

# IPO Performance and Trademark

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**Abstract:** This study considers the relationship between trademark and IPO performance based on the 400 companies which went to public during 2012-2016 (before the trade disputes). The findings indicated that trademark could be a sign for IPO performance. In addition, the study illustrated IPO performance was related to ROA ratio before IPO. As for the method used in this study, I choose the linear regression model and logistic regression model to examine the hypotheses. The three hypotheses in this study are all related to the topic of trademark and IPO performance. Further, this study proved the positive relationship between trademark application times and money collected at IPO.

**Key words:** Trademark, IPO Performance, Signal

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## Introduction

The amount of money raised at initial public offering (IPO) is significantly important for companies when it went to public at first time. At the same time, the amount of capital raised is also an index to measure the IPO performance. In order to measure the IPO performance, finding a signal of the IPO performance and value the amount of money raised at IPO through the signal is necessary. Wilbon (1999) argued that risk-adverse investors will be cautious when they are deciding to invest the companies. These investors will tend to choose good future prospects and high potential growth companies. The prospects and potential to grow is not the physical indication to measure the companies. Thus, investors need to measure the companies based on the physical financial data and public information. The first and the most important objective of this study is to find the signal of IPO performance. It can reduce the uncertainty of measuring the IPO performance if the signal of IPO performance was found <sup>[1]</sup>.

Higgins, et al (2011) found that the signal will change over time and the signal was not constant. Pisano (2006) also proved that investors would be more cautious over the last decade and would only decide to invest when the companies demonstrated more research outputs. The outputs of research are the outcomes of R&D investments. Patent, trademark and other intellectual assets are the outcomes of R&D investments. In this study, I choose the trademark as the study objective. The second objective is to analyze the role of trademark in companies' decision of go to be public <sup>[2]</sup>.

Based on the knowledge of the role of trademark in companies when the companies went to public, the relationship between trademark and IPO performance need to be discussed. The third objective is to examine the relationship between trademark and IPO performance. In order to examine the relationship, I will use four models to testify the hypotheses. The hypotheses are all about the trademark before IPO and IPO performance. The conclusion about whether the trademark is a signal for IPO performance could be examined based on the hypotheses and model results <sup>[3]</sup>.

## 1. Hypotheses

Based on the argument of Vismara (2013), R&D investments would affect capital raised when companies went into public. Trademark could be regarded as an outcome of R&D investments. Therefore, the first and the main hypothesis is about the relationship between trademark and money collected at IPO. In the study of Diego (2014), the research focused on the patent and IPO performance. The author used the Log of money collected at IPO as a measurement of IPO performance. Following the research design, I decide to use Log of money collected at IPO as dependent variable

in hypothesis 1. As for the key independent variable, trademark application times is a numerical variable and easy to measure, so the hypothesis 1 is about the trademark application times and money raised at IPO.

Except for the money raised at IPO, the offer price at the first date of IPO is another measurement of IPO performance. For this reason, offer price could be the dependent variable in hypothesis 2. Following the hypothesis 1, trademark application times also could be the independent variable in hypothesis 2. The former two hypotheses examined the numerical variable of trademark appear times and the IPO performance. The hypothesis 3 turned to study the non-numerical variable. The topic of this paper is about the trademark and IPO performance. Therefore, the property variable of trademark application was used as the study objective in hypothesis 3 and the money collected at IPO remains the other research objective.

In order to examine the hypothesis 1, the linear regression model was chosen. As for the hypothesis 2 and hypothesis 3, linear regression model and logistic regression model will be used respectively<sup>[4]</sup>.

Thus, the three hypotheses are stated as follows:

Null hypothesis 1: H0a. Trademark application times is not related to the money collected at IPO.

Alternative hypothesis 1: H1a. Trademark application times related to money collected at IPO.

Null hypothesis 2: H0b. Trademark application times is not related to offer price.

Alternative hypothesis 2: H1b. Trademark application times related to offer price.

Null hypothesis 3: H0c. Trademark application is not related to money collected at IPO.

Alternative hypothesis 3: H1c. Trademark application related to money collected at IPO.

