

A Study of Analyst Recommendation, Manager Compensation, Earnings Forecast Accuracy, and Abnormal Return

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Abstract

The credit and reputation of stock trading recommendations are important indicators of trust from investors. Previous research mainly focused on the information quality of analyst coverage and its impact on analysts. In the stock market of Taiwan, recommendations are issued in the name of security firms. When the quality of recommendation is poor, the possible impact on the credit of security firms and the association between securities firm managers' remuneration and analysts' coverage quality are rarely covered by current literature. In this study, we intend to examine the association between a securities firm's buy recommendation and the remuneration of securities firm managers, the accuracy of earnings forecast, and the implied abnormal returns. Through Logistic regression and event study methods, preliminary empirical results support the positive relationship between the probability of securities firm's buy recommendations and managers' remuneration, the accuracy of earnings forecast, and the abnormal stock price returns. We further examine whether there has been a change in the previous findings during the Covid-19 epidemic period when it is more difficult for investors to collect information.

JEL: classification: G3; G14, J3

Keywords: Analyst recommendation, Manager compensation, Earnings forecast accuracy, Abnormal stock return

I. Introduction

Stock trading recommendations are one of the important channels for security firms to communicate information on listed companies. Previous studies have shown that analysts' stock trading recommendations imply important information, such as: future expectations (Birru, Gokkaya, Liu and Stulz 2022), private information (Bernhardt and Kutsoati 2001), herd prediction or bold prediction (Clement and Tse 2005; Durand, Limkriangkrai and Fung 2014), abnormal returns for recommending buying or selling (Shen and Chih 2009; Barber, Lehavy and Trueman 2007). The credit and reputation of the recommender represent an important indicator of whether investors continue to trust after the trading recommendation is issued. In previous literature, while examining the value of stock recommendations, the main focus is on the information connotation or experience of the recommenders. For example, security firms with larger scales have information advantages (Clement and Tse 2003; Gleason and Lee 2003); a positive relation between analysts' personal experience or practice and the connotation of stock information recommended (Groysberg, Healy and Maber 2011). However, previous studies mainly focused on the information advantages of analyst coverage, and explored the influence on individual analysts after stock recommendations, such as becoming a star analyst or being promoted or transferred to a larger brokerage (Gleason and Lee 2003; Clement and Tse 2003). Since analysts are employed by security firms, there are few studies to examine whether the credibility of security firms will be affected when analysts issued poor accuracy recommendations. The consequence of issuing stock trading recommendations by security firms in Taiwan is different from that in the U.S. by analysts. The quality of analyst coverage or earnings forecast of the U.S. analysts will affect their personal salary, reputation and career development (Liu 2017; Durand, Limkriangkrai and Fung 2014; Clarke and Subramanian 2006; Clement and Tse 2005). However, in Taiwan, stock recommendations are issued in the name of the security firms. Therefore, when the recommendation quality differs greatly from the stock price performance, investors may not necessarily remember the analyst's name, but will feel disappointed with the security firms, who will bear all the results. Therefore, the impact suffered by security firms is not only on the business, but also on the reputation or goodwill.

The design of manager compensation systems has been shown to affect manager's and firm's performance (Ellis, Michaely and O'Hara 2011; Groysberg, Healy and Maber 2011; Bernhardt, Campello, and Kutsoati 2004). Previous research supports the conflict of interest that may arise from interactions between departments (such as research, underwriting, brokerage, and self-operated departments) of security firms (investment banks) (Shen and Chih 2009) and the manager reward system can effectively reduce agency problem of the company (Zheng et al. 2022; Zhu 2019). However, there has no relevant research on the relationship between the rewards of securities firm managers and analyst recommendations yet. To increase brokerage fee income, managers or brokers may encourage investors to trade frequently by issuing buy or sell recommendations. However, issuing a sell recommendation, if followed by declined stock price, may result in a repulsive response from listed company or a concern from authority.

Therefore, we will focus on buy recommendation, which will increase investors' trading frequency and brokerage's fee income. When a securities firm faces a conflict of reputation and interests, managers of the firm will maximize their own benefit based on the principle of self-interest. For the stocks recommendations in Taiwan, due to diverse conflicts of interest arising among advising firms, security firms, and financial holding companies, the motivation for recommending stock investments will also be different. The principle of investment advisors is precision, while brokerage firm managers and the securities firm based financial holding companies mainly focus on increasing transaction to earn fees. Therefore, in order to increase rewards, managers tend to increase the issuance of buy recommendation. However, if the reputation of securities firm or financial holding company is harmed due to the recommendation, manager will also be punished, which is the trade-off that the manager must face.

In this study we examine the relationship between security firms' buy recommendation and manager's salary, earnings forecast accuracy, and implied abnormal returns. First of all, Logistic regression is applied to examine the influence of brokerage's buy recommendation on the manager's salary, and the impact of earnings forecast accuracy on the probability of brokerage's buy recommendation. Next, the event study method is applied to test whether brokerage's buy recommendation implies with abnormal return. All the above three tests results are compared with results during the Covid-19 epidemic period, when it is more difficult for investors to collect information, to see whether the aforementioned relationship is different. The empirical results show that the probability of security firms' buy recommendation is positively correlated with the salary of managers, and the probability of buy recommendation is positively correlated with the of earnings forecast accuracy issued by security firms. When the securities firm issued a buy recommendation, the stock price showed a significant positive abnormal return. We present the literature review and research hypothesis in section two, the research methods, models and data in section three, and the empirical results and conclusion in section four and five, respectively.

II. Literature Review and Research Hypothesis

A. Buy recommendation and manager compensation

Securities investment advice is usually issued by security firms in Taiwan's financial market, and by analysts in the United States. Michaely and Womack (1999) pointed out the potential conflicts of interest in investment advice among three departments of investment banks: underwriting, brokerage, and trading. For example, if the target company in the advice is a client of an investment bank, the brokerage department tends to issue favorable advice for the client company (although the brokerage department is related to the reputation of analyst and the quality of advice). In addition, when the incentive mechanism of analyst's salary is related to profit derived from the client company's business in underwriting (corporate finance) department, or when the trading department's target is the client company's stock, potential of conflicts of interest are also existed. Shen, Chi and Gao (2005) explored the conflicts of interest that may arise from the interaction between departments of security firms (research, underwriting,

brokerage, and dealer). The empirical results with a sample in Taiwan stock market show that conflicts of interest existed between departments of security firms, and this conflict of interest is beneficial to the profitability of security firms. However, security firms with higher conflicts of interest are not punished by market forces.

Concerning the salary incentives mechanism of managers, previous studies on CEO compensation, including Cheng and Warfield (2005), Bergstresser and Philippon (2006), Burns and Kedia (2006) and Joo and Chamberlain (2017) have all support that the design of the CEO's salary structure will lead to incentives for managers' earning management. In the research of investment banking, Ellis, Michaely and O'Hara (2011) examined investment banks' possible trade-offs when acquiring new or existing clients, and found that the intense competition among investment banks in seeking (client) companies with similar quality (prestige) underwriting business was reflected in lower fees and more optimistic recommendations. Regarding the relationship among optimistic recommendations, investment banks' income and analyst compensation, Groysberg, Healy and Maber (2011) examined factors affecting analyst compensation and found that star analyst recognition, contribution to investment banks, portfolio size, and whether analysts are among the top stock pickers identified by Wall Street Journal are positively correlated with analyst compensation. The findings suggest that analyst compensation mechanism is designed to reward behaviors that increase brokerage and investment banks' revenues.

In contrast, Ljungqvist, Wilhelm, and Marston (2006) examined whether analyst recommendations had an effect on investment banks' winning of underwriting for 16,625 bond and equity offerings between 1993 and 2002, controlling for relation between issuers and investment bank's potential competitors, loan arrangement between issuer and bank, the endogeneity of the analyst's behavior, and the bank's decision to provide analyst coverage. Although results support the influence of compensation incentives on analysts' behavior, no evidence was found to support active analyst recommendations will increase the likelihood that a bank will win an underwriting offer. Research results indicates that the main determinant factor of an issuer's choice of investment bank is the strength of prior underwriting and lending relationships.

