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# The Analysts' Forecast of IPO Firms during the Global Financial Crisis

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**ABSTRACT:** In this study, we examine the analysts' behavior in the pre-crisis and post-crisis period for IPO firms in the U.S. from 2005 to 2011. By controlling variables size, the proxy of underpricing, the number of the IPO firms and whether the company is listed on NYSE or NASDAQ, we investigate the forecast error of analyst between pre-crisis and post-crisis period for 2008 global financial crisis. The result shows that analysts in our sample are optimistic, and they would become more optimistic after financial crisis. Conservative analysts would emphasize determinants of variables when valuing IPO firms to make their predictions before financial crisis but only consider the prior-year earnings change after financial crisis. Contrarily, analysts more optimistic notice whether the company is listed on NYSE or NASDAQ before crisis but also consider the factors of debt ratio, firm size and the market trends.

**Keywords:** IPO; Analysts' forecast; Financial crisis
**JEL Classifications:** G01; G15; G30

## 1. Introduction

Initial public offering (IPO) is one of the popular methods which corporation uses to finance their equity. IPOs can be either small or large companies to raise expansion capital and become publicly traded enterprises. Numerous studies provide that common stocks of IPOs usually get high abnormal returns during the initial period, and then underperform during the post-issue period. There is no behavioral theory to explain why investors would react so. Investors' behavior is difficult to be predicted and measured directly.

It's well-known that analysts' forecasts play an important role in the valuation of the firms by market participants. But many studies show that analysts may have irrational behavior when they forecast the future performance or make recommendations. For instance, Rajan and Servaes (1997) find that analyst tend to be overly-optimistic about the earning potential and suggest that long-term stock price performance may be influenced by analysts' overoptimism. So overoptimism may be one of the most important reasons why investors have abnormal return during the initial period and underperform afterwards.

In this study, we exam the factors relates to analysts' overoptimism and independent variables. Loh and Mian (2003) examine the efficiency of analysts' forecasts in the pre-Asian crisis and post-Asian crisis period, and they find that the forecast made during the crisis period contains systematic biases. We use control variables such as the firm size, the underpricing magnitude, the number of IPO firms in the same year and the listing of company to measure the analysts' behavior in

forecasting between pre-crisis and post-crisis periods during the global financial crisis in 2008. Loh and Mian (2003) consider the prior-year earning change as the main factor which would affect the forecast error during the Asian crisis. In addition, we add factors such as the debt ratio and the rating of firms in the regression. The global financial crisis hit the U.S. in September 2008, with the failure and merging of a number of American financial companies. We further subgroup the analysts' forecast after the onset of the crisis (in the period October 2008－2011) from those made during the pre-crisis period of January 2005 to September 2008. Complete analysts' forecasts data in the U.S. market provide great opportunity to exam the effects of these factors.

The main contribution of this paper is to that whether analysts would have the homogeneous pattern of optimism after financial crisis. If forecasts made during the crisis period are more systematic biases, it would be consistent with the behavioral explanation that there are likely more biases during the highly uncertain crisis period. Moreover, we analyze the behavior of different levels of optimistic analysts in two periods. Conservative analysts just notice that the performance of prior-year change after crisis but optimistic analysts would consider the debt ratio and the firm size after crisis. Surprisingly, analysts don't use the rating of firms, traditional considered essential in corporate finance, into their prediction.

The remaining sections of the study are organized as follows. Section 2 provides a review of literature on IPO firms, optimism of analysts. In Section 3 we describe our data and discuss the model. Section 4 presents results and section 5 concludes.

## 2. Literature Review

### 2.1 Analyst Forecast and IPO Underpricing

Research shows the relationship between underpricing and analyst following, and they find IPO firms may attract more analysts following if they have higher first-day returns. Rajan and Servaes (1997) examine the analyst with IPO data firms, and find that higher underpricing leads to increased analyst following. That is, analysts are overoptimistic about the earnings potential and long term growth prospects of recent IPOs. They also show that there is better stock performance of IPO firms when analysts ascribe low growth potential rather than high growth potential in the long run. The windows of opportunity appear to be driven by inflated expectations that eventually lead to poor long run returns. It means the issuers on taking the advantage of bullishness might put premium valuation at offer. When these shares start trading in the secondary market, the inefficiency in the pricing gets corrected, resulting in less valuation.

