

“IPO pricing: Informational inefficiency and misallocation in capital market”

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Extant literature is not unequivocal about IPO pricing. It is almost silent about the misallocation in the capital market. IPO pricing is mostly argued from the point of view of listing gains/ losses.

This paper seeks to explain the process and outcomes of IPO pricing in the capital market with the help of a basic model. With the help of certain cases it attempts to show that asymmetric information and informational inefficiency lead to misallocation of capital, adverse selection costs and moral hazard costs.

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Introduction

The Initial Public Offer (IPO) market is, in other words, the primary market. Extant literature is not unequivocal about IPO pricing. It is almost silent about the misallocation in the capital market. IPO pricing is mostly argued from the point of view of listing gains/losses and from the point of view of the individual investor rather than the capital market that is meant to mobilize and allocate capital fund. Unlike the secondary market, the IPO market is involved in the augmentation of capital. In the secondary market there is a transfer of wealth but there is no creation of new wealth. The concern of this paper is that the nature, process and outcome of IPO pricing is that it encourages misallocation of capital, is based on asymmetric information and distorts market signals and incentives of investment in the capital market.

This paper is laid out in five sections. In I Section we shall be discussing the micro-market structure of the IPO market. In the next section we shall develop a basic model that seeks to explain pricing under the fixed pricing era, namely, during the phase of Controller of Capital Issues (CCI). It also explains the subsequent Book Building process and the nature of 'true price' and its establishment. The third Section discusses the methodological details. Section IV presents the results. The final Section V gives conclusions, recommendations, and further research.

Section I: Market Micro Structure

Pricing of a new capital asset or instrument is the most critical element in the capital market.

The role of price in the capital market is the following:

1. It acts as a signal for attracting capital funds.
2. It equilibrates demand and supply.
3. It is a summary valuation of the underlying fundamentals of the share.
4. It is a summary of the information content of trading in a market.

Pricing Methods: The Initial Public Offer (IPO) can be priced on the basis of three methods:

- Auctions where the market price of the securities is determined after the bids are submitted.
- Fixed Price where the price is set prior to the allocation.
- Book Building where an indicative range is given before hand and the offer price and quantum to be issued is decided on the basis of bids received.

In the history of Indian stock markets, the two important methods of evaluating capital assets have been:

- i) Fixed prices based on a 'formula'; and
- ii) The book – building approach, consisting of price banding.

The issue of pricing of IPO can be studied by taking two regimes separately, that is:

- Pre-liberalisation - The Controller of Capital Issues (CCI) era (before 1991).
- Post liberalisation – Securities Exchange Board of India (SEBI) era (1992 onwards).

CCI era – In pre-liberalisation period, IPOs were priced through 'CCI formula'. The firms were required to take approval from the office of CCI (Controller of Capital Issues) for

raising capital and the CCI used to fix the size and price of the IPO. The economic rationale behind the philosophy was to ensure that there is no concentration of economic power.

But there has been a changing paradigm in financial sector. The Narasimham Committee, in 1991, initiated a reform process in capital market where it removed all kinds of controls and restrictions and introduced the elements of transparency, disclosure and freedom based on a well framed regulatory framework.

The Indian securities market has undergone several structural as well as policy reforms particularly after the deregulation of the economy. The vibrant economic environment and the waves of globalization and liberalization have contributed substantially for the deepening, widening and broadening of the securities market. A comprehensive package of reforms was introduced consisting of measures to liberalize, regulate and develop the market, the most applaudable reform being the dismantling of Controller of Capital Issues (CCI) and the introduction of free pricing. All kinds of controls over the pricing, timing and designing of capital issues are abolished. On the similar lines a new mechanism named as book building was recognized as a method of pricing by Securities and Exchange Board of India on the recommendation of the committee under the chairmanship of Y.H. Malegam in 1995.” the primary market witnessed a boom both in terms of no of issues and the amount of issues under SEBI era in comparison to CCI regime.

The two periods can be studied from the point of view of the differing pricing methods:

1. Fixed price method: It is a traditional method of pricing the IPOs. Here the issuer and the merchant banker agree on the issue price before making the actual issue and the investors are required to fill in an application form at this price and subscribe to the issue. As the issuer (or Controller) fixes the issue price well before the actual issue is launched or listed, it is a cautious and conservative in price so that the issue is fully subscribed. The issue usually has underwriters. The underwriters do not like the issue to devolve on them and hence, favour conservative pricing of the issue. On account of conservative pricing, it is generally

over-subscribed, hence there is some unsatisfied demand for the issue and there is high probability of the market price rising above the issue price after listing.