In analyst's coverage, Birru, Gokkaya, Liu and Stulz (2022) found that institutional investors attach great importance to short-term trading recommendations. Institutional investors believe that short-term trading recommendations, analyst recommendations and changes in the target price are as important as the impact on the stock price. For investment advice, it is more informative to include trading recommendation for event expected in the future. At the same time, analysts who have a better relationship with the company's management will generate better trading advice and institutional investors can obtain significant abnormal return by following trading advice. Regarding the quality of earnings forecast, Bernhardt and Kutsoati (2001) found that analysts' compensation is related to the quality of their forecasts. With private information, analysts have a higher tendency (60% probability) to overestimate their earnings in forecasts (0.75~0.8%). However, the research of Groysberg, Healy and Maber (2011) does not

support the inference that analyst compensation is related to earnings forecast accuracy, but support that analyst turnover is related to earnings forecast accuracy.

Regarding the incentive system of managers, Zhu (2019) took the Chinese A-share listed companies from 2007 to 2017 as a sample to test the impact of manager's incentive system on analysts' forecasting behavior. The study found that both the manager's salary incentive and the manager's equity incentive can significantly improve the quality of analyst's coverage and the analyst's optimistic forecasting tendency, although the influence of the salary incentive and the equity incentive on the accuracy of the analyst's forecast is heterogeneous. Regarding these two incentives, manager's compensation incentive system significantly improves the accuracy of analysts' forecasts by improving the company's short-term performance. However, manager's equity incentive system exacerbates the company's short-term performance fluctuations by improving the manager's risk-taking ability, and thus reduces the accuracy of analysts' forecasts. Further research shows that the manager's power distorts the corporate governance effect of the manager's incentive system to a certain extent. When analysts recognize the effect of this distortion, their forecasting behavior for the target company will be affected.

The Covid-19 epidemic has had a huge impact on the operations of various industries. A survey study conducted by Brynjolfsson et al. (2020) examined a sample of the US population during the Covid-19 epidemic period and found that, compared with the pre-epidemic period, about half of workers were currently working from home (WFH), including 35.2% of commuter workers who switched to WFH. Younger workers, management and related professions were more likely to switch to WFH; however, 10.1% of workers overall were still dismissed or furloughed. In addition, Du (2020) explored the impact of school closures caused by the Covid-19 epidemic and found that school closures significantly reduced the timeliness of female analysts' forecasts, especially the earnings forecast by mother analysts whose chance of timely release were reduced by 20%, after school closures.

Based on the above literature, this study intends to examine the relationship between the trading recommendation issued by security firms and the compensation of securities firm managers. Based on the sample data in Section III (also Table 1 and Table 2 in Section IV), we find that Brokers seldom provide "sell" recommendations. On the premise that the brokerage's income can be increased by increasing transactions, this study tested the hypothesis 1.1. Based on the trend of WFH during the epidemic period, we test that the probability of brokerage's buy recommendation, in Hypothesis 1.2, is higher during the epidemic period than during the non-epidemic period. We also examine in Hypothesis 1.3 to see if the positive correlation, between probability of brokerage's buy recommendation and compensation of managers, is stronger during the epidemic period than during the non-epidemic period. Hypotheses 1.1 to 1.3 are listed below:

Hypothesis 1.1 The probability of security firm's buy recommendation is positively related to the compensation of security firm managers.

Hypothesis 1.2 The probability of security firm's buy recommendation is higher during the Covid-19 epidemic period than during non-epidemic periods

Hypothesis 1.3 The positive relation between the probability of security firm's buy recommendation and the compensation of security firm managers is higher during the epidemic period than during the non-epidemic period.

B. Buy recommendation and earnings forecast quality

Concerning the quality of earnings forecast in analyst coverage, most of the previous studies focused on analyst's compensation structure. For example, Bernhardt and Kutsoati (2001) found that analysts' compensation is related to their forecast quality, and analysts with private information have a strong tendency (60% probability) to overestimate earnings in forecasts (0.75~0.8%). Bernhardt, Campello, and Kutsoati (2004) constructed a model to explain the bias of analysts' forecasts and their compensation structure, and found that analysts tend to overestimate forecasted EPS to increase returns, but investors may not be able to fully clarify these biases. Groysberg, Healy and Maber (2011) investigated the factors affecting analyst compensation and found no evidence to support the inference that analyst compensation is related to the accuracy of earnings forecast; however, analyst turnover is indeed related to forecast accuracy, indicating that incentives for analyst forecasts are outcome-based. Clarke and Subramanian (2006) applied a learning model to test the relationship between analysts' forecasting behavior and their performance, and found that in a highly competitive banking service market, the correlation between analyst's compensation and analyst's prestige is convex. The convexity of the compensation structure and the presence of employment risk lead to a U-shaped relationship between analysts' bold forecasts and prior performance, as well as a positive relationship between bold forecasts and experience. Underperforming analysts face higher employment risks and are more likely to issue bolder forecasts.

Clement and Tse (2005) divided analysts' earnings forecast into herd forecasts or bold forecasts in their research and found that: (1) The possibility of bold forecasts increases with the analyst's previous accuracy, brokerage scale and experience and decreases with the number of industries covered by analysts; (2) bold forecasts are more accurate than herd forecasts; (3) herd forecast revisions are more associated with analyst earnings forecast errors (actual earnings minus estimated earnings) as compared to bold forecast revisions. Analysts' bold forecasts are more fully incorporate the analyst's private information than the herd forecasts and provide investors with more relevant information. Durand, Limkriangkrai, and Fung (2014) find that analysts in the brokerage deviate from the general consensus as their confidence increases but move toward the general consensus as their confidence decreases. Liu (2017) examines analysts' motivations for releasing forecasts on weekends and the impact of this behavior on forecast accuracy and analyst careers. Empirical data from a sample from 2002 to 2011 show that analysts carefully time news releases based on workload and confidence levels, resulting in more accurate forecasts. Furthermore, with the same accuracy, analysts who exhibit unconfident behavior (those who are expected to work weekdays but actually work weekends) are not fired or downgraded by security firms; but analysts who exhibit inactive behavior Analysts (analysts who were expected to work weekends but did not work) were more likely to be fired or demoted by

brokerages, suggesting that brokerages understand the negative impact of both behaviors but choose the decision to react differently.

It has been shown in previous studies that investors' reactions to analysts' forecast revisions increase with the accuracy of analysts' forecasts. Clement and Tse (2003) tested whether investors care about the information regarding forecast accuracy provided by analysts. They found that investors under-appreciated information about the accuracy of future forecasts; moreover, forecast attributes other than expected accuracy appeared to correlate with value. For example, investors' perceptions of forecasts issued earlier in the year and reaction to forecasts by analysts at major security firms was stronger than the timeliness of forecasts. Regarding the price changes after forecast revisions, Gleason and Lee (2003) found that, first of all, the market did not fully distinguish between revisions that provide new information and revisions that only tend to consensus. Secondly, for star analysts of investment institutions and analyst coverage cover more companies, the process of price adjustments is relatively quicker and more complete. Finally, most of the delayed price adjustments occur around the dates of subsequent earnings announcements and forecast revisions.

Zhu (2019) took China's A-share listed companies from 2007 to 2017 as a sample to test the impact of the manager's incentive system on analysts' forecasting behavior and found that there is heterogeneity in the impact of salary incentives and equity incentives on analysts' forecasting accuracy. The compensation incentive system significantly improves the accuracy of analysts' forecasts by improving the company's short-term performance. However, the manager's equity incentive system increases the company's short-term performance fluctuations by increasing the risk-taking ability of managers, which reduces the accuracy of analysts' forecasts. The research by Zheng, Yang and Shen (2022) found that the labor protection provided by China's implementation of the "Labor Contract Law" increases the stability of employees, improves the information environment of enterprises, and thus improves the accuracy of analysts' profit forecasts. Labor protection also reduces company's business risk and accrual earnings management, reducing the possibility of simultaneous stock price changes and improving market pricing efficiency. The aforementioned positive effects will be more pronounced with less corporate agency problem, more independent board of directors, better company reputation, and more intense industry competition.

