What Factors drive IPO Prices? An Empirical Study of Alternative Factors

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IPO pricing is an emerging field in Finance that contains elements of Economics. It has been studied by researchers frequently over the past two decades. With availability of data and standardization of accounting norms, we can now study share prices in much greater detail. Few (or no) studies have so far touched the aspects of the 'objectives of the IPO' or 'type of industry' for the firm. Pricing of an IPO is governed by behavioral factors, and companies do try to induce investors to rush for their stocks. In this paper, we attempt to draw a relation between IPO pricing and the variables that we have introduced in this analysis.

Keywords: IPO Pricing, Long-run performance, Information asymmetry

Introduction

The concept of IPO pricing has held a lot of interest among researchers and financial economists over the past two decades. This has especially increased with the availability of data and standardization of accounting norms. There have been various studies on IPO mispricing, but few (or none) have so far touched the aspects of the 'objectives of the IPO' or 'type of industry' for the firm. The rationale behind studying these factors is that

a) the purpose for which money is being raised via an IPO may affect its urgency, and
b) the level of competition and monopolistic forces may affect the company's IPO pricing decision.

This paper studies how these variables affect the IPO price and also long term share prices in general.

Literature Review

This section talks about the major contributions in the area of IPO pricing. Following the findings from these reviewed studies, we can carefully formulate the methodology of the pursuant paper.

Share prices can often reveal interesting patterns. IPO pricing is an off-shoot of this topic, which displays certain important anomalies – such as are positive first day returns (underpricing) and long-run underperformance. The underpricing of IPOs is one of the most studied anomalies (Korajczyk et al, 1991; Ritter and Welch, 2002; Loughran and Ritter, 2002; among others).

It is discussed that IPOs are under-priced on the day of listing, leading to exploitable opportunities for investors. There is an asymmetry of information between the investors and the company going public. While the company wants to maximize subscription levels, the investor wants to maximize returns. The company thus under-prices its IPO. However, this information is not known to all. The extent and nature of under-pricing is an unknown variable. Investors can make use of this missing information, provided they have accessed to it. Abnormal returns are thus possible (Ibbotson, 1975; Ritter, 1984; Kuklinski, 2003; Purnanandam and Swaminathan, 2004). The time period for which this under-pricing canpersist is also quite long – from one year to up to five years (Ritter, 1991; Jaskiewicz et al 2005; Ritter and Welch, 2002).

It is also important to study the cyclical nature in the IPO market. Ghosh (2004) studied two key variables, namely, IPO volume and initial returns and analyzed their nature and interrelation during these two periods. He found that a firm's decision to go public over the last decade depended on the number of other companies that were getting listed over the previous months. He found no significant relation between IPO volume and initial returns during the hot and cold periods. This suggests that over the sample period, the Indian issuers' did not depend on the information content of the initial returns while taking their decision to go public. We may thus say that long term returns are considered quite important by the investors.

Chambers and Dimson (2008) assemble and analyze a new dataset of equity IPOs on the LSE (London Stock Exchange) from World War I (WWI) up to recent times. They found that under-pricing of public offers in the period 1917–45 averaged only 3.80%, as compared to 9.15% in the period 1946–86. This substantial rise is robust to the inclusion of variables controlling for changes in firm risk and method of issue, and improvements in disclosure and the emergence of prestige underwriters. Their regression model uses first day return as the dependent variable, and the independent variables include market capitalization, firm age, industry risk, the underwriter's reputation etc. This methodology of regression has been adopted in various papers. The current paper also uses a similar approach.

Ang and Boyer (2009) adopted a unique approach to study the area of IPOs. They analyze the price behavior of IPOs in new industries, relative to IPOs in established industries. The results show that there are fundamental differences between IPOs of companies in new industries and those in established industries in that there is greater uncertainty regarding future earnings, less competition and fewer barriers to entry. The results indicate that IPOs in new industries outperform IPOs in established industries during holding periods of one to ten years. Furthermore, IPOs in new industries tend to merge less often, declare bankruptcy less often and are delisted less often than firms conducting an IPO in established industries. As far as segregating industries are concerned, there have been limited studies. In this paper, we segregate industries based on concentration.