Chen and Ritter (2000) examine several possible explanations for the high average spreads on IPOs in the United States, and find that the larger IPO firms and companies with higher first-day return would cause more analysts following. Prior study found analyst coverage is very strongly correlated with firm size. For instance, Hong et al. (2000) find positive correlation between firm size and analyst following. Loh and Mian (2003) use three distinct notions to analyze the efficiency of analysts' forecasts in pre and post-crisis period. They assert earnings for companies with greater informational uncertainty are harder to predict, and therefore analysts have greater need for access to managers of such companies. Since managers of poorly performing companies would be less forthcoming in disclosing information, and hence analysts would need to establish better relations with such companies. Greater informational uncertainty and poorer performance of the companies being covered introduce more biases in earnings forecasts. Das et al. (2006) examine the ability of analysts to forecast future firm performance, based on the selective coverage of newly public firms. They find that underpricing, promotion by high-ranked banks, operating in an internet-related business, and backing by venture capitalists could create high visibility for IPO firms among analysts and thereby result in more analyst coverage. Besides, they also find firms listed on the New York Stock Exchange (NYSE) or NASDAQ is more likely to attract the attention of analysts and trigger initiation of analyst coverage. Besides, analysts may also be more likely to provide coverage for IPOs issued in a "hot"market. To capture the effect of issuance activity in the new issue market, we calculate the number of IPOs issued in the same year. Mokoaleli-Mokoteli et al. (2009) suggest that the market does react to changes in stock recommendations, new buy recommendations not performing in line with analyst expectations, and potential conflicts of interest have a very significant impact on the type of recommendation made.

### 2.2 The Global Financial Crisis in 2008

Lehman Brothers Holdings Inc. filed for bankruptcy protection on September 15, 2008, and Wall Street's subprime mortgage crisis instantly touched off the global financial crisis. Vasile et al. (2011) reflect the behavioral biases that lead to global financial crisis. They think rating agencies are the one who should have protected investors from buying risky financial products. Besides, some voices argue that rating agencies should have foreseen the high default rates for subprime borrowers. If the rating had been more accurate, fewer investors would have bought into these securities, and the losses may not have been as bad. Adjei (2012) examines the effect of corporate debt dependence on the differential impact of the sub-prime mortgage crisis on corporate performance. The results show the higher the new debt borrowed, the lower the corporate performance for high debt firms during the crisis period, but there's no such relation for low debt firms during the crisis.

### 2.3 Anomalies of IPO Firms

Investors may have positive return from hot issue market. Ritter (1984) examines whether there is any hot issue in the market with developing implication of Rock's (1982) model to explain IPO underpricing. Rajan and Servaes (1997) show that higher underpricing leads to increased analyst following. Datta and Iskandar-Datta (1995) document significantly positive price impacts on the publication day for the buy portfolio. Bauman, Datta and Iskandar-Datta (1995) find that the pattern of cumulative abnormal returns for the buy and sell portfolios seem symmetric in the pre-publication event period but asymmetric in the post-publication period. In particular, there are significant negative CARs for the sell portfolio. D'Mello and Ferris (2000) show analysts forecast contributing to reduction of the information asymmetry between investors and corporate at the time of new equity issue. Zheng and Stangeland (2007) provide the evidence that IPO firms with greater underpricing are of better quality, and show that analysts are less positively biased in their earnings forecasts for IPO firms that have greater underpricing.

## 3. Data and Methodology

Our search focus on the IPO firms during 2005-2011. We obtain the data for the U.S. companies from Securities Data Company database (SDC), Compusta and Institutional Brokers Estimates Systems (I/B/E/S) International Inc. We gather data on analysts' forecasts of earning per share before the fiscal end year for our sample period year. Then we obtain the rating of the firms done by Standards & Poors and Moody's from Xtra 3000 database. The original number of IPO firms from SDC is 1,359, but only 371 companies have forecast information in IBES database and 106 companies have rating information in Xtra3000 database. So there are 106 IPO firms and totally 1851 observations in our sample. Companies with missing needed analysts and related earning information are excluded.

