The Factors that Affect IPO Premium in China: An Empirical Study

Quanquan Xie[1]

[1]victoriaxqq@163.com

[1]Shandong Experimental High School

Abstract-This paper analyzes the impact of significant factors on IPO premium, and makes an empirical test on 1000 IPO companies from 2006 to 2021. We find the data and information of these companies from GTA and Wind database. Firstly, sentiment factor S is composed by six factors. Then, we explore the correlation between every two factors by correlation analysis and analyze the data with statistical analysis. Through stepwise multiple linear regression, six models formed with different included factors and the coefficient of determination. To conclude, the model that has performed the best includes sentiment S (a component made from factor analysis of six variables), the number of effective subscription account, investor sentiment index (calculated based on a previously invented regression function), effective subscription funds, the first day price fluctuation, and IPO price-earnings ratio. All these variables mentioned have significant correlation with IPO premium. This model has the highest coefficient of determination, 0.414.

Keywords: IPO, Behavioral Finance, Investors' sentiment

1 Introduction

Many theories, Efficient Market Hypothesis claims that investors balance risks and returns rationally [1], finance and investment are based on the assumption that investors are rational, which means they chase for maximized profit with the lowest risk. However, there are lots of anomalies during transactions. For example, stock symbols of a closed-end fund "MCI" and an American communication company "MCIC" are similar. There is an abnormal phenomenon that the changes of stock prices of these two stocks are also similar. Based on the story, we know that behavioral finance does exist. Noise traders are irrational, who could be disturbed by market sentiment. In that case, they take higher risks, sometimes with higher returns, which presents that noise traders are able to affect the market. Basically, sentiment in market is the opinions from investors towards the market with prospect or not [2].

Specifically, we concentrated on IPO premium with investors' sentiment and other effective factors. IPO refers to the first time a company sells its shares to the public.

In the rest of this paper, the factors that may influence IPO premium will be discussed. In the literature review part, we review other previous researchers' opinions toward the factors of IPO premium. In the methodology part, we explain our methods for research and the reliability of data. In the discussion part, we concentrate on the result of data analysis and explain them further. In the last part, we conclude the paper with limitations and future expectations.

ICIDC 2022, June 17-19, Qingdao, People's Republic of China

DOI 10.4108/eai.17-6-2022.2322811

2 Literature Review

Investors have different subjective opinions about a portfolio with an assumption that all of them own complete information. Because of this examination, it illustrated that individual difference exists in investment, which refuted that investors are rational [3].

The researchers demonstrated prospect theory as a basis in behavioral finance. Based on Expected utility theory, a framework for analyzing the choice of rational actors under uncertainty with mathematical expectation, the risk preference for each investor is different. For the returns higher than the reference point, people tend to show risk aversion and prefer small returns with certainty. On the other hand, people prefer risk, facing the loss type results lower than the reference point [4].

The author stated the concept of mental accounting by publishing paper. He pointed out lots of examples in daily life which could reflect critique of economic theory. Due to consumer mental accounting, individuals often violate some simple economic algorithms and make many irrational behaviors [5].

Investors held different attitudes, positive or negative, led to different discounts on close-end. Specifically, when investors are optimistic about future returns, discounts are low. When investors are pessimistic, discounts are high. They advanced investors' sentiment theory. It provided the basic statement that sentiment has the potential to disturb investors' opinions[6].

Investors' sentiment may have significant effects on the cross-section of stock price. Based on cross-sectional variation in sentiment and arbitrage, they concentrated on the impact of investors' sentiment on stock price, realized returns, and expected returns. As a result, they concluded that when the market has high sentiment, stocks which attract optimists but not arbitrageurs would have low returns. When the market experiences a low sentiment, these cross-sectional patterns would reduce, even become opposite [7].

With all documents above, we review main theories in behavioral finance. We could notice they support that people's mind, sentiment, generally behavior, could affect stock market and investment. Then, we focus on sentiment which could make a turbulence on stock price.

Next, we found six different sentiment factors which could influence stock price, and these factors had been confirmed by other papers with specific correlation. Sentiment changing is proportionally correlated to overvalued IPO firms, by examining 2100 IPO companies. They estimated the value of IPO firms by price-to-sales, price-to-EBITDA, and price-to-earnings ratios [8].