## **2. Research Methodology**

### **2.1 Data collection**

This empirical research focused on the trademark and IPO performance, so the companies started to go to be publicly during 2012-2016 were selected. These data were mainly collected from the SEC government website and NASDAQ IPO website. The SEC government website provided trademark information at IPO (trademark application times) and financial performance before IPO (ROA, total assets and leverage). The NASDAQ website provided the IPO offer price and offer amount (money collected at IPO). The dummy variable of venture capital was from the BvD Zephyr database<sup>[5]</sup>.

### **2.2 Data analysis**

Based on the requirements of the data collection, 400 companies in US were chosen to be analysed. The key measurement of IPO performance was the money collected at IPO, so Log (Money collected at IPO) was the key dependent variable in this research. This measurement of IPO performance was straightforward and objective. The research question was to identify the relationship between IPO performance and trademark, so trademark application and the times of application were the main independent variables.

Return on assets, which defined as net income after-tax divided by total assets, was an index of accounting performance. Thus, ROA ratio can be selected as an independent variable. Except for the ROA, total asset and leverage, which defined as total debt divided by total assets, were also the key index in the analysis of accounting performance which can be one of the independent variables.

Useche (2014) indicated that companies with more experience would have better IPO performance than younger companies. For this reason, I selected the age of the firm as an independent variable. The higher price of per share at IPO, the more money could be collected at IPO. Offer price was one of the independent variables in hypothesis 1. Besides, offer price was also one of the indications of IPO performance, which means offer price also can be used as dependent variable in hypothesis 2.

Meggison & Weiss (1991), Gompers (1995) and Brau & Fawcett (2006) stated that companies with venture capital support could increase the confidence to the company, so I used venture capital as a dummy variable. Moreover, I assumed that internet firms and firms with trademark application could attract more investors. In order to prove the

assumption, trademark application and internet firms were indicated as dummy variables [6].

## 2.3 Model

In order to test the hypothesis 1, I used Stata 12.0 software to analyzed the data and built models. Useche (2014) used the model of  $\text{Log (PROCEEDS)}_i = \alpha_0 + \lambda_{US} \text{PATAPPUS}_i + \lambda_{EU} \text{PATAPPEU}_i + \gamma_{US} \text{VCUS}_i + \gamma_{EU} \text{VCEU}_i + \beta \text{Xi} + \varepsilon_i$  in his research to examine the relationship between patent application and money collected at IPO. Based on the model, I built a linear regression model to test the relationship between log (money collected at IPO) and trademark application times. Therefore, the adjusted regression model is as follows:

$\text{Log (Money collected at IPO)} = \alpha_0 + \beta_1 \text{ Trademark application times} + \beta_2 \text{ ROA} + \beta_3 \text{ Offer price} + \beta_4 \text{ Leverage} + \beta_5 \text{ Age of the firm} + \beta_6 \text{ Total assets} + \lambda_1 \text{ Venture capital} + \lambda_2 \text{ Trademark application} + \lambda_3 \text{ Internet firms} + \varepsilon$

$\alpha_0$  is the intercept of the model.  $\beta_1 - \beta_6$  are the slope of the independent variables.  $\lambda_1 - \lambda_3$  are the slope of the dummy variables.

Following the hypothesis1, money collected at IPO was the dependent variable in the regression model and offer price was one of the independent variables, However, offer price was also the index of IPO performance. The higher offer price means better IPO performance. For this reason, offer price also could be dependent variable. Hypothesis 2 was to test the relationship between trademark and offer price. As stated above, those companies with venture capital support would have attracted more investors, so venture capital could also be a dummy variable in hypothesis 2. Besides, other variables such as ROA, leverage, total assets and age of the firm also could be independent variables <sup>[6]</sup>. The linear regression model for the test of the hypothesis 2 is stated as:

$\text{Offer price} = \alpha_0 + \beta_1 \text{ Trademark application times} + \beta_2 \text{ ROA} + \beta_3 \text{ Leverage} + \beta_4 \text{ Age of the firm} + \beta_5 \text{ Total assets} + \lambda_1 \text{ Venture capital} + \lambda_2 \text{ Trademark application} + \lambda_3 \text{ Internet firms} + \varepsilon$

Moreover, in order to test the hypothesis 3, I built a logistic regression model. The aim of the model is to examine the relationship between the trademark application and the age of the firm. The model can be concluded as:

