Benefits of Control, Individual Investors' Limited Rational Behavior, And Underpricing on the Initial Public Offerings of Equity Securities

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Abstract

The underpricing of initial public offerings (IPOs) of common stock has attained recognition as an important topic in corporate finance. Many studies have forced on this theme recently. To explain underpring phenomenon, several propositions with empirical evidence are brought out. However, the reasons of underpricing are still ambiguous, these propositions could not answer all the questions why underpricing.

In the proposition brought out by this study, underpricing is treated as a planned strategy to help the answers or the company. Underpricing is a cost paid to maintain the right to govern the firm. The gain achieved by underpricing is the non-pecuniary benefits of control. When the benefit is greater than the cost caused by underpricing, this strategy would be adopted for maximizing inside shareholders' benefit. The reason proposed by this study why underpricing would help the broad of directors to control the company is an assumption of new individual investors' limited rational decision on holding the securities. This assumption assumes that the investors' intention to hold the stock is higher when the current market price of the stock is greater than the purchasing cost if other conditions are all similar.

It would be possible of the influence proposed by this study if the above assumption could reflect the individual investors' psychology. A simple mathematical model is made to explain this proposition. Some hypotheses are brought out after the analysis of mathematics model for the future empirical studies. After discussion of this study, it's proposed that underpricing strategy in the IPO is a three-win situation for new outside investors, original stockholders and original members of broad of directors. The original stockholders win in the reason that the increased value generated by the IPO could supplement the cost of underpricing. So they agree the underpricing strategy. The new investors win because they pay less and get more than worth. So they accept the new issued stock in the IPO. The original members of broad of directors also win because of keeping the right of corporate governance. So they prefer the underpricing strategy. In short, in the IPO the original directors PREFER the underpricing strategy, stockholders AGREE the underpricing strategy and the new investors ACCEPT the underpricing stock.

Keywords: **Initial Public Offerings, IPOs, Mathematical Model, Underpricing, Price of Share**

1. Introduction

The underpricing of initial public offerings (IPOs) of common stock has attained recognition as an important topic in corporate finance. Many studies have forced on this theme recently. To explain underpring phenomenon, several propositions with empirical evidence are brought out. However, the reasons of underpricing are still ambiguous, these propositions could not answer all the questions why underpricing.

The proportion of institutional ownership is one of the propositions explaining this underpricing phenomenon. Bhide(1993), Burkart et al.(1997), Kahn and Winton(1998) and some other studies focus on this perspective, they found that there existed a correlation between the equity ownership structure and firm performance. They advocated that the larger the proportion of shares owned by the institutional investors, the higher performance that would get. That is the institutional shareholdings would affect firms` value. Why that? Monitoring is the key. When institutional investors own lots of stocks, they would be glad to put efforts on monitoring the company. The performance of the company would improve when monitoring is conduct. To attract institutional investors to invest the company, underpricing is a necessary tactics. The cost of underpricing could be regard as a cost to catch the improvement of value brought by better monitoring.

An ambiguity in distinguishing cause and result has been generated by this proposition. Would the institutions invest on a good company? Or would a company become a good one after institutional investors become the stockholders. If the institutional investors only good companies, better performance is just the reason rather than results of institutions` investments. Underpricing is an incentive to attract institutions` investments. Institutional investors effort on monitoring would help themselves to choose the stocks and decide when to buy and sell, but not the cause of the companies' performance.

Another question keep in company with this proposition is that even if underpricing is necessary for attracting institutional investors, why underpricing is also for small individual investors. In many cases, underpricing exists although it's obvious that over-subscription would happen. This phenomenon could not be explained by the above proposition.

Some other existing literatures of IPO focus on asymmetric information during the issue process and feature underpricing as a result. They advocated that underpricing is the result of adverse selection and underpricing is a cost to the issuer to attract outside investors. In the reason of asymmetric information, outsiders don't know the exact value of the company. The underpricing is then an incentive for outsider to bear the risk.

This perspective also can't answer the question that underpricing would still happen even if according to the experience the outside investors would over-script the new issued stock in this price. If the IPO price raises and the stock can still be sold out, the benefits of original shareholders would improve. If referring to the experience, over-subscription would be happen in such underpricing IPO price, why not raising the price to increase owners' benefit.