Based on the above literature, this study intends to examine the relationship between the probability of security firms' buy recommendations and the accuracy of security firms' earnings forecast. In hypothesis 2.1, it is tested that the probability of security firms' buy recommendation is positively related to the accuracy of earnings forecast. Also, considering the impact of the Covid-19 epidemic period, this study, in Hypothesis 2.2, tested the positive relation between the probability of security firms' buy recommendation and the accuracy of earnings forecast was higher during the epidemic period than during the non-epidemic period. In the meantime, since it is difficult to collect information during the epidemic period, this study, in Hypothesis 2.3, tested if there is a high degree of information overlap between the securities firm's buy recommendation and earnings forecast. Hypotheses 2.1 to 2.3 are listed below:

Hypothesis 2.1 The probability of security firms' buy recommendation is positively related to the accuracy of earnings forecast.

Hypothesis 2.2 The positive relation between the probability of security firms' buy recommendation and the accuracy of earnings forecast was higher during the epidemic period than during the non-epidemic period.

Hypothesis 2.3 During the period when it is difficult to collect information, there is a high degree of information overlap between the securities firm's buy recommendation and earnings forecast.

C. Buy recommendation and abnormal stock return

Barber, Lehavy and Trueman (2007) found that, compared with the buy recommendations from investment banks, the annualized daily abnormal returns (ARs) of buy recommendations from independent research institutions were about 8% higher. The investment bank's buy recommendation after new stock issuance (SEO) is about 22% lower than that of independent research institutions. At the same time, investment banks are less willing to issue downgrade recommendations for client companies, including weakened earnings forecast of client companies. The research of Shen and Chih (2009) examines the conflict of interest between brokerage department (issuing buy recommendations) and the trading department (actually buy and sell) in the investment bank or securities firm and finds that: (1) net buying in recommending security firms before release of buy recommendations and net selling after release of buy recommendations are existed; (2) net selling of non-recommended brokerages (independent research teams) is weaker after the release. In addition, the phenomenon that the abnormal stock return is positive (16 days) before the recommendation and negative (3 days) after the recommendation may be caused by the net selling decision of the recommending broker.

Research by Birru, Gokkaya, Liu and Stulz (2022) found that institutional investors highly value analysts' coverages for short-term trading recommendations. For the impact on stock prices, the view of short-term trading is as important as analyst recommendation on changing target prices. Trading recommendations that incorporate expectations about future events are more informative than trading recommendations that do not fully incorporate past stock price information. Analysts who have a better relation with the company's management will generate better trading recommendations, and institutional investors can obtain significant abnormal returns by following the trading recommendations.

Based on the above literature, this study intends to test the relationship between the probability of securities firm's buy recommendation and the abnormal stock return. In hypothesis 3.1, it is tested that there is a positive relation between the probability of securities firm's buy recommendation and the abnormal stock return. In the meantime, considering the impact of Covid-19 epidemic period, this study, in Hypothesis 3.2, tested if the positive relation between securities firm's buy recommendation and the abnormal stock return is lower during the epidemic period than that during the non-epidemic period. Also, it was tested in Hypothesis 3.3 that during the epidemic period, while it is more difficult for investors to collect information, the abnormal

response of the stock market price to the buy recommendation issued by securities firm is lower. Hypotheses 3.1 to 3.3 are listed below:

Hypothesis 3.1 There is a positive relation between the probability of securities firm's buy recommendation and the abnormal stock return.

Hypothesis 3.2 The positive relation between securities firm's buy recommendation and the abnormal stock return is lower during the epidemic period than that during the non-epidemic period.

Hypothesis 3.3 During the period when investor information is difficult to collect, the abnormal response of stock market prices to security firms' buy recommendations is lower.

III. Research Methods, Models and Data

A. Research methods

We first analyze the sample data including: (1) the number and percentage of brokerage (monthly) recommendations (Table 1 in Section IV) and (2) the relative accuracy of management salary and stock (buy and sell) recommendations and earnings forecast (Table 2 in Section IV). Then we apply three sets of models to test the research hypotheses. Model 1 and Model 2 apply Logistic regression to test the influence of (1) brokerage managers' salaries (2) earnings forecast accuracy and (3) whether the brokerage's recommendation is based on brokerage's earning forecast on the probability of brokerage's buy recommendation. Model 3 applies event study method to test whether the brokerage's buy recommendation implies abnormal returns. All three models further consider and compare the impact of the Covid-19 epidemic period. For research models and definition of and variables, please refer to section "Research Models and Variable Definitions" below.

B. Research data

We focus on security firms in Taiwan from 2018 to 2021 in this research. Main research data are collected from Taiwan Economic News (TEJ) database. Firms' financial information, compensations¹, management pay, number of branches (excluding the headquarter), consulting fee income, etc., are collected from the TEJ company information module. Security firms' investment recommendation, including company earnings forecast, trading recommendations, and target stock price, etc., are collected from the securities investment module in TEJ. Information regarding the number of employees, the founding date of security firm, and the amount of paid-in capital is collected from the brokerage module in TEJ. Regarding the data screening of earnings forecast, the date of earnings forecast and the date of company earnings

¹ Compensations include salaries, overtime pay, on-duty pay, remuneration for directors and supervisors, traveling expenses, year-end bonuses, wages, business bonus, retirement and compensation for personnel, provision for retirement pensions, employee training fees, appropriation of welfare funds, employee insurance premiums, lunch expenses, employee activities expenses, allowances, welfare expenses, meal expenses, medical expenses.

disclosure must be within 455 days²; the valid date of earnings forecast in security firms is the date of annual earnings forecast before the announcement of company earnings.

C. Research models and variable definitions

In Model 1 and Model 2 we apply Logistic regression to examine the influence of (1) brokerage managers' salaries (2) earnings forecast accuracy and (3) whether the brokerage's recommendation is based on brokerage's earning forecast on the probability of brokerage's buy recommendation. The value of dependent variable (RecBuy) is set to 1 when the brokerage's recommendation is "buy", otherwise it is set to 0. Model 3 applies the event study method to test whether the brokerage's buy recommendation implies abnormal returns. All three models consider and compare the impact of the Covid-19 epidemic; the three research models established in this study to test the research hypothesis are described as follows:

C1. Manager salary and probability of brokerage's buy recommendation

Model 1 examines the influence of the brokerage manager's salary on the probability of the buy recommendations, considering the factors during the Covid-19 epidemic period. The value of dependent variable (RecBuy) is 1 when the brokerage recommends "buy", otherwise it is set to 0. Independent variables include: management salary (MgtSalary), dummy of Covid-19 period (Covid), and the interaction term of MgtSalary and Covid. Control variables include: the number of buy and sell recommendations issued by brokerages (ln(NumRecBroker)), the number that a company was recommended by brokerages (ln(NumRecFirm)), whether the broker is affiliated with financial holding company (FinHold), whether the financial holding company is composed mainly by brokerage (BrokerFH), investment advisory company (Advisory), market value (MarketValue), book-to-market ratio (BM), leverage (Leverage), return on assets (ROA), growth rate of total assets (GrowthTA).

The model design and variable definitions of Model 1 are as follows:

Model 1

$$\text{Prob}(\text{RecBuy}_t=1) = b_0 + b_1 \times \text{MgtSalary}_{i,t-1} + b_2 \times \text{Covid}_{i,t} + b_3 \times \text{MgtSalary}_{i,t-1} \times \text{Covid}_{i,t} + b_4 \times \ln(\text{NumRecBroker})_{i,t} + b_5 \times \ln(\text{NumRecFirm})_{i,t} + b_6 \times \text{FinHold}_{i,t} + b_7 \times \text{BrokerFH}_{i,t} + b_8 \times \text{Advisory}_{i,t} + b_9 \times \text{MarketValue}_{i,t-1} + b_{10} \times \text{BM}_{i,t-1} + b_{11} \times \text{Leverage}_{i,t-1} + b_{12} \times \text{ROA}_{i,t-1} + b_{13} \times \text{GrowthTA}_{i,t-1} + \varepsilon_i \dots\dots\dots$$

(1)

where,

(MgtSalary) = Total Salary for Managers / Total Salary; Total Salary for Managers: all managers' salary; Total Salary: company's total salary expenses³

² In Taiwan, the disclosure of annual financial statements must be completed before the end of the first quarter in the next fiscal year.