$Y = 1 (\alpha_0 + \beta_1 \text{ Age of the firm} + \beta_2 \text{ Total assets} + \beta_3 \text{ Internet firm} + \beta_4 \text{ Venture capital} + \beta_5 \text{ Money collected at IPO} + \beta_6 \text{ ROA} + \beta_7 \text{ Offer price} + \beta_8 \text{ Leverage})$

OR

$Y = 0 (\text{else})$

## 3. Research Analysis

### 3.1 Summary statistic

**Table 1 Summary statistic**

Variables	Mean	Std. Dev.	Min	Max
Trademark application times	13.6075	15.76006	0	135
Trademark application	0.875	0.3311331	0	1
Log (money collected at IP)	8.080595	0.450069	6.722634	10.3378
Venture capital	0.4825	0.5003194	0	1
ROA ratio	-0.1747515	0.5067401	-3.61	1.5712
Offer price	15.45388	6.6294	0	68
Leverage	0.4517812	0.9602392	0	12.73046
Internet firm	0.0625	0.2423646	0	1
Total assets	1841.009	9407.582	0.147582	151167
Age of the firm	16.785	22.75044	1	173

The average ROA ratio was -0.17, which means a lot of companies had net loss prior IPO. It could be said that only the high net income or revenue couldn't decide whether the companies can go to public. Moreover, the average leverage was nearly 0.45, which means these companies had more assets than debts prior IPO. A high leverage ratio suggested the company have a huge amount of interest expense and a more risk financial situation. The increase in leverage, which

could also be stated as increase in debts, could lead to the decrease in ROA ratio, which was the utilization potential on assets.

The offer price could decide the amount of money collected at IPO directly, so the amount of offer price was important. If the offer price was low, it's easier to issue the shares but it would damage the interest of the original shareholders and could not meet the amount of money needed. However, if the offer price was high, it would increase the risk and difficulties of underwriter and increase the cost of issuing. In some extent, the companies' offer price could reflect the financial performance before IPO and investor demand in stock market <sup>[7]</sup>.

### 3.2 Linear regression model

In order to examine the hypothesis 1, I selected Log (money collected at IPO) as dependent variable. Trademark application times prior IPO, ROA ratio prior IPO, offer price, leverage prior IPO, total assets prior IPO and the age of the companies were independent variables. Besides, venture capital received prior IPO, trademark application prior IPO and internet firms were dummy variables. Based on these variables, I built a multiple linear regression model. Hypothesis 1 was trademark application times can influence the money collected at IPO. If the p-value of trademark application times variable was less than 0.05, then the hypothesis 1 was proved (the confidence interval was 95%).

**Table 2 Linear regression 1**

Variables	P-value	95% Confidence Interval of the Difference	
		Lower	Upper
Trademark appear times	0.042	0.0000869	0.004546
ROA ratio	0.023	0.0122097	0.1601271
Offer price	0.000	0.0359489	0.04641
Leverage	0.305	-0.0173265	0.0552124
Total assets	0.975	-0.00887393279	0.00860127005
Age of the firm	0.224	-0.0005757	0.0024542
Venture capital	0.007	-0.1784612	-0.0278742
Internet firms	0.116	-0.0274328	0.2480091
Trademark application	0.818	-0.1247107	0.0985982
Constant	0.000	7.324089	7.591585

The coefficient of trademark appear times was 0.0023165, which indicated that the trademark application times has small positive influence on the Log (money collected at IPO). The coefficients of ROA ratio, offer price and venture capital were 0.086, 0.041 and -0.103 respectively. 7.458 was the intercept of the model. the linear regression model 1 can be written as:

$\text{Log (Money collected at IPO)} = 7.458 + 0.0023165 \text{ Trademark application times} + 0.086 \text{ ROA ratio} + 0.041 \text{ Offer price} - 0.103 \text{ Venture capital}$

Trademark application times had positive impact on the Log (money collected at IPO) and the money collected at IPO was one of the indications of IPO performance. It can be concluded that trademark application times had positive influence on the IPO performance. Trademark could be the signal of IPO performance. Those companies with more trademark application could have better IPO performance. The linear regression model 1 verified the relationship between trademark application times and money collected at IPO. Hypothesis 1 was reasonable.

The hypothesis 2 was to examine the relationship between trademark application times and offer price. Offer price was one of the indexes of IPO performance, hypothesis 2 also was to test the relationship of trademark and IPO performance. In order to test the two variables' relationship, a multiple linear regression model was used. Offer price was the dependent variable, trademark application times, ROA ratio, leverage, total assets and age of the firm were the independent variables. Venture capital, trademark application and internet firm were the dummy variables.