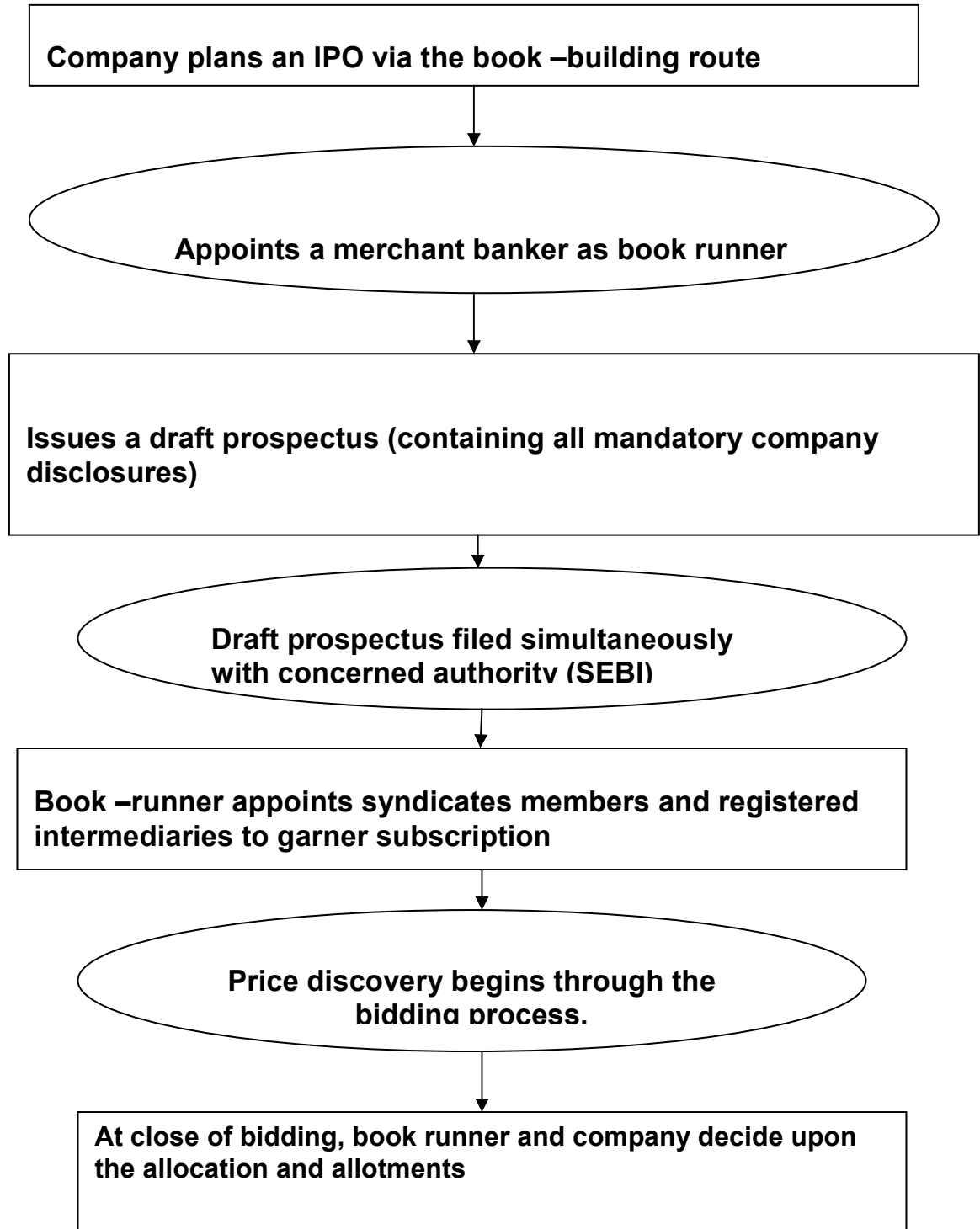
2. Book Building Method: Book Building charges a price that the market can bear. Book building usually leads to more aggressive pricing than traditional fixed price method. Under book building, since all applicants above the cut off points are allotted shares, ideally, there should not be any pressure of unsatisfied demand in the market, leading to a lesser possibility of market prices rising above the issue price after listing. Thus, IPOs based on book building method may give fair pricing.

Book Building is a price discovery mechanism used by companies issuing the securities. SEBI defines book building as “a process undertaken by which demand for the securities proposed to be issued by a body corporate is elicited and built up and the price for such securities is assessed for the determination of the quantum of such securities to be issued by means of a notice, circular, advertisement, document or information memorandum or offer document.”

Book Building is basically a price and demand discovery mechanism. Under this system during the period for which the book for the IPO is open, bids are collected from investors at various prices which are above or equal to floor price. The offer price is determined after the bid closing date on the basis of some evaluation criterion.

Figure 1

BOOK BUILDING PROCESS



Why Book Building?

The most apparent reason for the book building is the price discovery which is inherent and inbuilt in the system itself. No issuer knows the true price of his shares, no merchant banker knows the true price of shares; it is only the market that knows this price. And the book building mechanism induces the market to discover the price.

It provides the investors an opportunity to participate in the price fixing process. It is an interactive process, a change from the process involving offer and acceptance. Here the investor himself determines the price what he is willing to pay and what is acceptable to the company. It gives the realistic price as it is decided at a date which is very close to the date of opening of the issue. It gives the fair price as it is determined on the basis of bids made by the investors.

It evaluates the intrinsic worth of the securities and credibility of the company in the eyes of the public. There are better chances of the success of the issue. The cost of the issue is significantly reduced. There are less chances of IPO underpricing. However, often many stocks contradict this.

Steps involved in Book Building process

A company intending to sell its share appoints one of the lead managers bankers as book-runner. The investment bank prepares a registration statement to be filed with the regulator (SEBI in India). This registration document contains the management related information,

the current promoters' holdings structure, financial statements of the firm, legal issues related information, if any and the purpose of IPO.

