completion of the thesis, the interactive variables between profitability and cash flow forecasts were further analyzed. In addition, since the demander's perspective on the quality of earnings and the supplier's perspective are mixed in relation to the ACFF, samples were classified and analyzed according to the quality of the earnings. Nevertheless, there are limitations that have not been explored and we look forward to further research on these areas.

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Appendix A. Variable Definitions for H1, H2

Dependent Variables

FV	financial analysts' earnings forecast accuracy, −1× |analysts' earnings per share forecasts–actual earnings per share|/stock price for firm *i* in year *t*;
Tobin's Q	measured as total debt plus market value of equity divided by book value of total assets;
MB	ratio of market value of equity to book value of equity;

Explanatory Variables

JOINT_DUM	joint issuance dummy variable, an indicator variable equal to 1 if the financial analyst has provided both earnings and cash flow forecasts in a given year or 0 if not;
OCF_ACC	financial analysts' cash flow forecast accuracy, −1× |analysts' cash flow per share forecasts—actual cash flow per share|/stock price for firm i in year *t*;

Control variables

SIZE	natural log of total assets;
ROA	return on asset, measured as net income divided by lagged total asset;
LEV	financial leverage, measured as liabilities divided by total assets;
INTAN	ratio of intangible assets to total assets;
GRW	asset growth, measured as total assets in year t minus total assets in $t-1$ divided by total assets in $t-1$;
AGE	number of years from the date of initial listing to lagged period;
YD	year dummy;
ID	industry dummy.

Appendix B

Sample Selection Bias: (Heckman 1979)

This section deals with the problem of sample selection bias relating to the joint issuance of financial analysts' earnings forecasts and cash flow forecasts. Since this problem could have a potential impact on the results of this study, our analysis uses the two-step estimation model proposed by (Heckman 1979).

The first-order regression model variables expected to influence the selection of the joint issuance of financial analysts' earnings forecasts and cash flow forecasts are: accruals (ACCRUAL), earnings volatility (VOL), business cycle (CYCLE), capital intensity (CAPINT), financial health (K1_SCORE) and firm size (SIZE). The first-order regression model is calculated using the following equation:

$$\begin{aligned} Pr(JOINT\_DUM_{it}) & \\ &= \beta_0 + \beta_1 ACCRUAL_{it} + \beta_2 VOL_{it} + \beta_3 CYCLE_{it} + \beta_4 CAPINT_{it} \\ &+ \beta_5 K1\_SCORE_{it} + \beta_6 SIZE_{it} + \varepsilon_{it} \end{aligned} \quad \text{(A1)}$$

where *JOINT_DUM* is joint issuance dummy variable, an indicator variable equal to 1 if the financial analyst has provided both earnings and cash flow forecasts in a given year or 0 if not; *ACCRUAL* is absolute value of total accruals, which is measured as net income minus operating cash flow and standardized by total asset; *VOL* is earnings volatility and CYCLE is business cycle; *CAPINT* is capital intensity and *K1_SCORE* is financial health; *SIZE* is firm size, which is measured as the logarithm of total assets in year $t-1$.

Inverse Mill's Ratio (IMR) was estimated based on the Probit Model mentioned below. The second regression model was analyzed by further controlling estimated IMR.

Variable Definitions for Probit Model

JOINT_DUM	joint issuance dummy variable, an indicator variable equal to 1 if the financial analyst has provided both earnings and cash flow forecasts in a given year or 0 if not;
ACCRUAL	absolute value of total accruals, measured as absolute value of net income minus operating cash flow divided by total assets in t;
VOL	earnings volatility, (standard deviation of earnings from year $t-4$ to year t/average deviation of earnings from year $t-4$ to year t)/(standard deviation of operating cash flow from year $t-4$ to year t/average deviation of operating cash flow from year $t-4$ to year t);
CYCLE	business cycle, 365/inventory turnover + 365/receivable turnover, where inventory turnover is measured as cost of goods sold divided by average inventory and receivable turnover is measured as sales divided by average receivable;
CAPINT	capital intensity, (gross property, plant and equipment)/sales;
K1_SCORE	financial health, K1-SCORE = $-17.862 + 1.472X_1 + 3.041X_2 + 14.839X_3 + 1.516X_4$ where, X1: natural logarithm of total assets X2: natural logarithm of (sales/total asset) X3: retained earnings/total assetX4: equity/debt;
SIZE	firm size, logarithm of total assets in year $t-1$.

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