Xu (2018) chose 53 IPO companies from 2008 to 2014 to research and drew the conclusion. There is a negative correlation between the winning rate and investor sentiment. The increase of trading volume enhances investors' investment desire, which means that the increase of trading volume has a positive impact on investors' moods. The first-day turnover rate is a commonly used indicator to measure investor sentiment, and there is a positive correlation between the two factors. The number of new investors opening accounts lags behind in the real stock market environment, which cannot reflect the relationship between it and investor sentiment. The higher the consumer confidence index, the stronger the investment desire of investors, that is, there is a positive correlation between consumer confidence index (CCI) and

investor sentiment. The impact of the number of new shares on investor sentiment is positively correlated. The increase of the number of IPO firms has a positive impact on investor sentiment. What's more, the author analyzed data with verification description of KMO and Bartletthe and explained the variable by characteristic and variance. After that, the writer drew gravel map to work out the relationship between stock premium and investors' sentiment. Also, the author examined the conclusion by multiple linear regression [9].

Sentiment influences the IPO stock price. Specifically, the higher the uncertainty of corporate value, the greater the impact of market sentiment on IPO premium; The higher the company's speculative risk, the smaller the impact of market sentiment on IPO premium. In addition, the stock price of companies with high IPO premium will gradually reverse after listing. Moreover, employed multiple linear regression, in order to find out the relationship between IPO premium and each factor with different weights. They used the following four variables to obtain the comprehensive factors of market sentiment variables: the P / E ratio of the whole stock market (monthly), market turnover rate (monthly), closed-end fund discount rate (monthly), and number of shareholders' accounts (monthly) [10].

3 Methodology

Firstly, our research is associated to sentiments' impact on IPO stock price and design the most suitable model to explain the impact. In this section, I would mention about data resource, calculation method, and explanations for each factor.

Correlation analysis is a tool to find the relationship between two random variables. The degree of correlation between the two variables is expressed by the correlation coefficient R. The value of the correlation coefficient R is between - 1 and 1, but it can be any value in this range. When the correlation is positive, the value of R is between 0 and 1. At this time, one variable increases and the other variable also increases; When the correlation is negative, the R-value is between - 1 and 0, and the scatter diagram is oblique downward. At this time, one variable increases and the other variable decreases. The closer the absolute value of R is to 1, the stronger the correlation between the two variables. The closer the absolute value of R is to 0, the weaker the correlation between the two variables.

Statistical analysis refers to a research method to understand and reveal the relationship, change law and development trend between things through the analysis and research of the quantitative relationship of research objects, so as to achieve the correct interpretation and prediction of things. We calculate maximum, minimum, mean value, variance, and standard deviation for all variables.

Linear regression is a strategy that determines the linear relationship between a dependent variable and independent variables. When there are two or more independent variables during regression, it would be called multiple linear regression. In linear regression, the data is modelled by linear prediction function, and the unknown model parameters are also estimated by data. These models are called linear models. The most commonly used linear regression modelling is that the conditional mean of Y given the value of X is an affine function of X. To be more specific, We define IPO premium as the dependent variable. Independent variables include sentiment S which integrates six factors —— average price-earnings ratio of A-share

market, monthly turnover rate, monthly new shareholder accounts, discount of closed-end fund, A to H share premium, and recent trend of the market. Furthermore, we apply stepwise regression, in order to reach further accuracy. In statistics, stepwise regression is a method of fitting regression models in which the choice of predictive variables is carried out by an automatic procedure. In each step, an independent variable is considered for addition to or subtraction from the set of explanatory variables based on some pre-specified criterion. Also, the significance of each factor could be calculated during the process. When the significance is smaller than 0.05, this factor would have a significant influence on the dependent variable. We design six different models which add independent variables in sequence —— sentiment S (Msent2), the number of effective subscription account, investor sentiment index (0.64NA + 0.521TURN + 0.229CCI + 0.351DCEF + 0.227NIPO + 0.463RIPO), effective subscription funds, the first day price fluctuation, and IPO price-earnings ratio seeing from appendix 4. Following the increment of independent variables, adjusted R square is increasing, which refers to the greater accuracy of the model, comparing to the realistic scenario.