Quite recently, Sahoo and Rajib (2010) report using an OLS regression model, that offer size, initial day return, leverage, ex-ante uncertainty, and IPO activity period (i.e., timing of issue) significantly explain the under-performance. However, variables such as post-issue promoter

group holding, rate of subscription, age of IPO firm, and offer price-to-book value ratio are statistically insignificant in explaining long-run under-performance. This implies that basic data pertaining to the company's share prices and to the company itself is sufficient in explaining some of the unpredictability of IPO returns. This requires an investor to constantly update himself with data regarding the company in question.

Research Gaps

We find that no studies deal with the two separate issues of IPO objective and Industry concentration. Further, very few study the long run performance (up to 5 years). Thus, we will include the long-run performance across different sectors, attempting to correlate the objective and industry of the IPO.

The objective of the IPO may play an important role in explaining its pricing. On going through the IPOs of the past few years, it is seen that there were various objectives mentioned by companies for coming up with an initial issue, such as: to increase capacity, to list the shares on other exchanges, to raise funds for new projects, to meet working capital requirements, to acquire new capital, to setup R&D facilities, etc. We can classify the IPOs on the basis of their stated objective, and use this information to analyze its impact on pricing. The two main categories of objectives are: a) when the issue is made to raise funds for a new or urgent capital project, and b) when the issue is made to raise funds for general purposes. We propose that when the issue has a sense of urgency to it, this will be reflected in the IPO pricing.

We also consider the role of the degree of concentration of monopoly power in an industry. The method of calculation of the HHI has been discussed later. It will be interesting to study the role that monopoly power plays in determining IPO prices. We have data for around 54 so-called "Industries" as defined by the Capitaline database. We rely on their classification scheme for our analysis, as it would ensure consistency of data.

Methodology

i) **Sample size:** Between 2000 and 2005, records for over 150 IPOs in the Indian market are available from the Capitaline database. This is our primary source for IPO data, as well as sectoral information. On going through the data for the IPOs from Capitaline, and

tallying the available data on prices from the Bombay Stock Exchange (BSE) database, we reach a sample size of 135 public offers. This reduction is mainly due to missing information for some companies.

ii) Source of data: Various databases, mainly Capitaline, the BSE website and the SEBI website, among others, have been used.

iii) Tools and techniques:

We use OLS regression, where the returns are modeled as the dependent variable (Chambers and Dimson, 2008; Sahoo and Rajib, 2010), and the independent variables may be initial day return, offer size (Hanley, 1993; Cornelli and Goldreich, 2003), IPO period (Ritter, 1984; Sahoo and Rajib, 2010), rate of subscription, etc. as per few of the papers in the literature review. Share availability, in terms of liquidity, is also important (Holmstrom & Tirole, 1993). The amount of information in the stock price depends on the liquidity in the market. Less liquidity also reflects unavailability of shares. Here, variables such as industry type and IPO objective are new variables.

We use the following model:

$$1^{st}\ Day\ Return = \alpha + \beta_1\ Issue\ size + \beta_2\ Subscription\ rate + \beta_3\ HHI + \beta_4\ Period + \beta_5\ Proxy\ 1\ for\ Objective + \beta_6\ Proxy\ 2\ for\ Objective + \beta_7\ Proxy\ 3\ for\ Objective + \varepsilon \quad \text{---------- a)}$$

For long-run underpricing, we slightly modify the model:

$$N^{th}\ year\ Return = \alpha + \beta\ Previous\ year\ return + \beta_0\ First\ day\ return + \beta_1\ Issue\ size + \beta_2\ Subscription\ rate + \beta_3\ HHI + \beta_4\ Period + \beta_5\ Proxy\ 1\ for\ Objective + \beta_6\ Proxy\ 2\ for\ Objective + \beta_7\ Proxy\ 3\ for\ Objective + \beta_8\ Liquidity\ of\ shares\ in\ the\ period + \varepsilon \quad \text{---------- b)}$$

To calculate the HHI, we accept the common definition which is used by the US Department of Justice. It is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers.

$$HHI = \sum_{1}^{i} S_i^2 \quad \text{---------- c)}$$

where the market share of the i^{th} firm is denoted by S_i.