We examine the accuracy of analyst forecasts made before one year of the fiscal year end for IPO firms. Forecasts errors are computed as follows:

$$\text{Earning Forecast Error} = \frac{\text{Actual earning} - \text{Earning forecast}}{\text{Stock price at the time of the earning forecast}} \quad (1)$$

The contemporaneous stock price at the time of forecast is used to scale the forecast errors to control the cross-sectional differences. Negative (positive) values of errors in equation (1) imply that analysts' forecasts exceed (fall below) subsequently actual earnings. If analysts make optimistic forecasts, the earning forecast error would be negative. The larger forecast error is, the more optimistic analyst is

The regression is used to examine the notion of efficiency relates to forecasted changes in earnings. The regression is as following:

$$AC_t = \alpha + \beta FC_t + \epsilon_t \quad (2)$$

where the dependent variable $AC_t$ represents the change of actual earning, which is measured by $(E_t - E_{t-1}) / P_{t-1}$, is the actual current year earnings change scaled by the stock price at t-1. And the independent variable $FC_t$ represents the forecast error, which is measured by $( F_t - E_{t-1}) / P$. If analysts in our sample overestimate the changes in earnings, the slope coefficient will be significantly less than one. Then we can use the result of this regression to examine whether analysts would be optimistic in the pre-crisis period and in the post-crisis period.

We use the following regression to examine the relationship between some independent variables and forecast error.

$$\frac{E_t - F_t^{t-1}}{P} = \alpha_0 + \alpha_1 \mathrm{DEBT_t} + \alpha_2 \mathrm{SIZE_t} + \alpha_3 \mathrm{UNDERPRC_t} + \alpha_4 \mathrm{IPONUM_t} + \alpha_5 \mathrm{PERF_t} + \alpha_6 \mathrm{RATE_t} + \alpha_7 \mathrm{EX_t} + \varepsilon_t \quad (3)$$

The dependent variable is earning forecast error, and it measured as the number of difference between the actual earning and earning forecast then divide by the stock price at the time of forecast. If the forecast error in this regression is positive, it means that the analysts are optimistic.

There are several independent variables in our regression including four control variables. The control variables in our regression are SIZE, UNDERPRC, IPONUM and EX. Those variables are documented in prior studies (Das et al., 2006; Rajan and Servaes, 1997; Chen and Ritter, 2000; Hong et al., 2000) provide that some factors could affect the analyst following. SIZE is the log of market value of the firm. UNDERPRC is extent of underpricing, based on the closing price in the first day of trading. It is measured as the difference between the first aftermarket price and the offer price and then divided by the offer price. IPONUM is the number of IPO firms in the same year. Finally, if the company in our sample is listed on NYSE or NASDAQ, EX is equal to 1 and otherwise 0.

Additionally, we add independent variables in our regression, namely, the debt ratio and the rating of firms are related to financial crisis in 2008. The rating would reflect the financial position and the performance of the company. The debt ratio is measured as total liabilities divided to total assets of firms. Following the prior study (Naifar, 2006), we use a numerical equivalent of credit rating as Table 1. The other independent variable is PERF, which means the prior-year earning change. It is estimated by $(E_{t-1}-E_{t-2}) / p_{t-1}$. This variable is from the prior literature (Loh and Mian, 2003), and it provides the significant relationship with forecast error in the paper. We run test of multicollinearity for variables. The analysis exhibits no signs of multicollinearity with the VIF values are all below 10. Then, we form portfolio based on forecast error representing the optimism of analyst. We use top 30 percentage of forecast error as high level, middle 40 percentage of forecast error as normal level and low 30 percentage of forecast error as low level.

## 4. Empirical Results

### 4.1 Descriptive Statistics and Correlation Analysis

Table 1 is the list of rating from Standards & Poor's and Moody's for firms. We assign higher level rating a lower scores and lower level rating a higher scores.

**Table 1. Numerical value of rating**

This table lists credit rating for firms by Standard & Poor's and Moody's. We assign higher level rating a lower scores and lower level rating a higher scores.

| Standards & Poor's | Moody's | Numerical value |
|---|---|---|
| AAA | Aaa | 1 |
| AA+ | Aa1 | 2 |
| AA | Aa2 | 3 |
| AA- | Aa3 | 4 |
| A+ | A1 | 5 |
| A | A2 | 6 |
| A- | A3 | 7 |
| BBB+ | Baa1 | 8 |
| BBB | Baa2 | 9 |
| BBB- | Baa3 | 10 |
| BB+ | Ba1 | 11 |
| BB | Ba2 | 12 |
| BB- | Ba3 | 13 |

| | | |
|---|---|---|
| B+ | B1 | 14 |
| B | B2 | 15 |
| B- | B3 | 16 |
| CCC+ | Caa1 | 17 |
| CCC | Caa2 | 18 |
| CCC- | Caa3 | 19 |
| CC | Ca | 20 |
| C | C | 21 |
| D | D | 22 |