This document must be signed off for further proceedings. The regulator takes some time, which is called as 'cooling off period', to verify accuracy of the information provided in the registration document. Since the company will become public limited (from privately held) and the regulator has to look after the interests of investors, there are strict rules in place to get the required approval. During the cooling off period the merchant bank prepares the 'Red Herring prospectus'. The main purpose of Red herring prospectus is to attract potential investors by giving complete information like performance of the company, future growth potential of the firm, senior management profile etc. The investment bank meets potential investors and gathers their views on the timing of the issue and the best price to get the issue subscribed fully.

The book runner submits draft prospectus to SEBI for approval. The prospectus contains the detail regarding the total amount to be raised by way of issue but not necessarily the price at which the shares are to be issued. The book runner forms a team of other merchant bankers, financial institutions and brokers who are as syndicate members. The syndicate members invite bids from their clients for subscribing to the shares of the public, as per the detail given in the draft prospectus. The record of all the bids is finally submitted to the book runner. The book runner, on the basis of bids received; determine the final price which in no case greater than the price mentioned in the prospectus of the company. After determining the price, the syndicate member are required to obtain the subscription amount from their before the date of opening of issue to the general public. The application money obtained

from placement portion and net offer to the public are kept in different accounts. In case of under subscription in one category, the unsubscribed portion is offered to the other category.

Role of Merchant banker in an IPO process

Basically, during initial start of IPO process and till the end of IPO implementing various steps involved in ipo process 'Merchant bankers' are the financial intermediaries who assist corporate entities in raising funds from different sources. It could be in the form of equity shares or loan from financial institution. Merchant bankers are required to be registered with SEBI under its (Merchant Bankers) Regulations, 1992.

The application shall be made for any one of the following categories of the merchant banker namely:-

Category I), that is

i) to carry on any activity of the issue management which will inter alia consist of preparation of prospectus and other information relating to the issue, determining financial structure, tie-up of financier and final allotment and refund of the subscription; and ii) To act as advisor, consultant, manager, underwriter, portfolio manger.

Category II) that is, to act as advisor, consultant, co-manger, underwriter, portfolio manger.

Category III) that is to act as underwriter, advisor, consultant to an issue.

Category IV) that is to act only as advisor or consultant to an issue

Capital adequacy requirement

The capital adequacy requirement referred to in sub –regulation 6 shall not be less than the net worth of the person making the application for grant of registration

For the purpose of sub regulation (1) the net worth shall be as follows namely

Category	Minimum amount
Category I	Rs 5,00,00,000
Category II	Rs 50,00,000
Category III	Rs 20,00,000
Category IV	nil

Strategy of the syndicate

Although the term ‘syndicate’ refers to a conglomerate of merchant bankers which is usually formed in the case of a large Issue, here we use the term to signify a group of interested entities who act behind the scenes, like the underwriters, book-runners, auditor who have prepared the three years accounts reflected in the Red Herring prospectus. Since a certain minimum fixed cost is incurred by the merchant banker the commission is larger on small deals in percentage terms. In the case of larger issues the syndicate tries to win over the IPO Company by minimizing their own rate of commission. At the same time their game plan is to maximize their earning from the issue. They do so by exploring the paying capacity of potential investors during the ‘cooling-off period’ by holding meeting with them. In fact, they assess the elasticity of demand for the particular Issue. By lowering the rate of commission they have got the deal. Now the attempt is to maximize total turnover of the

Issue. If by raising price the quantity demanded (number of applicants * size of application (number of shares) does not fall then their variable cost is fixed but their total revenue rises because it is based on turnover in value terms. Similarly, if the demand for a small sized issue is limited through the book-building process they try to increase the price so that their earnings increase. In, short, it benefits them to raise the issue price. They are able to do so because of possession of asymmetric information at their behest. The IPO market is incomplete. It is informationally insufficient. Another set of entities whose interest coincide with the 'syndicate' are the FIIs, big industrial houses, promoters, etc. They are able to assess and gauge the possible trends upon listing. They are able to predict the "high" quote and take advantage of it by selling at the "high" quote.