**Table 3 Linear regression 2**

Variables	P-value	95% Confidence Interval of the Difference	
		Lower	Upper
Trademark appear times	0.329	-0.063373	0.0212873
ROA ratio	0.002	0.867686	3.643441
Leverage	0.543	-0.9023687	0.4758696
Total assets	0.004	0.0000311	0.0001636
Age of the firm	0.515	-0.0192319	0.0383318
Trademark application	0.158	-3.639613	0.0594453
Venture capital	0.026	-3.041588	-0.1972524
Internet firms	0.045	0.0602203	5.26921
Constant	0.000	16.0167	19.65986

The p-value of times trademark appears was higher than 0.05, so the trademark application times was not significant in this model. In other words, offer price and trademark application times were not related. Hypothesis 2 was not be proved.

### 3.3 Logistic regression model

The dependent variable only has two values. “0” represents no trademark application. “1” represents trademark applied. Logistic regression model is a qualitative model. The binary logistic regression model is used to test the probability of binary responses based on one or more independent variables.

The hypothesis 3 was to testify the relationship of trademark application and money collected at IPO. For this reason, I used trademark application as the dependent variable in the logistic regression model. The Log (money collected at IPO) was the key independent variables. Age of the firm, total assets, ROA ratio, offer price and leverage were control variables. Venture capital and internet firm were dummy variables.

**Table 4 Logistic regression model**

Variables	P-value	95% Confidence Interval of the Difference	
		Lower	Upper
Log (money collected at IPO)	0.583	-0.6322982	1.125024
ROA ratio	0.025	-3.209171	-0.2141905
Offer price	0.058	-0.1178039	0.0019886
Leverage	0.955	-0.6959309	0.6573489
Total assets	0.892	-0.0000453	0.0000521
Age of the firm	0.019	0.0037974	0.0428753
Venture capital	0.000	1.533411	3.971765

**Table 5 Trademark application and the money collected at IPO**

Variables	LOGISTIC
Log (money collected at IPO)	0.246 (0.55)
ROA ratio	-1.712* (-2.24)
Offer price	-0.0579 (-1.89)
Leverage	-0.0193 (-0.06)
Total assets	0.00000336 (0.14)
Age of the firm	0.0233* (2.34)

Venture capital	2.753*** (4.43)
Internet firm	0 (.)
Venture capital dummy	Yes
Internet firm dummy	Yes
Constant	-0.271 (-0.08)
Observations	375

t statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Form the table 4, the p-value of money collected at IPO was higher than 0.05, which means money collected at IPO was not related to trademark application. The hypothesis 3 was not proved. Moreover, the p-value of venture capital in logistic regression model was lower than 0.05 and its coefficient was 2.753. The logistic regression model did not prove the hypothesis 3, so the relationship between trademark application and money collected at IPO still uncertain.

## Conclusion

From the first linear regression model, it found that trademark application times had positive relationship with Log (money collected at IPO). The finding implicated that companies applied trademark more frequently, the capital raised at IPO would increase. Besides, the regression model 1 also found that ROA ratio and offer price had positive effect on the Log (money collected at IPO), which implicated that companies with higher ROA or higher offer price would have more raised money at IPO. However, the model 1 found that venture capital had negative relationship with money collected at IPO, which suggested that companies with venture capital support would have less money collected at IPO.

Based on the model results, the most important finding is that trademark application times related to the money collected at IPO. The hypothesis 1 is proved. Trademark is a signal of IPO performance.

The second linear regression model was to examine the relationship between offer price and trademark appear times. The model results showed that ROA ratio, total assets and internet firm dummy variable had positive impact on the offer price. The findings implicated that internet firms would have higher offer price due to the better development prospects. Companies with higher ROA ratio or higher total assets prior IPO, the offer price would be higher. However, the linear regression model 2 did not testify the hypothesis 2. The relationship between trademark application times and offer price need to be studied with other research models.

The hypothesis 3 was examined by the logistic regression model. The model results showed that ROA ratio before IPO had negative influence on the trademark application while the age of the firm and venture capital support had positive influence on the trademark application. The model did not testify the relationship between trademark application and money collected at IPO, so hypothesis 3 need to be examined in the future study.

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