Table 2 reports sample distribution. The IPO firms are concentrated in the pre-crisis period of 2005 to 2007 with 63.80 percent of the sample. There is the least IPO firm in 2008 financial crisis with only 3%. The last column is the number on IBES with forecast values. The number in brackets is the fraction of the number of IPOs in IBES based on number of IPO in every year from 2005 to 2011. After financial crisis in 2008, there is more analysts' forecasts information available in IBES database, and the fractions are all larger than 35%.

**Table 2. Distribution of Initial Public Offerings (IPOs)**

We obtain a sample of initial public offerings (IPOs) during the period of 2005-2011 from SDC database. The data are further merged with the Institutional Brokers Estimate System (IBES) database to obtain information of analyst coverage of IPO firms. The fraction of lasted column is based on the number of IPOs in every sample year.

| Year | Number of IPOs | % | Number on IBES with Forecast (Fraction) |
|---|---|---|---|
| 2005 | 281 | 21 | 59 (0.21) |
| 2006 | 254 | 19 | 42 (0.17) |
| 2007 | 332 | 23 | 75 (0.23) |
| 2008 | 51 | 3 | 13 (0.25) |
| 2009 | 75 | 6 | 31 (0.41) |
| 2010 | 193 | 15 | 85 (0.44) |
| 2011 | 173 | 13 | 66 (0.38) |
| Total | 1,359 | 100 | 371 (0.27) |

In panel A of table 3, the debt ratio is average between 31% and 39%. In panel B, UP is extent of underpricing, based on the closing price in the first day of trading, and it would attract analyst following if the value is high. The average first-day return is 3.71 percent, and all the underpricing values are positive which is consistent with previous studies except year 2010. The highest value is 54 percent in year 2011 and the lowest value in 2010. Investors get 2% return during 2008 financial crisis year. The average underpricing in our sample is less than prior studies with 0.61%.

**Table 3. Sample Distribution**

The following variables are utilized in our regression. *DR* stands for debt ratio, which is measured as total debt divided total assets. *S* stands for the firm size, which is equal to the market value of the firm. *UP* stands for underpricing and it is measured as the difference between the first aftermarket price and the offer price, divided by the offer price. *Perf* stands for the prior-year earnings change $(E_{t-1}-E_{t-2})$ scaled by the concurrent price at year *t-1*.

| *Year* | *Panel A* | ***DR*** | | | ***S (market value)*** | | | |
|---|---|---|---|---|---|---|---|---|
| | ***Aver. (percentage)*** | ***Max*** | ***Min*** | ***SD*** | ***Aver.*** | ***Max*** | ***Min*** | ***SD*** |
| 2005 | 37.39 | 107.49 | 0 | 26.78 | 1,813.67 | 9,905.26 | 48.75 | 1,695.61 |
| 2006 | 38.56 | 109.35 | 0 | 25.22 | 2,159.91 | 12,278.19 | 51.10 | 1,912.10 |
| 2007 | 36.09 | 106.70 | 0 | 24.31 | 2,709.33 | 24,400.56 | 20.58 | 2,921.61 |
| 2008 | 38.49 | 117.40 | 0 | 25.46 | 2,347.36 | 38,835.84 | 7.12 | 3,490.41 |
| 2009 | 37.48 | 117.40 | 0 | 25.69 | 1,567.11 | 29,489.75 | 6.22 | 2,546.64 |
| 2010 | 36.75 | 125.47 | 0 | 24.00 | 2,125.79 | 31,170.61 | 12.38 | 3,328.14 |
| 2011 | 30.43 | 86.14 | 0 | 28.83 | 2,575.75 | 46,234.06 | 7.93 | 4,221.33 |
| Overall | 37.27 | 125.47 | 0 | 25.24 | 2,233.46 | 46,234.06 | 6.22 | 3,230.38 |