Although these two reasons discussed above may explain some parts of firms' underpricing decision on the IPOs, they still couldn't explain all of the underpricing phenomena. For answering the question why the governors of the companies would adopt underpricing decision even if over-subscription would happen and institutional investors have already intentions to buy the stock, another advocacy has been proposed.

In the proposition brought out by this study, underpricing is treated as a planned strategy to help the answers or the company. Underpricing is a cost paid to maintain the right to govern the firm. The gain achieved by underpricing is the non-pecuniary benefits of control. When the benefit is greater than the cost caused by underpricing, this strategy would be adopted for maximizing inside shareholders' benefit.

The reason proposed by this study why underpricing would help the broad of directors to control the company is an assumption of new individual investors' limited rational decision on holding the securities. This assumption assumes that the investors' intention to hold the stock is higher when the current market price of the stock is greater than the purchasing cost if other conditions are all similar.

It would be possible of the influence proposed by this study if the above assumption could reflect the individual investors' psychology. A simple mathematical model is made to explain this proposition. Some hypotheses are brought out after the analysis of mathematics model for the future empirical studies.

2. Two-Period Mathematic Model for the IPO

In order to explain the underpricing phenomena in IPO, a two-period model is set as below. Before explaining why underpricing is a preferred alternative in IPO, a discussion is made for explain why stockholders choice underpricing in IPO rather than not offering in the public.

In the first period, period 1, the company decided to offer their stock on the public market. Because it's the first time the company's stock is exchanged on the security market, the company should make a decision about what price her stock worth. This first time to offer the stock in public is named as initial public officer (IPO). The price is mark in this study as

$$P_{IPO}$$

2.1 Price Determined by the Effective Market

Before IPO, period 1, the value of the company is V_1 and divided into S_1 shares of stock. If the price of stock before IPO, P_m, is determined by the effective market, it should equal to $\frac{V_1}{S_1}$.

If the company want to fund I for new investment opportunities or some other purposes and the authority decided to issue the new share at the price of P_m, the shares her need to offer, S_{2m}, should be the number as follow:

$$S_{2m} = \frac{I}{P_m}$$

After IPO, that is, in the second period (period 2) the company's value would be $V_{2n} = V_1 + I$ if NOT consider the extra value generated by the usage of the fund obtain in the IPO. At this moment, the original stockholders' value, O_{2m}, should be

$$
\begin{aligned}
O_{2m} &= \frac{S_1}{S_1 + S_{2m}} = \frac{S_1}{S_1 + S_{2m}}\left(V_1 + P_m S_{2m}\right) \\
&= \frac{S_1}{S_1 + S_{2m}}\left(V_1 + \frac{V_1 I}{S_1 P_m}\right) \\
&= V_1\left(\frac{S_1}{\frac{S_1 P_m + I}{P_m}}\right)\left(\frac{S_{1m} P_m + I}{S_1 P_m}\right) \\
&= V_1
\end{aligned}
$$

The value owned by the original stockholder in this period is equal to the total value of the company in period 1, V_1, in this situation. That is, the value kept by the original stockholders of the company is the same in period 1 and 2 if this simpfy situation existed.

2.2 Underpricing

This situation would happen if and only if the price of IPO is the same as the price determined by the effective market. If underpricing existed, the price of IPO, P_{IPO}, less than the price determined by effective market, P_m.

$$P_{IPO} < P_m$$

A variable α is used to descript the proporition of P_{IPO} to the price determined by the effective market, P_m.

$$P_{IPO} = \alpha P_m$$

The variable α would less than one if underpricing happen. In order to obtain I for investment opportunities or some other purposes, the company should issus S_{2IPO} shares where

$$S_{2IPO} = \frac{I}{P_{IPO}}$$

The company's value in Period 2 would be $V_{2n} = V_1 + I$ if Not consider extra value generated by the usage of the fund obtain in the IPO. It's the same as the value of the company when issuing the stock at the price of P_m. But the original stockholders' value is different.