The HHI takes into account the relative size and distribution of the firms in a market and approaches zero when a market consists of a large number of firms of relatively equal size. The HHI increases both as the number of firms in the market decreases and as the disparity in size between those firms increases. As table 1 below shows, a market with HHI below 1000 points represents a competitive market, where there is scattered control. When the HHI is between 1000 and 1800 points, the market has certain large players who may attempt to control the market. When the HHI is over 1800 points, it represents that too much power is concentrated among too few players, leading to an oligopoly or monopoly. Lawmakers in various countries use this basic yardstick to intervene markets when they sense that some companies are attempting to control the market.

Table 1: Classification of Markets using the HHI

HHI Level	**Market structure**
below 1000 points	well scattered market
between 1000 and 1800 points	moderately concentrated market
excess of 1800 points	concentrated market

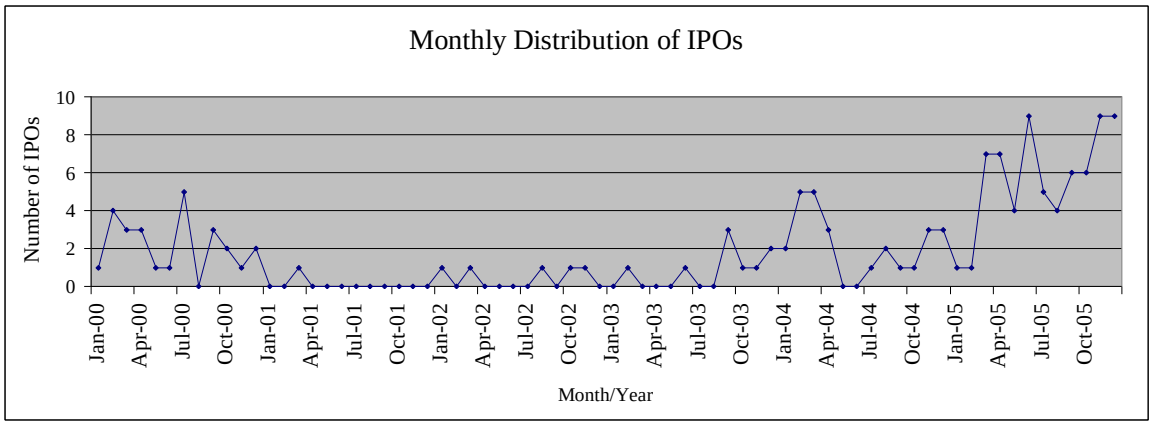
Source: Defined by the US Department of Justice and accepted worldwide

Findings

Continuing with the spirit of the analytical tools used in several other papers, we shall report our results using simple graphical tools and descriptive statistics, as well as results of the regression model.

Let us first take a look at the frequency distribution of IPOs over our reference period. Our sampling period is six years long. However, the IPO activity across this period wasn't uniformly distributed.

Figure 1: Graph showing the monthly distribution of IPOs



Source: Author's calculations

It is distinctly seen here that the IPO market witnessed a slump between mid-2001 and mid-2003. There were periods that lasted for months with no public offers. In other periods when the market was 'hot' (read Ritter, 1984 for more information on 'hot' markets) we had even witnessed multiple issues in a single month. The issue of IPO performance in 'hot' markets is an entire research area by itself. The phase between 2004 and around 2008 was one of those periods, characterized by a large number of IPOs and widespread under-pricing. It is similar to a 'boom' period.