| *Year* | *Panel B* | ***UP*** | | | ***Perf$_{t-1}$*** | | | |
|---|---|---|---|---|---|---|---|---|
| | ***Aver.*** | ***Max*** | ***Min*** | ***SD*** | ***Aver.*** | ***Max*** | ***Min*** | ***SD*** |
| 2005 | 0.07 | 0.50 | -0.68 | 0.16 | 0.0013 | 0.05 | 0.00 | 0.01 |
| 2006 | 0.10 | 1.01 | -0.65 | 0.29 | 0.0019 | 0.46 | -0.09 | 0.02 |
| 2007 | 0.08 | 0.67 | -0.13 | 0.16 | -0.0010 | 0.22 | -0.55 | 0.02 |
| 2008 | 0.02 | 0.57 | -0.19 | 0.19 | -0.0026 | 6.90 | -1.47 | 0.21 |
| 2009 | 0.03 | 0.39 | -0.13 | 0.10 | 0.0279 | 18.22 | -6.57 | 0.65 |
| 2010 | -1.80 | 0.13 | -5.67 | 2.74 | 0.0031 | 1.09 | -0.77 | 0.06 |
| 2011 | 0.54 | 5.98 | -0.95 | 1.25 | 0.0032 | 0.44 | -0.30 | 0.03 |
| Overall | 0.03 | 5.98 | -5.67 | 0.59 | 0.0061 | 18.22 | -6.57 | 0.30 |

The correlation matrix in Table 4 shows that forecast error has powerful connection with most of variables except debt ratio.

**Table 4. Correlation Analysis**

***FE*** represents forecast error, which is dependent variable in our main regression and it is measured as actual earnings minus earnings forecast divided by stock price at the time of the earnings forecast. ***DR*** represents debt ratio, which is equal to total debt divided by total asset. ***S*** is market value. ***UP*** is computed as the difference between the first aftermarket price and the offer price then divided by the offer price. ***IPON*** represents the number of IPO firms in the same year. ***RATE*** represents the rating of the firms. ***PERF*** represents the prior-year earnings change $(E_{t-1}-E_{t-2})$ scaled by the concurrent price at year *t-1*. ***EX*** is dummy variable for firms listed on NYSE and NASDAQ.

| | *FE* | *DR* | *FS* | *UP* | *IPON* | *RATE* | *PERF* | *EX* |
|---|---|---|---|---|---|---|---|---|
| *FE* | 1 | | | | | | | |
| *DR* | -0.036 | 1 | | | | | | |
| *FS* | -0.058$^{*}$ | 0.006 | 1 | | | | | |
| *UP* | 0.110$^{***}$ | -0.391$^{***}$ | -0.074$^{*}$ | 1 | | | | |
| *IPON* | 0.101$^{**}$ | -0.009 | -0.115$^{***}$ | 0.599$^{***}$ | 1 | | | |
| *RATE* | 0.092$^{**}$ | 0.471$^{***}$ | 0.056 | 0.020 | 0.061$^{*}$ | 1 | | |
| *PERF* | -0.085$^{**}$ | 0.003 | 0.014 | -0.010 | -0.013 | 0.008 | 1 | |
| *EX* | 0.113$^{***}$ | -0.468$^{***}$ | 0.114$^{***}$ | 0.064$^{*}$ | -0.323$^{***}$ | -0.178$^{***}$ | 0.005 | 1 |

Notes: $^{***}$ notes significance at the 1% level; $^{**}$ notes significance at 5% level; $^{*}$ notes significance at 10% level.

In table 5, the forecast error is measured as actual earning minus forecast earning. Negative signs mean that analysts' forecasts are optimistic in our sample period. The overall average forecast error is -0.1025. In the year 2008 and 2009, analysts appear to display larger magnitudes of optimism. This result is consistent to the findings of Loh and Mian, (2003) with larger forecast error -0.2158 in 2008 and -0.2719 in 2009. Conversely, the analysts in pre-crisis period are not as optimistic as the result in post-crisis period.