Section II: The Basic Model

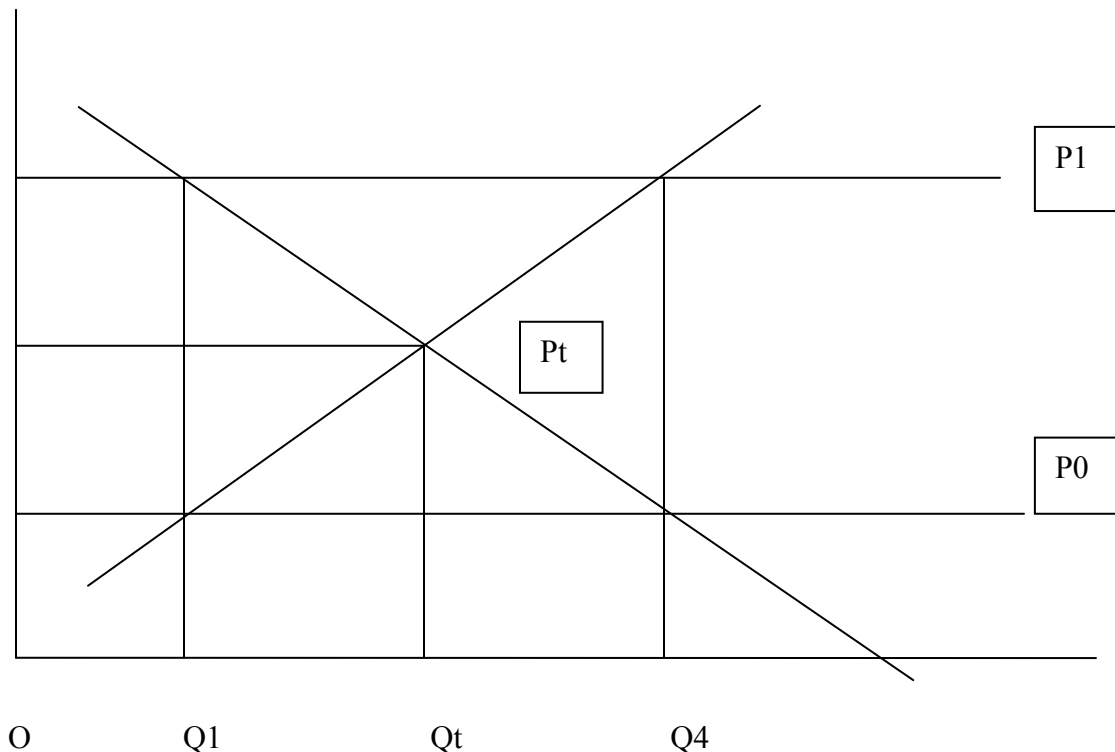
Under CCI regime the market used to allocate new shares on the basis of a fixed price. If price is high, there would be excess supply (See Figure 2). This would result in downward pressure on price, such that equilibrium quantity is established. Conversely, if price is low there would be excess demand and there would be an upward pressure on price, so that once again equilibrium quantity is established. CCI used to fix the price adhocly. Therefore, it did not allow market forces to operate. This leads to misallocation of capital.

Case 1: (Under CCI era) when the price has been fixed without taking the influence /opinion of the investors, if we take (P1) as a price set by CCI, then our supply is OQ4 and our demand is OQ1 the excess supply is Q4Q1. The 'actual demand' (DDA) which is equal to OQ1 = 'actual supply' (SSA). But, since true price is Pt, demand equals OQt. So Q1Qt is

misallocation of capital. At price P_1 , investors do not want to invest their money because they perceive the fixed price P_1 could be reduced and equal to true price (P_t). If this thing happens, then the investors may invest without any hesitation and demand of shares may increase to Q_t from Q_1 . In this case, 'actual price' is P_1 which is higher than true price P_t . Hence stock is overvalued and it also leads to under-subscription of shares. This under-subscription reflects the failure of the market to allow price and quantity to adjust. The misallocation is a social loss because flexible prices could have lead to a conversion of the 'market signal' of excess supply into a lowered price, at P_t , which is the 'true price'. Under-subscription does not translate into a lowering of price, so as to encourage capital investment. It is a loss-loss situation because neither does the IPO gain fully, nor does the investor nor does the market. The capital market is short of funds to the tune of Q_1Q_t .

Figure2

Pricing under CCI



Case 2: If price is fixed at P_0 , then the actual demand is OQ_4 and actual supply is OQ_1 . Excess demand is Q_1Q_2 (which is refund by the company to the investor). But at the same time true price is P_t and true quantity is OQ_t . At the opening of issue, if price is fixed then Q_1Q_t is misallocation of demand. The issue of the company is oversubscribed but the company is unable to fix a correct or right price and due to which they suffer a loss of Q_1Q_t demand, which is misallocation.

Shortcomings of CCI era

In practice, during the CCI regime most of the issues had to price their issue based on the CCI formula was conservative. It is not rational to argue that all companies would have been fundamentally unsound. As a result of this, all the issues coming into the market were easily oversubscribed leaving a few developments. The role of merchant bankers during that period was limited. During CCI era, the pricing formula ensured a price of the issue which mostly resulted in underpricing of the initial public offer.

Pricing under book-building

With the abolition of CCI in June, 1992, the restriction was removed and companies were allowed to price the equity at a premium subject to certain conditions. Ideally, the pricing should be rational. It should reflect the fundamental value of the share and should adjust to

the demand and supply conditions. In such a case there would be no over-subscription or under-subscription. There would be neither listing gain nor loss. Under the book building or free pricing era we could picturize the market conditions as given in Figure 3.

Informational Inefficiency

Under the free pricing era, we assume that the market is efficient. This implies the following:

1. Information is available to every body, instantly and uniformly.
2. It assumes that entities involved in the process of price discovery do not have a conflict of interest in fixing the price.
3. That price fixation is done in a fair and transparent manner.
4. Also, it is expected that the potential buyers would influence the price through the book-building process.
5. Where a suggestive price band is offered, it is assumed that the price signal is non-distorting.

However, six distortions that operate in the process of price discovery, which lead to informational inefficiency.

1. Asymmetric information

Although the process of price discovery is supposed to be transparent and unequivocal in fact there is a high degree of opaqueness and separation of information between those responsible for price fixation and the investors. This leads to a situation of asymmetric information between the two.