On analyzing the IPO data, it is seen that, on an average, companies offer high returns two to three years after the IPO, but with a high element of uncertainty, as reflect in the standard deviation. There were a few companies which offered exceptional returns in the two to three year time frame, which is of course a notional return. The first day return is also an interesting phenomenon, indicating underpricing of issues. Returns usually settle down up to five years after the issue.

Table 2: Average returns (%) of offerings

Year of IPO	Average First day return	Average One Year return	Average Two Year return	Average Three Year return	Average Four Year return	Average Five Year return
2005	32.83	69.99	195.82	135.19	23.50	62.14
2004	41.46	150.01	276.19	366.28	198.60	63.40
2003	55.38	234.28	232.38	238.02	597.61	275.03

2002	17.96	154.73	468.95	590.51	702.98	1106.71
2001	-24.05	-76.80	-35.65	-32.98	-10.62	-47.58
2000	31.15	-48.34	-71.3	-65.10	-46.65	-14.01

Source: Author's calculations

On segregating the data further into year-wise IPOs, we can perform a much clearer analysis. It is seen that issues before 2002 offered very low returns on an average, over the years. Issues between 2004 and 2008 offered phenomenal returns on an average. We had seen earlier in Figure 1 that this was a 'hot' period in the Indian IPO scenario. Aggressive pricing and beefed up markets led to quite high returns, with high volatility as well. This was obviously a time of active speculation and intra-day trading.

The correlation matrix below shows that there isn't high correlation between the independent variables in our data set. This is a good sign.

Table 3: Correlation between Dependent and Independent Variables

	Issue Size (Rs. Cr)	*Subs. rate*	*HHI*	*Period*	*New capital /Urgent*	*General/ Misc.*	*New capital/ Urgent & General /misc*	*Liquidity of shares Ist year*
Issue Size (Rs. Cr)	1.00							
Subs.rate	-0.09	1.00						
HHI	0.28	-0.08	1.00					
Period	-0.09	0.02	0.04	1.00				
New capital/Urgent	-0.29	0.12	-0.16	0.28	1.00			

General/Misc.	0.17	-0.20	0.12	-0.06	-0.60	1.00		
New capital/ Urgent and General/misc	-0.09	-0.13	-0.02	0.20	0.29	0.57	1.00	
Liquidity of shares Ist year	0.06	0.03	0.06	-0.01	0.05	-0.09	-0.06	1.00

Table 4 below displays the results of the regression analysis.

Table 4: Results (t-values) of the Regression across all objectives and all sectors

Independent Variables ↓	**Dependent Variable** →					
	First day return	One Year return	Two Year return	Three Year return	Four Year return	Five Year return
Constant	1.677*	0.532	-0.532	0.457	0.438	-1.733*
Previous period return	NA	NA	11.529***	14.870***	3.550***	10.077***
First day return	NA	0.915	-0.582	-0.834	0.649	-1.265
Issue Size (Rs. Cr)	-0.853	-1.034	0.038	0.506	-1.398	0.632
Subs. Rate	5.386***	0.948	-0.261	0.636	-0.881	0.632
HHI	-0.837	0.551	1.185	0.270	-0.711	-1.035
Period	-1.440	0.065	0.829	-1.653*	-2.079**	-1.010
New capital/Urgent objective	-0.877	-0.429	0.493	0.056	-0.145	2.219***
General/Misc. objective	-0.834	0.168	0.067	0.166	0.682	2.207***

New capital/Urgent and General/misc.	0.767	0.077	-0.042	0.317	-0.769	-2.260***
Share Liquidity in the period	NA	-0.157	-0.122	-4.202***	2.784***	-0.500
Adjusted R^2	0.18	0.01	0.56	0.66	0.28	0.53
F-value	5.27***	1.20	18.08***	27.60***	6.13***	16.02***
Observations	135	135	135	135	135	135

*indicates significance at the 0.1 level, **indicates significance at the 0.05 level, ***indicates significance at the 0.01 level, NA = not applicable