Our data is collected from Wind and GTA database. Specifically, GTA database records the average discount rate of closed-end funds last month, the average yield on the first day of IPO, number of new accounts opened, market turnover rate last month, consumer confidence last month, and investor sentiment index (0.64NA + 0.521TURN + 0.229CCI + 0.351DCEF + 0.227NIPO + 0.463RIPO). We find one thousand IPO firms during 2006 to 2021 with feature data in Wind database. In 2006, the government published Measures for the Administration of Securities Issuance and Underwriting which nearly finished the reform of IPO in China. Therefore, we choose the IPO companies as samples after 2006.

During data processing, we discover an abnormal phenomenon that lots of companies' IPO premiums, (First day closing price - company intrinsic value) / issue price, equal 1.44 except the Science and Technology Innovation Board (STAR Market). Because there was a limit that IPO stocks cannot rise over 44% in the first day, according to China Securities Regulatory Commission in 2014. In this way, by interfering from policy our research only focus on the Science and Technology Innovation Board (STAR Market) to calculate IPO premium.

According to the literature review part, multiple linear regression is an appropriate method for our research's purpose. It could present the dominance of every factor associated with the dependent variable directly and clearly during process. Also, even though there are many other methods to determine the correlation between two variables, they still use multiple linear regression as verification.

4 Discussion

As a result of data analysis, we finally discovered six significant factors which could significantly affect IPO premium. In the first model, according to stepwise regression the model only includes the sentiment S and the coefficient of determination is 0.186 which means that 18.60% of IPO premium's variance could be explained by sentiment S. The second model based on the first one contains sentiment S and the number of effective subscription account with 0.238 degree of interpretation. The next model adds investor sentiment index as an extra independent variable, which better explains the impact on IPO premium with 0.291. After that, stepwise regression considers four independent variables: sentiment S, the number of effective

subscription account, investor sentiment index, and the effective subscription funds to improve the coefficient of determination with 0.357. Then, the fifth model with a coefficient of determination 0.391 is based on the fourth one by adding value uncertainty variable represented by the first-day price fluctuation. The last model with the highest determination coefficient 0.414 includes an additional independent variable IPO price-earnings ratio. Therefore, the sixth model would be the most appropriate explanation for the relationship between IPO premium and factors which are chosen by stepwise regression. Following tables help explain the process: Table 1 is the descriptive statistics, illustrating the attribute of IPO premium. Table 2 presents different models of gradually adding factors and the analysis of coefficient of determination. Table 3 is the analysis of variance of each model. According to table 2 and table 3, we easily compare the difference to every model and find out the most accurate one.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
IPO Premium	282	.97851201478743070	10.239082365948038	2.610233059493015	1.242428211706572	1.544
Valid N (listwise)	282					

Table 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.438[a]	.192	.186	1.134894441540487
2	.500[b]	.250	.238	1.097769766043515
3	.554[c]	.307	.291	1.059214390440701
4	.614[d]	.377	.357	1.008381948995330
5	.644[e]	.414	.391	.981628971213655
6	.664[f]	.441	.414	.963026288527853

a. Predictors: (Constant), Msent2
b. Predictors: (Constant), Msent2, The number of effective subscription account
c. Predictors: (Constant), Msent2, The number of effective subscription account, Investor sentiment index2
d. Predictors: (Constant), Msent2, The number of effective subscription account, Investor sentiment index2, The effective subscription funds (hundred millions yuan)
e. Predictors: (Constant), Msent2, The number of effective subscription account, Investor sentiment index2, The effective subscription funds (hundred millions yuan)
f. Predictors: (Constant), Msent2, The number of effective subscription account, Investor sentiment index2, The effective subscription funds (hundred millions yuan), Value uncertainty variable1, Industry PE (Monthly, TTM)