**Table 5. Forecast Errors by year**

The sample consists of 371 firm-year observations that had one-year ahead consensus earnings forecasts available from IBES.

| | | | *Forecast Errors* | | | |
|---|---|---|---|---|---|---|
| *Year* | *No.of Firms* | *Mean* | *Median* | *Max* | *Min* | *Std. Dev.* |
| 2005 | 59 | - 0.0269 | - 0.0054 | 0.11 | -0.36 | 0.0779 |
| 2006 | 42 | - 0.0029 | - 0.0022 | 0.48 | -0.03 | 0.0563 |
| 2007 | 75 | - 0.0201 | - 0.0022 | 0.42 | -0.96 | 0.0983 |
| 2008 | 13 | - 0.2158 | - 0.0189 | 5.77 | -40.06 | 1.7907 |
| 2009 | 31 | - 0.2719 | - 0.0111 | 1.80 | -45.89 | 1.9396 |
| 2010 | 85 | - 0.0338 | - 0.0047 | 0.36 | -1.03 | 0.1300 |
| 2011 | 66 | - 0.0132 | - 0.0092 | 4.41 | -1.55 | 0.2803 |
| Overall | 371 | - 0.1025 | - 0.0070 | 5.77 | -45.89 | 1.1473 |

Notes: Forecast errors are defined as:

$$FE = \frac{E_t - F_t^{t-1}}{P}$$

where $E_t$ is the actual reported earnings for year t, $F_t^{t-1}$ is the forecast of year t's earnings made one year prior to year end, and P is the stock price at the time of forecast.

## 4.2 Regression Analysis

We report the main sample regression results in Panel A of Table 6. The slope coefficient β is significantly below one (0.090, t = 39.168). In Panel B, the forecast errors in the pre-crisis period and the post-crisis period are all significant.

**Table 6. Regression of Actual Earnings Change on Forecast Errors**

The main sample consists 371 IPO firms during 2005 and 2011. The period of pre-crisis is from January 2005 to August 2008 and the period of post-crisis is from September 2008 to December 2011. The dependent variable is the change of actual earnings, and the independent variable is the forecast errors. The regression model is:

$$AC_t = \alpha + \beta FC_t + \epsilon_t$$

| *Sample* | *Intercept* | *Slope* | $R^2$ | *F stat* |
|---|---|---|---|---|
| **Panel A: Main Sample** | | | | |
| Overall | **-0.007**$^{***}$ (-2.641) | **0.090**$^{***}$ (39.168) | **0.198** | **1534.101**$^{***}$ |
| **Panel B: Pre and Post-crisis Samples** | | | | |
| Pre-crisis | **-0.002907**$^{**}$ (-2.517) | **0.005367**$^{**}$ (2.089) | **0.002** | **4.362179**$^{**}$ |
| Post-crisis | **-0.009788**$^{**}$ (-2.363) | **0.095658**$^{***}$ (33.164) | **0.228** | **1099.839**$^{***}$ |

Notes: 1. $^{***}$ notes significance at the 1% level; $^{**}$ notes significance at 5% level; $^{*}$ notes significance at 10% level.

2. The dependent variable $AC_t$ is the change of actual earning, which is measured by $(E_t\text{-}E_{t-1}) / P$.
3. The independent variable $FC_t$ is the forecast error, which is measured by $(F_t - E_{t-1})$ / P.

Table 7 documents regression results on forecast error. Surprisingly, the debt is not significant in both periods. Two variables are significantly related to forecast error in both periods. The first one is the number of IPO firms. However, the coefficient in the pre-crisis is positive (0.0015, t=2.3383) and negative in the post-crisis period (-0.0013, t=-2.1640). When there are more IPO firms, analysts would make more optimistic forecast earning and thus cause larger forecast error in the pre-crisis period, but not in the post-crisis period. The other variable is PERF which is the prior-year earnings change. The coefficient in the pre-crisis (-0.6983, t=-2.2156) and in the post-crisis (-0.7843, t=-4.9414) are interestingly all negative. This indicates that if the prior earning change is negative, there exists large forecast error. Analysts are more optimistic no matter what the performance in prior-year is.

Three variables in our regression are all not significant in the post-crisis period but significant in the pre-crisis period. The first one is underpricing. The more underpricing firms are, the more forecast error analysts make in the pre-crisis period. The rating of firms is significant in the pre-crisis period (0.0476, t=6.9813). Because we give higher scores to lower rating firms, the positive coefficient means the firms with lower rating would cause larger forecast error in the pre-crisis period. In the pre-crisis period, if the firm is listed on NYSE or NASDAQ, then it would significantly (0.4117, t=3.9421) affect the forecast error. Finally, we observe the impact of the firm size in the post-crisis is significant and the coefficient is negative (-0.1884, t=-4.7881). The number of IPO firms and prior-year earning change are the variables analysts would use to make their recommendations no matter in pre- or post-crisis period.