In this moment, the value owned by the original stockholders, O_{2IPO}, would be

$$O_{2IPO} = \frac{S_1}{S_1 + S_{2IPO}} = \frac{S_1}{S_1 + S_{2IPO}} \left(V_1 + P_{IPO} S_{2IPO}\right)$$

$$= \frac{S_1}{S_1 + \dfrac{I}{\alpha P_{2m}}} \left(V_1 + \frac{V_1 I}{S_1 \alpha P_m} \right)$$

$$= V_1 \left(\frac{S_1}{\dfrac{S_1 \alpha P_m + I}{\alpha P_m}} \right) \left(\frac{\alpha S_{1m} P_m + \alpha I}{S_1 \alpha P_m} \right)$$

$$= V_1 \left(1 - \frac{(1-\alpha) I}{I + \alpha V_1} \right)$$

the original stockholders' loss would be $\dfrac{(1-\alpha)I}{I + \alpha V_1}$

2.3 Value Added after the IPO

It's obvious that underpricing IPO would cause a loss for the original stockholders if no extra value added for the company. Please note that this result would stand only when the no extra value added assumption stand. But the question mark would present about why the original stockholders agree to accept or bear the loss. In the real world, there are few chances that stockholders agree to adopt any activities which would cause the loss of value for them. That is, this assumption is incorrect for almost all situations. The company and her stockholders would get benefits when the company goes public. These benefits includes obtain profit generated from capital investment, improve financial structure and reduce the risk of bankrupt, and some others.

We let the symbol V_{add} to stand for the added value the company obtain in IPO. The company's value in period 2, $V_2^{'}$, would be

$$V_2^{'} = V_1 + I + V_{add}$$

in this situation, the original stockholder's value in period 2 would be

$$\left(\frac{(1-\alpha) I}{I + \alpha V_1} \right) V_1 \left(\frac{S_1 + S_{2IPO}}{S_1} \right)$$

if

$$\left(\frac{S_1}{S_{2IPO}+S_1}\right)V_{add} > \left(\frac{(1-\alpha)I}{I+\alpha V_1}\right)V_1$$

$$V_{add} > \left(\frac{(1-\alpha)I}{I+\alpha V_1}\right)V_1\left(\frac{S_1+S_{2IPO}}{S_1}\right)$$

$$= \left(\frac{(1-\alpha)P_m I}{1+\alpha V_1}\right)\left(\frac{I+\alpha V_1}{\alpha P_m}\right)$$

$$= \left(\frac{1-\alpha}{\alpha}\right)I$$

IPO would still be profitable for the original stockholders even underpricing happen. Even if underpricing is acceptable for the original stockholders, issue the new share at the price determined by the effective market would still be a better alternative. Why the company's authority decides to and the stockholders accept to adopt underprice rather than equilibrium price?

Some reasons must existed for this phenomous. The stockholder would always accept the decision which would increase their wealth and refuse any conduct which would hurt their property.
Several studies with theorical inference or empirical evidence were brought out to explain this underpricing phenomous. But the reasons of underpricing are still ambiguous. These studies could not explain all situation why underpricing.

The explain reasons proposed by this study why underpricing includies the benefit of control and individual investors' limited reational decision.
If

$$V_{add} > \left(\frac{1-\alpha}{\alpha}\right)I$$

IPO would still be profitable for original stockholders even underpricing happen. If the company issue the new shares at the price determined by the effective market, the original stockholders' value at period 2 would be

$$\frac{S_1}{S_1+S_{2m}}(V_1+I+V_{add})$$

The loss of the original stockholders when the company adopt underprice strategy rather than sell the new shares at the effective market price would be

$$\left(\frac{S_1}{S_1+S_{2m}}-\frac{S_1}{S_1+S_{2IPO}}\right)(V_1+I+V_{add})$$

$$=S_1\left(\frac{1}{S_1+\frac{I}{P_m}}-\frac{1}{S_1+\frac{I}{P_{IPO}}}\right)(V_1+I+V_{add})$$

$$=S_1\left(\frac{1}{\frac{P_mS+I}{P_m}}-\frac{1}{\frac{S_1P_m+\alpha I}{\alpha P_m}}\right)(V_1+I+V_{add})$$

$$=S_1P_m\left(\frac{1}{P_mS+I}-\frac{1}{P_mS+\alpha I}\right)(V_1+I+V_{add})$$

$$=S_1P_m\left(\frac{V_1+\alpha I-\alpha(V_1+I)}{(V_1+I)(V_1+\alpha I)}\right)(V_1+I+V_{add})$$

$$=S_1P_m\left(\frac{V_1(1-\alpha I)}{(V_1+I)(V_1+\alpha I)}\right)(V_1+I+V_{add})$$

3. Benefits of Control

The cost could be regard as the cost of underpricing. Why pay for this cost? There must be some benefits keep in company with the cost. In this study, benefits of control is in this position.