2. Insider information

The 'insiders' like the promoters, merchant bankers, underwriters, brokers, and others have greater access to information. They know the true worth of the project.

3. Moral hazard

There is a conflict of interest because their commissions depend on the final value of the issue. The entities involved in the process of book building are driven by short term gain. They may be uncertain about the success of the project. This creates a moral hazard in the sense that those who have more information have a vested interest in mispricing the issue.

4. Adverse selection

Asymmetric information, moral hazard and mispricing lead to adverse selection. Unlike any other ordinary investors one who has invested in an IPO is committed. He has sunk in the money. Other investors have the choice of either buying the share or investing in the 'market' and earning on the 'index'. By giving a wrong signal the insiders have forced a 'fiat-accompli' on the IPO investor who then is forced to make an adverse selection.

5. Misallocation

The mispricing leads to overvaluation and this in turn leads to a mismatch between supply and demand. Although it is expected that in the book building regime such distortions should not exist, in fact, the informational inefficiencies and the nature of the market period and pricing mechanism result in misallocation.

6. Distortion of incentives

The nature of pricing in the market period and short term result in a distorted set of incentives which discourage long term holding and long term return which is the essence of primary markets.

Role of market period

Ordinarily, there are two periods of analysis are recognized.

- 1) Short period
- 2) Long period

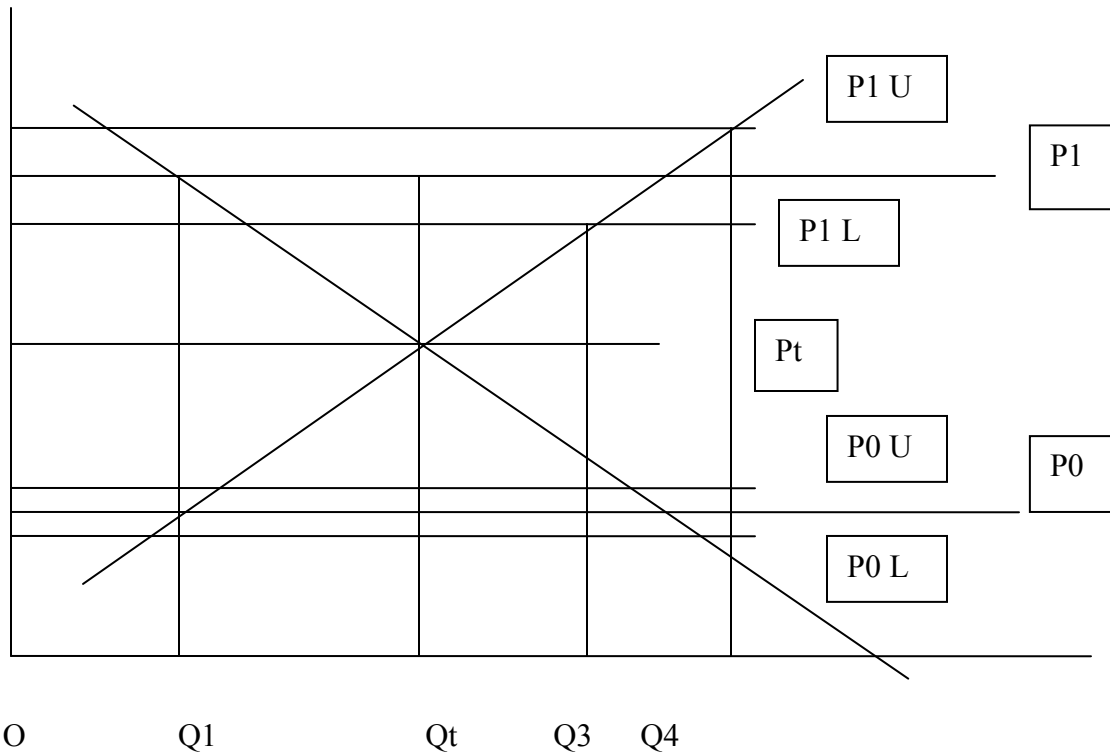
Most of the extant studies recognize only these periods. During the short period the demand and supply factors are able to adjust to immediate information, although short-term price is not based on long run information. After the adjustment process takes place, subsequent to listing, it may be assumed that the true short run price is established.

In the long run price, other factors such as financial performance, non-financial performance, dividend payout and other long run policies and conditions are incorporated into the price discovery process. This price however, relates to the secondary market. The study of primary market through IPO is primarily related to process of listing and immediate follow-up of price formation in the near time horizon. This period is known as the 'market period'.

None of the extant studies refer to market period. In this paper, we emphasize that the listing date and the trading days in the near time horizon reflect the process of adjustment soon after the listing. During the market period, the issue has been announced, investors have sunk their fund, and before the date of price discovery, there is little scope for any adjustment of demand and supply.

Figure 3

Pricing under Book-Building



Once the issue is closed, implicitly, the volume of trading, the final listing price and turnover is fixed. The price discovery is a one-time process. It is based on limited information. Therefore, in all probability, there would be process of adjustment, which follows in the weeks to come. It is only at the end of this process, that the true price is established. It is on account of the condition of market period that we may expect high volatility in the price of the listed share.