³ All sample salaries are divided into 3 groups (5 companies each), ranked based on managers' salary in 2017 and 2018. Low: Jih Sun Securities, Hua Nan Securities, E.SUN Securities, MasterLink Securities, MEGA Securities;

(Covid): Dummy value is set to 1 if sample period is within Covid-19 period, 0 otherwise⁴. (0 for 2018 and 2019, 1 for 2020 and 2021).

(MgtSalaryxCovid): Interaction term of manager's salary and Covid-19

$\ln(\text{NumRecBroker}) = \ln(1 + \text{number of buy and sell recommendations issued by security firms on the day})$

$\ln(\text{NumRecFirm}) = \ln(1 + \text{number of times the company was recommended by security firms on the day})$

(FinHold): Whether the security firm is affiliated with financial holding company.; Dummy value is set to 1 if the security firm is affiliated with financial holding company, 0 otherwise.

(BrokerFH): Whether financial holding company is mainly composed by security firm.; Dummy value is set to 1 if financial holding company is mainly composed by security firm, 0 otherwise.⁵

(Advisory): Whether the recommendation is released by investment advisory.; Dummy value is set to 1 if recommendation is released by investment advisory, 0 otherwise.

(BM) = The company's book value (BookValue) to market value (MarketValue) ratio.

(Leverage) = financial leverage ratio of company = (Total Liabilities/Total Assets)

(ROA) = Net profit/Total assets

(GrowthTA) = (Total assets - total assets in previous period) / absolute value of total assets in previous period

C2. Earnings forecast and brokerage's recommendation

On the basis of Model 1, we further add earnings forecast and brokerage's recommendation in Model 2 to examine the impact of (1) earnings forecast accuracy and (2) whether the brokerage's recommendation is related to earnings forecast on the probability of brokerages' buy recommendation. The value of dependent variable (RecBuy) is set to 1 for buy recommendation, 0 otherwise. Independent variables in Model 2, added on the basis of Model 1, include: earnings forecast accuracy (ForecastAccu), earnings forecast error (ForecastErr), whether recommendation is based on earnings forecast ($\ln(\text{DayEPStoRecom})$), and the interaction terms of three variables above and the Covid-19 epidemic (Covid). Control variables are the same as in Model 1. The model design and variable definitions of Model 2 are described as follows:

Model 2

$$\begin{aligned} \text{Prob}(\text{RecBuy}_t=1) = & b_0 + b_1 \times \text{MgtSalary}_{t-1} + b_2 \times \text{Covid}_t + b_3 \times \text{MgtSalary}_{t-1} \times \text{Covid}_t + \\ & b_4 \times \text{ForecastAccu}_t + b_5 \times \text{ForecastErr}_t + b_6 \times \ln(\text{DayEPStoRecom})_t + \\ & b_7 \times \text{Covid}_t \times \text{ForecastAccu}_t + b_8 \times \text{Covid}_t \times \text{ForecastErr}_t + \\ & b_9 \times \text{Covid}_t \times \ln(\text{DayEPStoRecom})_t + b_{10} \times \ln(\text{NumRecBroker})_t + \\ & b_{11} \times \ln(\text{NumRecFirm})_t + b_{12} \times \text{FinHold}_t + b_{13} \times \text{BrokerFH}_t + b_{14} \times \text{Advisory}_t + \\ & b_{15} \times \text{MarketValue}_{t-1} + b_{16} \times \text{BM}_{t-1} + b_{17} \times \text{Leverage}_{t-1} + b_{18} \times \text{ROA}_{t-1} + \\ & b_{19} \times \text{GrowthTA}_{t-1} + \\ & \varepsilon_t \end{aligned} \quad (2)$$

Middle: CITIC Securities, Cathay Securities, Concord Securities, HORIZON Securities, Yuanta Securities; High: SinoPac Securities, CAPITAL Securities, President Securities, KGI Securities, Fubon Securities.

⁴ The first case of Covid-19 in Taiwan was confirmed on 2020/01/21.

⁵ After the merger of financial holdings, the main surviving firms are securities companies.

where,

$(ForecastAccu) = (\max(AFE) - AFE) / (\max(AFE) - \min(AFE))$; $AFE = \text{abs}(ForecastErr)$; $\max(AFE)$: The maximum value of earnings forecast error for the current year; $\min(AFE)$: The minimum value of earnings forecast error for the current year.

$(ForecastErr) = (FEPS1Y - EPS) / StokPrc_L2$; $FEPS1Y$: Earnings Forecast; EPS : Earnings per share in the company; $StokPrc_L2$: stock price 2 days before earnings forecast.

$\ln(\text{DayEPStoRecom}) = \ln(366 - \text{abs}(\text{RecomDate_Broker} - \text{EPSDate_Broker}))$; RecomDate_Broker : Brokerage's recommendation announcement date; EPSDate_Broker : Brokerage's earnings forecast announcement date

C3. Abnormal return and rokerage's buy recommendation

In Model 3 we apply event study method to test whether brokerage's buy recommendation implies abnormal return, considering the possible effect of Covid-19. Dependent variable ($CARRec(-1,1)$) is the cumulative abnormal returns from one day before to one day after brokerage's buy recommendation. Independent variables of the model include: dummy variable of brokerage's buy recommendation ($DumRecBuy$), Covid-19 epidemic period ($Covid$), and the interaction term of ($DumRecBuy$) and ($Covid$). Control variables include: market value ($MarketValue$), book-to-market value ratio (BM), leverage ($Leverage$), return on assets (ROA) and growth rate of total assets ($GrowthTA$). The model design and variable definitions of Model 3 are described as follows:

Model 3

$$CARRec(-1,1) = b_0 + b_1 \times DumRecBuy_t + b_2 \times Covid_t + b_3 \times DumRecBuy_t \times Covid_t + b_4 \times MarketValue_{t-1} + b_5 \times BM_{t-1} + b_6 \times Leverage_{t-1} + b_7 \times ROA_{t-1} + b_8 \times GrowthTA_{t-1} + \varepsilon_t \quad (3)$$

where,

$$CARRec(-1,1) = \sum_{t=-1}^1 Ret_t - MarketRet_t$$

(Ret): Return of stocks recommended by brokerages.

($MarketRet$): Market return proxied by Taiwan Stock Exchange Weighted Index (TAIEX) return.

($DumRecBuy$): Dummy value is set to 1 if brokerage's recommendation is "buy", 0 otherwise.

Other variable definitions

Definitions of the other variables in this study are described as follows:

1. Three stages of the Covid-19 epidemic alert in Taiwan are:

1.1 The first stage: 2020/01/21 to 2021/05/11

(The first overseas immigration case in Taiwan to the first day of level 2 epidemic alert release)

1.2 The second phase time: 2021/05/12 to 2021/07/26

(The second day of level 2 epidemic alert release to the end of level 3 epidemic alert)

1.3 During the third phase: 2021/07/27 to 2021/12/31

(The first day of downgrade back to level 2 epidemic alert to the end of sample period)

2. Brokerage's earnings forecast: the date when a brokerage firm releases its earnings forecast, usually before the company announces its annual earnings.
3. Number of forecasts: the total number of earnings forecast issued by individual brokerage i each year.
4. Relative accuracy of earnings: the number of days of earnings forecast = the date of company's earnings announcement - the date of brokerage firm's earnings forecast.
5. Scale of company in earnings forecast: The market value (in the previous year) of company in brokerage's earnings forecast.