Source: Author's calculations

Our analysis yields certain interesting results. First of all, we find that our regression model is quite robust and explains significant variation in IPO pricing, except for the first year returns. For the other years, the model is significant even at the 1% level. The previous period return is the most significant factor in explaining IPO returns over a period of time. This implies that investors keep a watch out for the performance of shares before they invest in the IPO. Further, they keep track of the share returns for the entire period of time they have invested their money. Subscription rate of the IPO plays an important role only in the very short run. Investors may try to analyze the demand-supply situation of the IPO before investing, but this factor has very little significance in the long run. Based on our analysis, the objective of the IPO showed its significance only in the long run, i.e., five years after the IPO. This may also imply that the company fulfils its objective in this time frame – understandably so, because most such projects are capital intensive and major projects. We have also introduced the variable of share liquidity in our analysis, which seems to hold significance after 3 years. However, there is no consistent result for this variable.

Conclusion

This paper is a brief attempt to study the phenomenon of anomalies in IPO pricing. The results have been explained in the previous section. While the objective of the IPO showed certain relationships with the IPO pricing after five years, the industry type failed to show any proper relation. This may imply that investors study the objectives of the IPO when investing - however they don't pay much attention to the industry monopoly features. They may focus on other industry characteristics – which may be studied in further research papers. We need a suitable proxy to represent a certain industry.

We may probe our data further by conducting analysis for different periods, segregating the industry types, objectives etc. But that analysis would require more data and would fall out of the scope of this paper. We must also attempt to conduct this analysis for more recent IPOs; the crucial aspect here is availability of standardized data, as mentioned earlier. The tests can also be run for certain panels within the data, but that would again require a different dataset.

ANNEXURE

A) Industry-wise IPO details (for this paper)

Industry	**No. of IPOs**	**Industry**	**No. of IPOs**
Auto Ancillaries – Others	1	Oil Exploration / Allied Services	1
Automobiles - passenger cars	1	Packaging – BOPP Film	1
Banks - Private Sector	1	Packaging – Others	2
Banks - Public Sector	12	Paper - Medium / Small	1
Biotechnology	1	Personal Care - Indian – Large	1
Castings - Steel / Alloy	1	Personal Care - Indian - Medium / Small	1
Chemicals - Inorganic – Medium / Small	1	Pharmaceuticals - Indian – Bulk Drugs	4
Computers – Education	1	Pharmaceuticals - Indian – Bulk Drugs & Formln M/S	4
Computers - Hardware - Large	3	Pharmaceuticals - Indian – Formulations	1
Computers - Peripherals / Accessories	1	Power Generation And Supply	3
Computers - Software - Converts	1	Printing & Stationery	1
Computers - Software – Large	2	Refineries	1
Computers - Software - Medium / Small	26	Retailing	3
Construction - Civil / Turnkey – Large	2	Securities/Commodities Trading Services	2
Construction - Civil / Turnkey – Medium / Small	1	Ship - Breaking / Repairing	2
Construction - Factories / Offices / Commercial	1	Steel – Large	1
Decoratives - Wood-based	1	Steel - Medium / Small	1
Electric Equipment - Gensets / Turbines	1	Steel - Sponge Iron	3
Entertainment - Content Providers	8	Sugar – Integrated	2
Entertainment - Electronic Media	8	Telecommunications - Service Provider	2
Ferro Alloys	1	Textiles - Cotton Yarn – 100% EOUs	1
Finance - Investment / Others	2	Textiles - Others	5
Forgings - Medium / Small	2	Textiles - Readymade Apparel	1
Gas Distribution	3	Textiles - Spinning/Cotton/Blended Yarn – Ring Spg	1
Infotech / Database	1	Trading – Large	2

IT Enabled Services / BPO	1	Trading - Medium / Small	1
Leather Products – Others	1	Transport – Airlines	1
Miscellaneous – Large	1	**Total**	**135**

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