Case 3:

With the help of Case3, below, we can understand the distorting phenomenon listed above.

Asymmetric information

The insiders know the true worth of the company and share. The investors are influenced by the reputation of the merchant banker. The price banding fixed by them is indicative and acts as a 'market signal'. If the price band is P_{1U} to P_{1L} investors expect that the issue price would be fixed at P_1 . This is overvaluation because the true price is P_t .

Moral Hazard

If the 'issue price' is fixed at P_{1L} , this is an *ex-post* price since the transaction is done and sealed. The insiders are forcing the investors into an adverse selection. The investors have sunk their investment till the listing day. This is an incentive for the IPO Company because the company has succeeded in convincing the investor that the true price is P_1 . This is indicative of 'moral hazard' because the 'insiders' have greater information and have over-priced the share in comparison to the true price P_t . However, in terms of popular terminology P_{1L} is treated as 'underpricing'. The expectation is that the listing price would be higher than P_{1L} and so the investors would have an immediate gain of P_{1L} to P_{1U} . In the market period since information and flows are incomplete the listing price may open at P_{1U} and drop on closing to P_{1L} . The 'insiders' and other players who have better means and better information or have a stake in raising the issue price protect themselves and leave the ordinary investor to bear the risk both in the case of listing gains as well as the short-run gains. They can do so because they are able gain by selling at the 'high' listing price while other cannot because they do not know what is the 'likely' 'true price'.

Insider information and inefficiency

However, if the market is 'semi-strong form' efficient, it cannot absorb the 'insider information'. The true price will not be established immediately. Finally, the market would evaluate the stock at P_t and the listing price would fall. This would, however, take sometime because of informational inefficiency and 'noise trading' in the very short run.

Adverse selection cost and misallocation

The real pricing puzzle lies in a complex calculation of private gain and social loss. The immediate gain for investors may be $P1L - P1U$. The adverse pricing has the immediate effect of causing a loss if the closing price is $P1$ on the listing day.

The immediate effect is thus;

$$P1L - P1 < 0$$

Leading to a listing day loss equal to $P1L - P1 * Q4$, for the market, since that much of wealth is lost to the market. There is excess supply at $Q4$. The original misallocation is $Q4 - Qt$ and on closing, the measure of misallocation is $Q3 - Qt$. Nevertheless, there is an excess supply so the price will fall down to Pt in the near time horizon.

Distortion of incentives

Although there are initial gains there is surely a disincentive to the buyer because it discourages the investor from holding the share for the long-run. The purpose of the primary market should be to encourage long-run holding. A large majority of the investors would be shed these shares. Such investors do not have a long run interest in the company. This may also create corporate governance problems in the long run. It would also give rise to a highly volatile secondary market. It would encourage the presence of short term 'noise' trading during the 'market period'.

Case 4: In this case the price band $P0L$ to $P0U$ is an undervaluation. Under the free pricing era, once again, we assume that the market is efficient and information is complete. Therefore, the price would move up to Pt on listing. If the price band is $P0U$ to $P0L$ investors expected that the issue price would fixed at $P0$. At this *ex-post* price $P0$, there is

excess demand at OQ4. However, if the market is efficient, it would evaluate the stock at P_t and the listing price would rise and there would be a listing gain.

$$P_t - P_0 > 0$$

In the bargain, if the demand is elastic, a lower indicative price would raise the investment outlay. This is beneficial to the IPO. In the long run, the listing gain would give a better 'signal' to the investor. By the slow adjustment if the true price P_t is established, an upward trend would harbingers confidence of the investors who face the uncertainty of having invested and sunk their money in an 'unknown' company. It would also increase the market value of the company. This would act as a reward by the 'market'. If on the other hand, the company does not perform then by a natural course the price would decline and the share would be punished by the 'market'.

In the following analysis we shall be concentrating on Case 3. This gives rise to a framework of analysis that is laid out below.

Nature of share price

It is our contention that share price has a permanent component and a temporary component.