IV. Empirical Results

A. Number and percentage of brokerage's recommendation

In the preliminary analysis of the sample data, the number and percentage of brokerage's recommendations are presented in Table 1, including the number of recommendations in each month, the percentage relative to total number of recommendations in each year during the sample period from 2018 to 2021, and the difference in the number of recommendations, relative to 2018, in 2019, 2020, and 2021. Panel A of Table 1 presents the monthly times and percentages of recommendation from all brokerages (including foreign institutional investors), while Panel B includes only the monthly times and percentages of recommendation from local brokerages.

Data in Panel A and Panel B indicates that, during the four-year sample period, March, August, and November in each year are the months with relatively higher recommendation numbers and percentages. Similar patterns are also found in the sample of all brokerages and local brokerages. The months of higher number and frequency of recommendation are related to the end date of the company's quarterly earnings disclosure. The month with a is related to the closing date of company's quarterly earnings disclosure. This result is consistent with findings in previous research, implying that analysts will incorporate the company's disclosed earnings information and revise their earnings forecast.

At the same time, compared with the number of recommendations in 2018, the total number of recommendations in 2019, 2020, and 2021 all showed a decline pattern, especially the most significant decline in 2019-2018, followed by 2021-2018. This finding is shown in Panel A of Table 1 (all brokerages) and Panel B (local brokerages) with consistent similarities. However, under the downward trend of the total number of recommendations, May and December in 2019, 2020, and 2021 all showed a higher number of recommendations than in 2018. Specifically, in 2020, although the total number of recommendations is slightly lower than that in 2018 (5,321 vs. 5,589 in Panel A; 4,820 vs. 4,909 in Panel B), the number of recommendations in 2020 is higher than that in 2018 for the month of May (621 vs. 357 in Panel A; 563 vs. 331 in Panel B) and December (474 vs. 287 in Panel A; 420 vs. 242 in Panel B), implying a research direction to examine if the Covid-19 epidemic is a related factor.

B. Management salary, recommendations and earnings forecast accuracy

In Panel A of Table 2, through the grouping of management salaries, we list the number of brokerage recommendations (sell/neutral/buy) (excluding foreign institutional investors) from 2018 to 2021 and the difference in numbers in 2019, 2020, and 2021, relative to that in 2018. In Panel B, we list the descriptive statistics of earnings forecast accuracy in each year from 2018 to 2021, also grouped by of management salaries. The upper part of Panel A in Table 2 shows that, during the period from 2018 to 2021, brokerage's recommendations are mainly buy and neutral (hold), sell recommendations are relatively rare, which is similar to findings in previous studies. Therefore, security firms may increase probability of placing trading orders from investors, by signals from issuing buy recommendation, and thus earn more fees and commissions. Thus, based on self-interest and on the premise of not violating security regulations, security firms tend to encourage analysts to issue buy recommendations and signals. Through the increase in revenue, managers and analysts have a higher chance for higher remuneration or bonus.

The bottom part of Panel A in Table 2 shows that, as compared to the number of recommendations in 2018, the number decreased in 2019 in both high- and low-salary groups. However, for the recovery in 2020, the buy recommendations are the main driver (neutral recommendations are relatively reduced), specifically in the low-salary group. In the 2021 data, the number of recommendations reduced in the low-salary group, while the numbers increased instead in high-salary group, where the main driver is the significant increase in buy recommendations. In Panel B of Table 2, we present the descriptive statistics of earnings forecast accuracy issued by security firms from 2018 to 2021. Although the data shows that generally higher mean and median (except for 2019) and a lower standard deviation of accuracy in the high-salary group, however, the sample data lacks significance except the mean value in 2021 (0.687***).

(insert Table 1 here)

(insert Table 2 here)

C. Brokerage managers' salary and probability of issuing buy recommendation

In Table 3, we apply Model 1 to test the relationship between manager's salary and the probability of brokerage's issuance of buy recommendation. Independent variables of Model 1.1 only include manager's salary (MgtSalary) and control variables. Empirical results show a 73% probability (at 0.01 significance level) that the brokerage firm's buy recommendation is affected by manager's salary, a finding supports Hypothesis 1.1: The probability of security firm's buy recommendation is positively related to the compensation of brokerage firm managers. In control variables, the probability that brokerage firm's buy recommendation affected by market value of company in the previous year is 54.3%, by the company's book-to-market value ratio is 42.8%, by the company's leverage is 57.7%, and by ROA of company in the previous year is 67.6%.

The independent variables of Model 1.2 include only the occurrence of Covid-19 (Covid) and control variables. Empirical results show that when Covid-19 occurs, the probability that

brokerage's buy recommendation is 57.9% (at 0.01 significance level), implying that, during the epidemic period, brokerages suggest investors to increase stocks purchase for more fees. This finding supports Hypothesis 1.2: The probability of security firm's buy recommendation is higher during the Covid-19 epidemic period than during non-epidemic periods.

In Model 1.3 we further consider the relation between probability of brokerage's buy recommendation and compensation of brokerage firm managers during the epidemic period. Independent variables include manager salaries (MgtSalary), dummy variable of the Covid-19 period (Covid), the cross-product of the two ($\text{MgtSalary}_{t-1} \times \text{Covid}$) and control variables. Empirical results show that the probability of brokerage's buy recommendation is affected by manager salaries and Covid-19 is 69.1% (0.01 significance level), indicating that, during the epidemic period, brokerage managers issue buy recommendation to ensure that, as the sales performance is achieved, manager will receive the bonus and remuneration as expected. Our findings support Hypothesis 1.3: The positive relation between the probability of security firm's buy recommendation and the compensation of security firm managers is higher during the epidemic period.

In Model 1.4 we further add the number of trading recommendations issued by brokerage on the day ($\ln(\text{NumRecBroker})$), the number of times the company was recommended by brokerage on the day ($\ln(\text{NumRecFirm})$), whether the brokerage is affiliated with financial holding company (FinHold), whether the financial holding company is mainly composed by security firm (BrokerFH), and whether the recommendation is released by investment advisory (Advisory). The empirical results show that when a company is recommended by more security firms, the probability of brokerage issuing buy recommendation is 47.7% (0.01 significance level). In addition, we find that when the brokerage is affiliated with financial holding company, the probability of brokerage issuing buy recommendation is lower (46.1% at 0.01 significant level). The main reason is that when the brokerage is affiliated with financial holding company, the issuance of recommendation is affected by other affiliated companies, thus the performance measurement of brokerage managers is more complex. Therefore, brokerage managers who are not affiliated with financial holdings will be more independent on recommendation and the probability of issuing buy recommendation is higher than managers in brokerages affiliated with financial holding companies.

The financial holding companies in Taiwan can be composed mainly by banks, insurance companies or security firms. If a financial holding company is composed mainly by security firm, it implies that the main decision power belongs to managers in securities firm. Therefore, the securities firm managers have relatively higher discretionary power, and the probability of security firms issuing buy recommendation is relatively higher, with a probability of 52.5% (0.01 significance level). Some financial holding companies in Taiwan also incorporated with independent investment advisory firms. The performance evaluation of managers in investment advisory firms, mainly service charge on analyst coverage, is different from that of managers of security firms. Both investment advisory firms and security firms are affiliated to financial holding companies and are parallel units, thus the conflict of interest between investment

advisory firms issuing buy recommendation and advisory firm managers' rewards is lower than that of brokerage firm managers. Empirical results show that advisory firms issuing less buy recommendation than that of security firms, with a probability of 45% (0.01 significance level).

(insert Table 3 here)

D. Earnings forecast and brokerage's recommendation

Brokerages collect information for buy or sell recommendations and firm's earnings forecast. If the brokerage's recommendations are related to firm's future earnings, then a positive correlation is expected between brokerage's recommendations and firm's earnings forecast, which is tested via Model 2.1 to 2.3 in Table 4. Empirical results of Model 2.1 show that the accuracy of brokerage's earnings forecast (ForecastAccu) is positively correlated with brokerage's buy recommendation, with a probability of 52.4% (0.01 significance level). The findings support the hypothesis 2.1: The probability of security firms' buy recommendation is positively related to the accuracy of earnings forecast. In addition, we do not find a statistically significant relationship between the brokerage's earnings forecast error (ForecastErr) and the brokerage's buy recommendation.