**Table 7. Forecast Error Regression**

***FE*** : forecast error, which is measured as actual earnings minus earnings forecast divided by stock price at the time of the earnings forecast. ***DR*** : debt ratio, which is equal to total debt divided by total asset. ***FS***: the firm size, which is market value. ***UP*** : underpricing, which is computed as the difference between the first aftermarket price and the offer price, divided by the offer price. ***IPON*** : the number of IPO firms in the same year. ***RATE*** : the rating of the firms. ***PERF*** : the prior-year earnings change $(E_{t-1}-E_{t-2})$ scaled by the concurrent price at year *t-1*. ***EX*** : 1 if the firm is listed on NYSE or NASDAQ

$$FE_t = \alpha_0 + \alpha_1 DEBT_t + \alpha_2 SIZE_t + \alpha_3 UNDERPRC_t + \alpha_4 IPONUM_t + \alpha_5 PERF + \alpha_6 RATE + \alpha_7 EX + \varepsilon_t$$

| | *Independent Variable* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *Intercept* | *DR* | *S* | *UP* | *IPON* | *PERF* | *RATE* | *EX* |
| ***Panel A: Pre-crisis Period*** | | | | | | | | |
| *FE* | **-1.2276**$^{***}$ (-4.1635) | **0.0002** (0.2665) | **-0.0444** (-1.1541) | **0.3723**$^{***}$ (2.8947) | **0.0015**$^{**}$ (2.3383) | **-0.6983**$^{**}$ (-2.2156) | **0.0477**$^{***}$ (6.9813) | **0.4117**$^{***}$ (3.9421) |
| | $R^2$ 0.0916 ($F$ = 11.1799) | | | | | | | |
| ***Panel B: Post-crisis Period*** | | | | | | | | |
| *FE* | **0.9659**$^{***}$ (3.3102) | **0.0002** (0.1836) | **-0.1884**$^{***}$ (-4.7881) | **-0.0038** (-0.0322) | **-0.0013**$^{**}$ (-2.1640) | **-0.7843**$^{***}$ (-4.9414) | **0.0152** (1.5417) | **-0.03992** (-0.4308) |
| | $R^2$ 0.0448 ($F$ = 7.012420) | | | | | | | |

Notes: $^{***}$ notes significance at the 1% level; $^{**}$ notes significance at 5% level; $^{*}$ notes significance at 10% level.

In Table 8, we group the forecast error to three levels, low, normal and high. Top 30% forecast error is as high level and the low 30% forecast error is as low level. For low level forecast error portfolio, three variables are significant in the pre-crisis period, namely, underpricing, the number of IPO firms in the same year and whether the firms are listed on NYSE or NASDAQ. Prior-year earning change is significant negative after financial crisis. For the normal forecast error portfolio, most of variables are significant in the pre-crisis except the firm size and the number of IPO firms. For high level of forecast error portfolio, the factor whether the company is listed on NYSE or NASDAQ is significant in the pre-crisis period. The debt ratio, the firm size and the number of IPO firms are all significant in the post-crisis period.

**Table 8. Forecast Error Regression for sub- portfolios (Low, Normal, High)**

We separate the forecast error to three levels, low, normal and high. Top 30% forecast error is as high level and the middle 40% forecast error is as normal level and finally the low 30% forecast error is as low level. ***FE*** :forecast error, which is measured as actual earnings minus earnings forecast divided by stock price at the time of the earnings forecast. ***DR*** : debt ratio, which is equal to total debt divided by total asset. ***FS***: the firm size, which is market value. ***UP*** : underpricing, which is computed as the difference between the first aftermarket price and the offer price, divided by the offer price. ***IPON*** : the number of IPO firms in the same year. ***RATE*** : the rating of the firms. ***PERF*** : the prior-year earnings change $(E_{t-1}-E_{t-2})$ scaled by the concurrent price at year *t-1*. ***EX*** : 1 if the firm is listed on NYSE or NASDAQ.