$$P_x = P_c + T_c$$

Where,

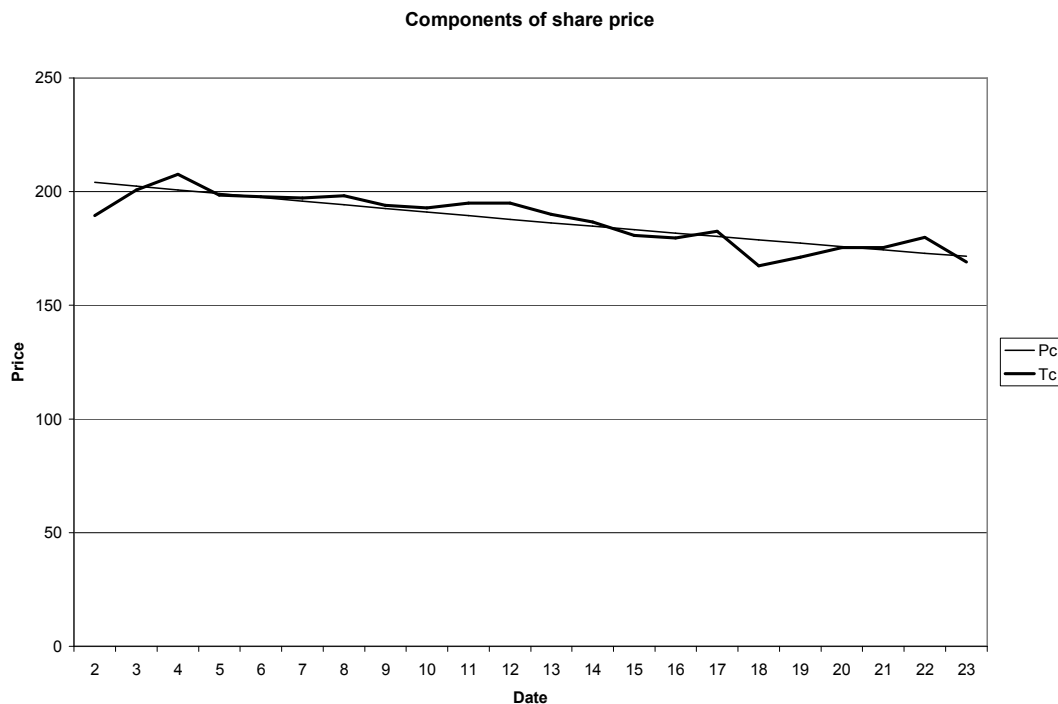
P_x = Price of Share (x);

P_c = Permanent component; and

T_c = Temporary component.

Here, the temporary component is unobservable. The permanent one can be perceived by the investor, and would help in the decision to hold or sell a share.

Secondly, trading takes place in the secondary market only because there are differences in the expectations of various market participants. This disagreement leads to volatility in daily share prices in the short run. The less the information and the more asymmetric is the information the greater is the volatility.



The permanent component is of little use in undertaking decisions to buy or sell in the short run. It may only help to make comparisons with the index or other shares in the long run. The high volatility makes steady changes observed in the permanent component irrelevant for day-to-day decision making. On the other hand, permanent part may or may not be correlated with the 'Market Index'. This leads to a choice between investing in the 'Index' and investing in the IPO (post launch), through acquiring the share on the listing day. The choice rests upon the excess short-run gain over the opportunity loss of investing in the 'Index'.

Types on investors

IPO investment is done by three types of investors with different objectives.

- 1) The first investor may be called as 'Fly by investor' who invests for listing gain.
- 2) The second investor may be called the short term investor who invests for Short term capital gain.
- 3) The third investor may be called as long term investor who wishes to stay for long term gain.

The investment decision of first category investor is based on three points of information.

- 1) Red herring prospectus
- 2) Lowest price in the price band
- 3) Highest price in the price band
- 4) Listing price

While there are some other factors like, sectors of the company, plans of the company, government policy and so on these factors affect the permanent component of share price. Another possible source of information is the 'market index' (Sensex). However, this information is not of great relevance to the first investor. Firstly, because the capital is locked in and the investor cannot switch to investing in the market. Therefore, there is no opportunity cost in this case. Secondly, if the share price of a particular scrip could be predicted from Sensex, there would be no price differential amongst share. Listing price is not ubiquitous, it is specific to the particular stock and price formation depends on the underlying information (relating to particular stock) which will be differentiated for each stock price belonging to different IPOs. Therefore, the underlying information is likely to impact the temporary component of price rather than the permanent component. Further

more the permanent component may or may not be correlated with the Index. Even this pre launch information is highly opaque. It is insider information. It can be manipulated. There is uncertainty on account of lack of knowledge. There is asymmetrical information between all other entities involved in pricing, like the merchant banker, promoter, chartered accountant, on the one hand and the investor, on the other hand. Apart from all these entities the qualified institutional buyers (QIBs), large industrial houses and FIIs have vastly greater and different means for gathering and analyzing information. They have permanent treasury departments that have technologies and experience. Therefore, apart from the ordinary investor, most others, who may be few in number and may indulge in bulk purchase, are likely to 'estimate' or have 'prior' knowledge of the 'high' price that may ensue at the time of listing, that is the opening day. It is most likely that at this price quote the traded volumes would be low, but with a high average size of the transaction, characteristic of the 'big' players. They can therefore, gain by cashing in on the 'high' price on the listing day.

On account of all these factors, the decision of the ordinary investor ('Fly by investor'), which is prompted by listing gain, is based on very narrow information, asymmetrical information and finally is fraught with the possibility of moral hazard. Interested parties involved in pricing would push their own motives, leading to mispricing such that the listing price is not the true price.

All these factors are responsible for three things:

- 1) Mispricing: The asset does not reflect the fundamentals of the company.
- 2) Fuzzy decision making: Investors is not able to make rational decisions on account of the opaqueness, uncertainty and asymmetric information.

3) Misallocation of capital: It occurs because the true price is not established in the first place.

All these factors interfere with the smoother adjustment of demand supply. They lead to volatility. In the absence of any substantial change in the information content relating to the specific issues, the permanent component of price would be governed by the general information that is available. It is therefore expected that the second type of investor who does not wish to sink in funds at the time of the announcement of the issue and wait for the return at the time of listing, would be having the motive of earning short-term capital gain. It is expected that only a certain proportion of the total subscribers would be having a sustained interest with a view to earn a long-term profit. Therefore their behavior is not likely to influence the share price to any great extent in the short period for two reasons.