The number of days between the brokerage's recommendation date and the earnings forecast date can indicate the correlation among information in brokerage firm. The longer period between those two dates, the lower the correlation among the information shared by brokerage for recommendation and earnings forecast. Empirical results show a negative relationship between brokerage's buy recommendation and the number of days between the recommendation date and the earnings forecast date ($\ln(\text{DayEPStoRecom})$), indicating a 46.8% (0.01 significance level) probability that the brokerage's buy recommendation is based on the earnings forecast information. The accuracy of brokerage forecasts (ForecastAccu) is positively correlated with brokerage's buy recommendation, with a probability of 52.4% (0.01 significance level).

We further apply Model 2.2 and Model 2.3 to examine whether the increased difficulty of information collection during the epidemic period has an impact on brokerage's buy recommendations. Empirical results of Model 2.3 show a probability of 54.4% (0.01 significance level) that the relative accuracy of brokerage's earnings forecast ($\text{CovidtxForecastAccu}$) affects the buy recommendation, mainly during the epidemic period. These results support hypothesis 2.2: the positive relation between the probability of security firms' buy recommendation and the accuracy of earnings forecast was higher during the epidemic period than during the non-epidemic period. In addition, there is a positive relationship between the buy recommendation and the number of days between recommendation date and earnings forecast date ($\text{Covidtxln}(\text{DayEPStoRecom})$), with a 50.5% probability (0.01 significance level). The results support Hypothesis 2.3: During the period when it is difficult to collect information, there is a high degree of information overlap between the securities firm's buy recommendation and earnings forecast.

The findings of this study show that during the epidemic period, it is more difficult for brokerage to collect information, thus the degree of information sharing between buy

recommendation and earnings forecast was higher than that during non-epidemic periods. The empirical results support that the buy recommendation is related to information collection. When the market information is easy to collect, the distinction between the information for buy recommendation and the earnings forecast information is relatively higher. However, when information collection is not easy, the overlapping between the information for buy recommendation and the earnings forecast information will be increased. In Table 4, we apply Model 2.1 to 2.3 to control the earnings forecasting factors in the brokerage. The impact of brokerage managers' salary on buy recommendations are similar to that in Table 3, indicating a consistent influence of brokerage managers' salary on brokerage's buy recommendations.

(insert Table 4 here)

E. Market price reaction on brokerage's issuance of buy recommendation

In previous studies, stock market has shown to reflect a company's future information. The signal from buy or sell recommendation mainly reflect the expected value or future information of a company. If the expected future value of a company is higher than the current market price, the brokerage firm will issue a buy recommendation for investors and expect to obtain higher bonuses or rewards through the increase in revenue. In Table 5, we apply event study method to test whether there is a relationship between stock abnormal returns and security firms' recommendations. Empirical results in Panel A show that, when security firms issue buy recommendations, statistically significant and economically abnormal returns, a 1.69% CAR (-1,1), appear in stock market. When security firms issue non-buy recommendations, a statistically significant -0.19% CAR (0,-1) appear but no significant abnormal return economically.⁶ During the Covid-19 epidemic period, due to difficulty in information collection and higher uncertainty in the stock market, investors' attitude of risk aversion has increased.

We further examine the impact of brokerage's buy and sell recommendation on investor's return during the Covid-19 period. As shown in Panel B of Table 5, when brokerages issue buy recommendation, whether it is during the Covid-19 period or not, a significant cumulative abnormal return existed in the stock market. However, during the Covid-19 epidemic period, when brokerages issued buy recommendations, the stock market's reaction was lower than that during non-epidemic periods, with a confidence level of 95%. When brokerages issued non-buy recommendations, negative cumulative abnormal returns existed in most of the time. During Covid-19 period, when brokerages issued non-buy recommendations, investors reacted less (as compared to the reaction during non-epidemic periods). Research findings in Table 5 show that there is a statistically significant difference in investor's reaction toward brokerage's non-buy recommendations between the epidemic and non-epidemic period.

⁶ Security transaction costs in Taiwan include transaction tax and transaction fees. When securities are sold, the 0.3% securities transaction tax and 0.1425% transaction fee are required to be paid. The purchases of securities are exempt from the transaction tax, but are subject to transaction fees.

F. Abnormal stock returns and brokerage's buy recommendation

According to the findings in Table 5, we further include factors that affect the cumulative abnormal returns resulted from brokerage's issuance of buy recommendations. In Table 6, we adopt the cumulative abnormal return $CAR(-1,1)$ of the days before and after the event day as the dependent variable in Model 3. The research results of Model 3.1 to 3.3 and Model 3.5 to 3.8 indicate that the buy recommendations (DumRecBuy) issued by brokerage is positively correlated with the abnormal returns of stocks. Research findings support Hypothesis 3.1: There is a positive relation between the probability of securities firm's buy recommendation and the abnormal stock return.

Research results of Model 3.2 and Model 3.5 to 3.8 (DumRecBuy \times Covid) show that during the Covid-19 epidemic period, compared with the non-epidemic period, there is a significant negative correlation between brokerage's buy recommendation and cumulative abnormal returns. This (negative correlation) result does not support Hypothesis 3.2: The positive relation between securities firm's buy recommendation and the abnormal stock return is lower during the epidemic period than that during the non-epidemic period. Research results of Model 3.2 and Model 3.5 to 3.8 imply that during the epidemic period, when brokerages issue buy recommendations, it is more difficult for investors to collect information to confirm decisions. Therefore, the reaction to brokerage's buy recommendation on stock price is relatively weak. The findings support Hypothesis 3.3: During the period when investor information is difficult to collect, the abnormal response of stock market prices to security firms' buy recommendations is lower. In addition, large companies are found to be negatively correlated with the cumulative abnormal returns of brokerage's buy or sell recommendations, a finding which is consistent with previous studies. We also apply cluster error terms to control for company, industry and year factors, and find that the research results remain consistent.

(insert Table 5 here)

(insert Table 6 here)

V. Conclusion

In this study we examine the relationship between security firms' buy recommendation and firm managers' salaries, earnings forecast accuracy, and implied abnormal returns. Issues including the impact of brokerage's buy recommendation on firm manager's salary, the impact of earnings forecast accuracy on the probability of brokerage's buy recommendation, and whether the brokerage's buy recommendation implies abnormal returns are examined with models individually. This study focuses on the Covid-19 epidemic period, as the difficulty in collecting information for investors increases, they will rely more on information from investment institutions such as security firms.

We start with examining whether, due to self-interest, security firm managers will increase their fee income by issuing buy recommendation, thereby increasing managers' salary. First of all, a positive correlation between the probability of issuing buy recommendation and the salary of security firm managers indicating that security firms can increase manager's salaries by issuing buy recommendation. Next, due to risk of infection during the Covid-19 epidemic period, investors avoid contacting with people and rely more on media information. Therefore, during the Covid-19 period, security firms issue more buy recommendations through media and thus increase trading frequency of investors, thereby increasing the salary of managers. Finally, whether a brokerage firm affiliated with the financial holding company do affect the probability of issuing buy recommendations. The main reason is the performance measurement is more complicated when brokerage firm affiliated with financial holding company. Therefore, for managers of brokerage firm not affiliated with financial holding company, performance measurement is relatively simple and the probability of issuing buy recommendations is higher.

Next we examine whether brokerage's recommendations are based on earnings forecast or just noise. Empirical results indicate that there is a consistent relationship between the buy recommendations and earnings forecast accuracy. We further find that during the epidemic period, when the difficulty of information collection increases, the probability of brokerage's buy recommendation is affected by brokerage's earnings forecast accuracy, implying that during the epidemic period, more efforts were made to collect information to serve investors, and the relation between buy recommendation and information collection is yet again supported. When the market information is easy to collect, the difference between information forming buy recommendations and information for earnings forecast is relatively higher. However, when it is not easy to collect information, the overlapping between the information for buy recommendations and information for earnings forecast increases.