Table 3. ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.175	1	39.175	30.416	.000[b]
	Residual	164.862	128	1.288		
	Total	204.038	129			
2	Regression	50.990	2	25.495	21.156	.000[c]
	Residual	153.048	127	1.205		
	Total	204.038	129			
3	Regression	62.674	3	20.891	18.621	.000[d]
	Residual	141.364	126	1.122		
	Total	204.038	129			
4	Regression	76.933	4	19.233	18.915	.000[e]
	Residual	127.104	125	1.017		
	Total	204.038	129			
5	Regression	84.552	5	16.910	17.549	.000[f]
	Residual	119.486	124	.964		
	Total	204.038	129			
6	Regression	89.965	6	14.994	16.168	.000[g]
	Residual	114.073	123	.927		
	Total	204.038	129			

a. Dependent Variable: IPO Premium
b. Predictors: (Constant), Msent2
c. Predictors: (Constant), Msent2, The number of effective subscription account
d. Predictors: (Constant), Msent2, The number of effective subscription account, Investor sentiment index2
e. Predictors: (Constant), Msent2, The number of effective subscription account, Investor sentiment index2, The effective subscription funds (hundred millions yuan)
f. Predictors: (Constant), Msent2, The number of effective subscription account, Investor sentiment index2, The effective subscription funds (hundred millions yuan), Value uncertainty variable1
g. Predictors: (Constant), Msent2, The number of effective subscription account, Investor sentiment index2, The effective subscription funds (hundred millions yuan), Value uncertainty variable1, Industry PE (Monthly, TTM)

5 Conclusion

After reviewing the behavioral finance existing and sentiment which could affect stock price, we explore the factors with significant impact on IPO premium by employing stepwise regression, correlation analysis, and statistical analysis. As a result, we find the most appropriate model with the highest coefficient of determination —— 41.4 percent. The model has six independent variables: sentiment S, the number of effective subscription account, investor sentiment index 2, the effective subscription funds, value uncertainty variable1, IPO price-earnings ratio. Still, our best model remains to be improved, because the coefficient of determination could be increased by adding other meaningful factors as independent variables.

Reference

[1] Fama, Eugene. “Efficient Capital Markets: a Review of Theory and Empirical Work.” May. 1970 pp.387. DOI: 10.1111/j.1540-6261.1970.tb00518.x

[2] De Long, J. Bradford et al. “The Economic Consequences of Noise Traders.” Journal of Political Economy, Vol .98, No.4, (August 1990),Oct. 1987, pp.703-738. DOI: 10.3386/w2395

[3] Harrison, J. Michael and David M. Kreps. “Speculative Investor Behavior in a Stock Market with Heterogeneous Expectations.” The Quarterly Journal of Economics, Vol. 92, No. 2, The MIT Press, May. 1978, pp. 323-336. http://www.jstor.org/stable/1884166

[4] Kahneman, Daniel and Amos Tversky. “Prospect Theory: An Analysis of Decision under Risk.” Econometrica, Vol. 47, No. 2, Mar. 1979, pp. 263-292. http://links.jstor.org/sici?sici=0012-9682%28197903%2947%3A2%3C263%3APTAAOD%3E2.0.CO%3B2-3

[5] Thaler, Richard. “Toward a Positive Theory of Consumer Choice.” Journal of Economic Behavior and Organization, June.1979, pp.39-60. http://www.eief.it/butler/files/2009/11/thaler80.pdf

[6] Lee, Charles M.C, Andrei Shleifer, and Richard H. Thaler. “Investor Sentiment and the Closed-End Fund Puzzle.” The Journal of Finance, Vol.XLVI, No.1, March.1991, pp.75-110. https://scholar.harvard.edu/files/shleifer/files/investorsentiment.pdf

[7] Baker, Malcolm and Jeffrey Wurgler. “Investor Sentiment and the Cross-Section of Stock Returns.” The Journal of Finance, Vol. LXI, NO. 4, Aug. 2006, pp.1645-1681. https://pages.stern.nyu.edu/~jwurgler/papers/wurgler_baker_cross_section.pdf

[8] Campbell, Cynthia J et al. “Market Sentiment, IPO Underpricing, and Valuation.” March, 2008, pp. 1-30. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1108540

[9] Xu, Yujia. “Study on the Influence of Investor Sentiment on IPO Premium in a - Share Market.” June. 2018, pp.1-45.

[10] Song, Shunlin and Yanchao Wang. “How investor sentiment affects stock pricing.” Journal of Management Sciences in China, Vol.19, No.5, May. 2016, pp.41-55.