In this study, it's preposed that the original directors wish to maintain control of the firm after the IPO. The main reason for maintaining control is to avoid the possiblility of a hostle takeover. This assumption is similiar as Brennan & Franks(1997)'s.

We assume that the privilage generated by controling the company could convert to monetary value. This value at the period 2, G_2, would great than at the period 1, G_1, in the reason that the scale of the company enlarge and the benefits of control is positive relative with scale.

If the corporate governance is taken by new outsider investors after IPO, the original members of broad of directors would loss a value of G_1 they kept at period 1.Or the original directors would got a value added G_2-G_1 if the keep the control after the IPO. That is, for the original directors, the factors they need take into consider including the value generated by IPO, the cost of underpricing, the value added in corporate governance and the possibility of loss the control.

The corporate governance is determined by the numbers of share supported or undercontrolled. The hostle takeover would be difficult if if the new investors don't sell the stock. And the original directors could maintain the right to control the company if the new investors, specially individual investors, support them in the stockholders' conference.

We assume that the original directors own the β proportion of the original shares. The original directors' value after IPO would increase (or decrease)

$$\beta\left(\frac{S_1V_{add}}{S_1+S_{2IPO}}-\frac{(1-\alpha)I}{I+\alpha V_1}\right)+(G_2-G_1)$$ if underpricing and keep the control of the company,

,increase (or decrease)

$$\beta\left(\frac{S_1V_{add}}{S_1+S_{2IPO}}-\frac{(1-\alpha)I}{I+\alpha V_1}\right)$$ if underpricing and loss the control of the company,

or increase (or decrease)

$$\beta\left(\frac{S_1V_{add}}{S_1+S_{2m}}-\frac{I}{I+V_1}\right)$$ if no underpricing happen and loss the control of the company.

That is, if the underpricing strategy could help the original directors to keep the control and this right to governance the company could convert into a value which could recover the underpricing cost, they would prefer the underpring strategy.

4. Limited Rational Behavior

Why underprice could help the original directors to maintain the right to control the company? We propose an assumption that new individual investors' limited rational decision on holding the securities would make this happen. This assumption assumes that the investors' intention to hold the stock is higher when the current market price of the stock is greater than the purchasing cost if other conditions are all similar.

The possiblility of a hostle takeover would increase when the new outside investors choice to sell the stocks in the market or choice not to support the original broad of directors in the stockholders' conference. The new outside investors' intention to keep the stock or support the original broad of directors would be related with the their revenue on the stock. If the market price greater than the price they buy, their intention to keep the stock and intention to support the original directors would be higher.

In the assumption of rational investor behavior, the stockholders' intention to keep the stock in decided by comparsion between the price with the value and future potention of the company. This assumption would stand if all investors adopt perfect rational behavior. This is 'right' behavior because the stock price is determined by the value of the stock. The value of stock is positive related with the value of the company. The future potention of the company is included but the past revenue of the stock is excluded in measure the value the company.

But in almost all situation, the behavior of investors, specially individual investors, would be limited rational. The investors intention of keep the stock depend not only by the future of the stock but also by investors' revenues got from this stock in the past. It's a behavior not follow the financial theory but happen in practice.

This is one of the reasons why the broad of directors prefer underpricing. If the company issue the stock at the underpricing price, the possibility the price of stock higher than the IPO price would be high. At this situation, the intention of the new investors to keep the stock and support the original directors would be higher. On the contrary, if the company issue the stock in the price determined by equilibrium price rather underpricing, the possibility the price of stock lower than the IPO price would be high. This would increase the chance the new investors sell the stock and the intention to opposite the original broad of directors at the stockholders' conference.

5. Discussion

It would be possible of the influence proposed by this study if the above assumption could reflect the individual investors' psychology. A simple mathematical model is made to explain this proposition. Some hypotheses are brought out after the analysis of mathematics model for the future empirical studies.

It's a three-win situation. The original stockholders win in the reason that the increased value generated by the IPO could supplement the cost of underpricing. So they agree the underpricing strategy. The new investors win because they pay less and get more than worth. So they accept the new issued stock in the IPO. The original members of broad of directors also win because of keeping the right of corporate governance. So they prefer the underpricing strategy. In short, in the IPO the original directors PREFER the underpricing strategy, stockholders AGREE the underpricing strategy and the new investors ACCEPT the underpricing stock.

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