Last of all, we find that security firm's buy recommendation is mainly reflect the undervalue of stock at that time. Prices in stock market reveals statistically significant and economically abnormal returns when security firms issue buy recommendations. During the Covid-19 epidemic period, it is more difficult for investors to collect information, and the uncertainty of the stock market increases, thus investors' risk aversion attitude has increased. In this study we find that during the Covid-19 epidemic period, when brokerages issued buy recommendations, the stock market reacted less than that during the non-epidemic period.

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Table 1. Number and Percentage of Brokerage's (monthly) Recommendations

Panel A. Recommendations from all brokerages (including foreign institutional investors)

	2018		2019		2020		2021		2019 -2018	2020 -2018	2021 -2018
Month	Number	%	Number	%	Number	%	Number	%	Number	Number	Number
1	521	9.32	375	8.29	199	3.74	442	8.37	-146	-322	-79
2	339	6.07	290	6.41	354	6.65	317	6.00	-49	15	-22
3	536	9.59	372	8.22	526	9.89	551	10.43	-164	-10	15
4	483	8.64	424	9.37	512	9.62	425	8.04	-59	29	-58
5	357	6.39	420	9.28	621	11.67	442	8.37	63	264	85
6	321	5.74	227	5.02	338	6.35	354	6.70	-94	17	33
7	539	9.64	403	8.91	431	8.10	479	9.07	-136	-108	-60
8	630	11.27	524	11.58	596	11.2	527	9.98	-106	-34	-103
9	390	6.98	266	5.88	364	6.84	375	7.10	-124	-26	-15
10	537	9.61	413	9.13	397	7.46	408	7.72	-124	-140	-129
11	649	11.61	506	11.18	509	9.57	570	10.79	-143	-140	-79
12	287	5.14	305	6.74	474	8.91	393	7.44	18	187	106
Sum.	5,589	100%	4,525	100%	5,321	100%	5,283	100%	-1,064	-268	-306

Panel B. Recommendations from local brokerages only

	2018		2019		2020		2021		2019 -2018	2020 -2018	2021 -2018
Month	Number	%	Number	%	Number	%	Number	%	Number	Number	Number
1	469	9.55	321	8.08	191	3.96	376	8.38	-148	-278	-93
2	288	5.87	259	6.52	326	6.76	284	6.33	-29	38	-4
3	484	9.86	337	8.48	505	10.48	465	10.36	-147	21	-19
4	411	8.37	340	8.56	482	10.00	371	8.27	-71	71	-40
5	331	6.74	378	9.51	563	11.68	390	8.69	47	232	59
6	288	5.87	192	4.83	285	5.91	281	6.26	-96	-3	-7
7	452	9.21	348	8.76	384	7.97	368	8.20	-104	-68	-84
8	536	10.92	476	11.98	530	11.00	447	9.96	-60	-6	-89
9	355	7.23	214	5.39	319	6.62	294	6.55	-141	-36	-61
10	470	9.57	369	9.29	356	7.39	356	7.93	-101	-114	-114
11	583	11.88	467	11.75	459	9.52	504	11.23	-116	-124	-79
12	242	4.93	272	6.85	420	8.71	351	7.82	30	178	109
Sum.	4,909	100%	3,973	100%	4,820	100%	4,487	100%	-936	-89	-422

Table 2. Management salary, Recommendations, and Earnings forecast accuracy**Panel A. Management salary and Recommendations (sell /hold/ buy)**

Recommend	Management salary _ Low				Management salary _ High			
	2018	2019	2020	2021	2018	2019	2020	2021
Sell	4	12	3	0	14	4	1	3
Hold	1,867	1,251	1,406	1,066	904	727	684	519
Buy	1,300	1,253	1,730	1,338	554	493	723	1,291
Sum.	3,171	2,516	3,139	2,404	1,472	1,224	1,408	1,813

Recommend	Management salary _ Low			Management salary _ High		
	2019-2018	2020-2018	2021-2018	2019-2018	2020-2018	2021-2018
Sell	8	-1	-4	-10	-13	-11
Hold	-616	-461	-801	-177	-220	-385
Buy	-47	430	38	-61	169	737
Sum.	-655	-32	-767	-248	-64	341

Panel B. Management salary and Earnings forecast accuracy

	Management salary _ Low				Management salary _ High			
	2018	2019	2020	2021	2018	2019	2020	2021
Sample	374	213	324	322	286	229	249	255
Mean	0.574	0.629	0.651	0.571	0.582	0.591	0.692	0.687***
Median	0.644	0.786	0.814	0.694	0.656	0.715	0.841	0.912
S.D.	0.396	0.386	0.381	0.393	0.376	0.371	0.350	0.385
Max.	1	1	1	1	1	1	1	1
Min.	0	0	0	0	0	0	0	0

Notes:

1. The calculation method for the salary level of the management level is: the total salary of the management level / the salary of the whole company, based on 2018 (excluding foreign capital).
2. The management salary classification is divided into two groups: pure investment consultants and security firms (4 investment advisory samples and 11 security firms), and each group is divided into management salary.
3. Brokerage earnings forecast: the date when a brokerage firm releases its earnings forecast, usually before the company announces its annual earnings.
4. Number of forecasts: the total number of earnings forecast issued by individual brokerage i each year.
5. Relative accuracy of earnings: Days of earnings forecast = company earnings announcement - date when brokers release earnings forecast.

Table 3. Brokerage Managers' Salary and Probability of Issuing Buy Recommendation

Model 1

$$\text{Prob}(\text{RecBuy}_t=1) = b_0 + b_1 \times \text{MgtSalary}_{t-1} + b_2 \times \text{Covid}_t + b_3 \times \text{MgtSalary}_{t-1} \times \text{Covid}_t + b_4 \times \ln(\text{NumRecBroker})_t + b_5 \times \ln(\text{NumRecFirm})_t + b_6 \times \text{FinHold}_t + b_7 \times \text{BrokerFH}_t + b_8 \times \text{Advisory}_t + b_9 \times \text{MarketValue}_{t-1} + b_{10} \times \text{BM}_{t-1} + b_{11} \times \text{Leverage}_{t-1} + b_{12} \times \text{ROA}_{t-1} + b_{13} \times \text{GrowthTA}_{t-1} + \varepsilon_t$$

	Model 1.1	Model 1.2	Model 1.3	Model 1.4
Intercept	-1.0627*** (0.124)	-1.1355*** (0.124)	-1.0795*** (0.125)	-0.9536*** (0.129)
MgtSalary _{t-1}	1.0013*** (0.067)		0.6059*** (0.094)	0.8535*** (0.107)
Covid _t		0.3184*** (0.021)	0.2132*** (0.027)	0.2198*** (0.027)
MgtSalary _{t-1} × Covid _t			0.8025*** (0.137)	0.6966*** (0.138)
ln(NumRecBroker) _t				-0.0179 (0.021)
ln(NumRecFirm) _t				-0.0936*** (0.023)
FinHold _t				-0.1566*** (0.026)
BrokerFH _t				0.1004*** (0.038)
Advisory _t				-0.1995*** (0.033)
MarketValue _{t-1}	0.0506*** (0.007)	0.0498*** (0.007)	0.0418*** (0.007)	0.0506*** (0.007)
BM _{t-1}	-0.2892*** (0.033)	-0.2421*** (0.033)	-0.2341*** (0.033)	-0.2495*** (0.033)
Leverage _{t-1}	0.3121*** (0.072)	0.3283*** (0.072)	0.3367*** (0.072)	0.3188*** (0.072)
ROA _{t-1}	0.7360*** (0.218)	1.0078*** (0.220)	1.0661*** (0.221)	1.0744*** (0.222)
GrowthTA _{t-1}	-0.0378 (0.054)	-0.0799 (0.055)	-0.0720 (0.055)	-0.0699 (0.055)
Control SIC	yes	yes	yes	yes
Sample Obs.	15,701	15,701	15,701	15,701