$$FE_t = \alpha_0 + \alpha_1 DEBT_t + \alpha_2 SIZE_t + \alpha_3 UNDERPRC_t + \alpha_4 IPONUM_t + \alpha_5 PERF + \alpha_6 RATE + \alpha_7 EX + \varepsilon_t$$

| | | *Panel A: pre-crisis sample* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ***Intercept*** | ***DR*** | ***S*** | ***UP*** | ***IPON*** | ***PERF*** | ***RATE*** | ***EX*** | $R^2$ |
| ***FE*** | (1) *Low* | **-1.282**$^{***}$ (-3.373) | **0.001** (1.171) | **-0.004** (-0.093) | **0.555**$^{***}$ (3.252) | **0.002**$^{**}$ (2.126) | **0.227** (0.373) | **0.000** (-0.016) | **0.248**$^{**}$ (2.142) | 0.072 |
| | (2) *Normal* | **-0.469**$^{***}$ (-2.979) | **0.001**$^{*}$ (1.912) | **0.027** (1.4) | **0.222**$^{***}$ (3.392) | **0.000** (1.338) | **-0.281**$^{*}$ (-1.914) | **0.01**$^{***}$ (2.609) | **0.214**$^{***}$ (3.928) | 0.076 |
| | (3) *High* | **0.585**$^{***}$ (2.758) | **0.000** (0.476) | **-0.043** (-1.344) | **0.052** (0.455) | **0.000** (-0.499) | **0.113** (0.529) | **-0.002** (-0.298) | **0.164**$^{*}$ (1.738) | 0.021 |
| | | *Panel B: post-crisis sample* | | | | | | | | |
| | | ***Intercept*** | ***DR*** | ***S*** | ***UP*** | ***IPON*** | ***PERF*** | ***RATE*** | ***EX*** | $R^2$ |
| ***FE*** | (1) *Low* | **-0.759**$^{*}$ (-1.878) | **0.002** (1.627) | **0.069** (0.171) | **-0.077** (0.392) | **-0.001** (0.066) | **-2.449**$^{***}$ (-8.691) | **0.010** (0.939) | **-0.141** (-1.036) | 0.251 |
| | (2) *Normal* | **-0. 2**$^{**}$ (2.088) | **0.000** (-1.526) | **-0.038**$^{***}$ **(**-2.832**)** | **-0.12**$^{***}$ **(**-2.878) | **-0.001** (3.042) | **-0.054** (-0.972) | **0.010**$^{**}$ (2.471) | **0.013** (0.399) | 0.061 |
| | (3) *High* | **2.550**$^{***}$ (6.667) | **0.003**$^{**}$ $^{*}$ (2.640) | **-0.249**$^{***}$ (-5.464) | **0.100** (0.814) | **-0.005**$^{**}$ $^{*}$ (-6.383) | **0.031** (0.195) | **-0.003** (-0.243) | **0.155** (1.471) | 0.203 |

Notes: $^{***}$ notes significance at the 1% level; $^{**}$ notes significance at 5% level; $^{*}$ notes significance at 10% level.

## 5. Conclusion

The firm size, underpricing, the number of IPO firms and the listing on NYSE and NASDAQ are factors which would affect the analyst following. In the pre-crisis period, analysts would make their predictions infer to most of factors including underpricing, the number of IPO firms in the same year, the prior-year earning change, the rating of the companies and whether the company is listed on NYSE or NASDAQ. But in the post-crisis period, analysts would consider only the firm size, the number of IPO numbers and the prior-year earning change to make their predictions. The reason why the firm size becomes significant after crisis might be analysts think the larger company may have greater opportunity to overcome the difficulties of crisis. Besides, analysts pay much attention to the prior-year earning change after financial crisis. If the performance of company is deteriorating last year, analysts would believe the situation will reverse in the future no matter before or after financial crisis.

Firms are less willing to enter the public market during the financial crisis. Besides, analysts tend to notice the information of firms after crisis and make optimistic predictions. Moreover, analysts would be more optimistic when they face the uncertain environment and this result is consistent with prior study (Loh and Mian, 2003). Analysts would overestimate no matter in the pre-crisis or in the post-crisis. We suggest that the forecast bias of analysts exists and might lead investors to make more optimistic decision.

For those conservative analysts, they would notice the underpricing, the number of IPO firms in the same year and whether the firm is listed on NYSE or NASDAQ. But after crisis, the analysts just notice the prior-year earning change. Optimistic analysts believe that the firms listed on NYSE or NASDAQ would have good performance in the post-crisis period.

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