Table 4. Brokerage's Recommendation and Earning Forecast

Model 2

$$\begin{aligned} \text{Prob}(\text{RecBuy}_i=1) = & b_0 + b_1 \times \text{MgtSalary}_{i-1} + b_2 \times \text{Covid}_i + b_3 \times \text{MgtSalary}_{i-1} \times \text{Covid}_i + b_4 \times \text{ForecastAccu}_i + \\ & b_5 \times \text{ForecastErr}_i + b_6 \times \ln(\text{DayEPStoRecom})_i + b_7 \times \text{Covid}_i \times \text{ForecastAccu}_i + \\ & b_8 \times \text{Covid}_i \times \text{ForecastErr}_i + b_9 \times \text{Covid}_i \times \ln(\text{DayEPStoRecom})_i + b_{10} \times \ln(\text{NumRecBroker})_i + \\ & b_{11} \times \ln(\text{NumRecFirm})_i + b_{12} \times \text{FinHold}_i + b_{13} \times \text{BrokerFH}_i + b_{14} \times \text{Advisory}_i + \\ & b_{15} \times \text{MarketValue}_{i-1} + b_{16} \times \text{BM}_{i-1} + b_{17} \times \text{Leverage}_{i-1} + b_{18} \times \text{ROA}_{i-1} + b_{19} \times \text{GrowthTA}_{i-1} + \varepsilon_i \end{aligned}$$

	Model 2.1	Model 2.2	Model 2.3
Intercept	-0.0282 (0.188)	0.0341 (0.221)	0.0914 (0.188)
MgtSalary _{i-1}	0.8035*** (0.109)	0.8008*** (0.109)	0.7966*** (0.109)
Covid _i	0.2224*** (0.028)	0.1224 (0.249)	
MgtSalary _{i-1} × Covid _i	0.6578*** (0.140)	0.6521*** (0.140)	0.6606*** (0.139)
ForecastAccu _i	0.0956*** (0.029)	0.0139 (0.041)	0.0101 (0.040)
ForecastErr _i	-0.0796 (0.251)	-0.1676 (0.340)	-0.1699 (0.340)
ln(DayEPStoRecom) _i	-0.1302*** (0.022)	-0.1286*** (0.030)	-0.1383*** (0.022)
Covid _i × ForecastAccu _i		0.1674*** (0.058)	0.1756*** (0.056)
Covid _i × ForecastErr _i		0.0635 (0.513)	0.0651 (0.513)
Covid _i × ln(DayEPStoRecom) _i		-0.0020 (0.043)	0.0188** (0.008)
ln(NumRecBroker) _i	-0.0232 (0.022)	-0.0238 (0.022)	-0.0237 (0.022)
ln(NumRecFirm) _i	-0.1061*** (0.023)	-0.1081*** (0.023)	-0.1080*** (0.023)
FinHold _i	-0.1508*** (0.027)	-0.1509*** (0.027)	-0.1508*** (0.027)
BrokerFH _i	0.0665* (0.039)	0.0725* (0.039)	0.0727* (0.039)
Advisory _i	-0.1622*** (0.034)	-0.1652*** (0.034)	-0.1653*** (0.034)
MarketValue _{i-1}	0.0365*** (0.007)	0.0354*** (0.007)	0.0354*** (0.007)
BM _{i-1}	-0.2455*** (0.034)	-0.2432*** (0.035)	-0.2433*** (0.035)
Leverage _{i-1}	0.3307*** (0.074)	0.3326*** (0.075)	0.3324*** (0.075)
ROA _{i-1}	0.9574*** (0.229)	0.9747*** (0.229)	0.9738*** (0.229)
GrowthTA _{i-1}	-0.1140** (0.059)	-0.1204** (0.059)	-0.1208** (0.059)
Control SIC	yes	yes	yes
Sample Obs.	15,092	15,092	15,092

Note: A collinearity existed between dummy (Covid-19) and ln(DayEPStoRecom).

Table 5. Market Reaction to Brokerage's Issuance of Recommendations

Panel A	Full	Buy	Hold
CAR(-1,1)	0.0081***	0.0169***	-0.0007
CAR(0,1)	0.0050***	0.0121***	-0.0019***
CAR(-1,3)	0.0088***	0.0188***	-0.0011***
CAR(0,3)	0.0061***	0.0144***	-0.0022***
CAR(-1,5)	0.0094***	0.0198***	-0.0008
CAR(0,5)	0.0067***	0.0154***	-0.0019***

Panel B	Buy			Hold		
	NonCovid-19	Covid-19	Difference	NonCovid-19	Covid-19	Difference
CAR(-1,1)	0.0189***	0.0154***	0.0035***	-0.0026***	0.0018**	-0.0044***
CAR(0,1)	0.0144***	0.0103***	0.0042***	-0.0031***	-0.0003	-0.0028***
CAR(-1,3)	0.0204***	0.0175***	0.0028**	-0.0037***	0.0025**	-0.0062***
CAR(0,3)	0.0165***	0.0127***	0.0038***	-0.0040***	0.0003	-0.0043***
CAR(-1,5)	0.0223***	0.0179***	0.0044***	-0.0036***	0.0030***	-0.0065***
CAR(0,5)	0.0184***	0.0131***	0.0053***	-0.0039***	0.0008	-0.0047***

Table 6. Abnormal Returns and Brokerage's Buy Recommendation

Model 3

$$CARRec(-1,1) = b_0 + b_1 \times DumRecBuy_t + b_2 \times Covid_t + b_3 \times DumRecBuy_t \times Covid_t + b_4 \times MarketValue_{t-1} + b_5 \times BM_{t-1} + b_6 \times Leverage_{t-1} + b_7 \times ROA_{t-1} + b_8 \times GrowthTA_{t-1} + \varepsilon_t$$

$$CARRec(-1,1) = \sum_{t=-1}^1 Ret_t - MarketRet_t$$

	Model 3.1	Model 3.2	Model 3.3	Model 3.4	Model 3.5	Model 3.6	Model 3.7	Model 3.8
Intercept	0.0264*** (0.005)	0.0257*** (0.005)	0.0264*** (0.005)	0.0302*** (0.005)	0.0240*** (0.005)	0.0240*** (0.005)	0.0240*** (0.009)	0.0240*** (0.004)
DumRecBuy	0.0184*** (0.001)	0.0199*** (0.001)	0.0182*** (0.001)		0.0222*** (0.001)	0.0222*** (0.002)	0.0222*** (0.002)	0.0222*** (0.003)
Covid			0.0015* (0.001)		0.0055*** (0.001)	0.0055*** (0.001)	0.0055*** (0.002)	0.0055*** (0.000)
DumRecBuy × Covid		-0.0026** (0.001)		0.0112*** (0.001)	- 0.0081*** (0.002)	- 0.0081*** (0.003)	- 0.0081*** (0.002)	-0.0081* (0.003)
MarketValue	- 0.0021*** (0.000)	- 0.0020*** (0.000)	- 0.0021*** (0.000)	- 0.0020*** (0.000)	- 0.0021*** (0.000)	- 0.0021*** (0.000)	- 0.0021*** (0.001)	-0.0021** (0.000)
BM	0.0045*** (0.001)	0.0043*** (0.001)	0.0047*** (0.001)	0.0037*** (0.001)	0.0050*** (0.001)	0.0050*** (0.001)	0.0050** (0.002)	0.0050** (0.002)
Leverage	0.0090*** (0.003)	0.0089 (0.003)	0.0090*** (0.003)	0.0105*** (0.003)	0.0091*** (0.003)	0.0091** (0.004)	0.0091 (0.006)	0.0091 (0.005)
ROA	0.0350*** (0.009)	0.0335*** (0.009)	0.0365*** (0.009)	0.0447*** (0.009)	0.0359*** (0.009)	0.0359*** (0.011)	0.0359** (0.018)	0.0359 (0.020)
GrowthTA	-0.0023 (0.002)	-0.0022 (0.002)	-0.0024 (0.002)	-0.0028 (0.002)	-0.0027 (0.002)	-0.0027 (0.003)	-0.0027 (0.004)	-0.0027 (0.004)
Control SIC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster SIC	No	No	No	No	No	Yes	No	No
Cluster firms	No	No	No	No	No	No	Yes	No
Cluster year	No	No	No	No	No	No	No	Yes