1) They are not actively involved in trading.

2) Residual effect, if any that is exerted by them is likely to influence the permanent component, alone.

The volatility of the price is therefore arising out of adjustment problems and secondly relates to expectations, sentiments and whims of the market participants. It is based on relatively little stable information.

Short run analysis

The extant studies like (Kunz and Aggarwal, 1994; Levis, 1995; Ritter1991) have not adopted a standardized approach or methodology for defining short run. We have developed

a procedure for identifying the behaviour of the short-term investors and trading pattern based on a notion of the behaviour of market price.

In the absence of any new and fundamental information, as pointed out, true short run price would be established, only then the market is relatively stable. This is the only viable criterion, which indicates the establishment of the short run price. It is therefore expected, that a rational investor would sell a stock (that is purchased on the date of listing) on the date, when true price is established. The decision to buy on the date of listing is based on the understanding that the short run investor does not want to lock in capital by applying for shares, since; there is a gestation period between application and listing. Therefore the earliest date for purchase is the date of listing.

A short-term investor unlike the 'flyby' investor is not trading as a one-day affair. She would be driven by various factors such as a price trend of the share, a trend of the index and volatility in the market. While the two trends may be similar and related they need not be same. Therefore, the trend of the index is not a sufficient condition for undertaking a decision to sell. The volatility, therefore, would play a major role in decision-making. In the absence of long-term information, new information, change in fundamentals and so on, volatility would become a major factor, in decision making. Volatility causes uncertainty in decision making and riskiness causes a variance in return. In the short run, unlike the long run there is no cushioning due to hedging through portfolio management.

Therefore, the decision would be dominated by seeking to sell when the true price is established. The investor would be assured of the true price when there is minimum

disagreement among the investor about the price. The volatility in price arises mostly because of difference in perception of price. Therefore the strongest market signal that heralds the establishment of true price is presence of minimum variance in price. We have therefore developed a methodology by which the behaviour performance and return of two types of investors can be studied and by which we can make a judgment about informational and allocative efficiency of the IPO market.

Section III: Methodological Details

Review of Literature

The empirical evidence on initial returns in Initial Public Offerings (IPOs) reveals average overpricing as well as underpricing, depending on the type of security offered for sale. However, while the underpricing phenomenon is relatively well understood, it is less clear what generates overpricing. Indeed, why would rational investors want to buy securities that on average drop in price during their first day of trading? Is it possible that the measurement of mispricing in previous work was somehow inappropriate, leading to the wrong conclusion? To our knowledge Tore Leite (2004) is only study that approaches the above question that we have raised. Dimovsky and Brooks (2008) is a recent paper that discusses underpricing. They state that,

“There have been many studies into initial public offerings (IPOs) documenting underpricing. Underpricing is the term used when the issue price of a newly listed company’s shares is below the price at which those shares are traded, on the first day of listing. In essence, it is the return or profit made by investors subscribing to an IPO and then selling at the closing price on the first day of listing.”

This understanding of ‘underpricing’ falls short of our understanding, as has been explained above. In his paper “Revisiting IPO Underpricing in India”, Saurabh Ghosh, attempts to identify the factors explaining IPO underpricing in an emerging economy, India, using 1842 companies that got listed on the Bombay Stock Exchange (BSE) from 1993 to 2001. Unlike the existing works that analyzed the relation of ex-ante risk proxies and underpricing, this paper concentrates on volatility of stock return just after listing and underpricing of Indian IPOs. Contrary to the theoretical prediction, this paper finds a negative relation of underpricing and volatility.

Kumar (2000) attempts to examine efficiency of IPO issuing mechanisms using a sample of Indian IPOs that tapped the capital markets during 2003-07 by taking in to consideration the total costs the issuers have to face i.e., by including both direct costs as well as indirect costs.

Aggarwal (2008) analyze the Indian IPO issue and their pricing mechanism with empirical studies on the valuation of IPOs and both theoretical and empirical work on the determinants of short-run under pricing.

Aggarwal, Krigman and Womack (2002), Madhusoodanan, and Thiripalraju (1997) and Rock (1986) and Jegadeesh, Weinstein, and Welch (1993), amongst others have reviewed the problem of underpricing. Their approach varies from ours and is not comparable.

Data and methodology

We have taken data on share prices of IPOs quoted in National Stock Exchange and the NIFTY index. Our approach is a case study approach. The data of twenty four companies has been taken from NSE.

The following procedures, measure and tests have been done for two time periods, in the stock market, namely;

- i) January 2007 to July 2007 – a period of boom. The index was growing at 0.1% per day¹.
- ii) January 2008 to July 2008 – a period of downturn. The index was falling at 0.228% per day².

The methodology consists of the following step:

To measure and analyse:

- a. Listing gain – by taking the ‘high’ quote.
- b. Price trends:
 - i. To study the trends of average price of the share - post listing.
 - ii. To study the trend in the index (Nifty).
- c. Standard deviation of stock price.
- d. Identify the ‘event day’ – when the short run investor sells the share.
- e. Abnormal gain – as difference between ‘short-run gain’ and ‘market gain’.
- f. Index of listing gain and index of abnormal gain.
- g. Applying t-test for comparing gains.

The following propositions were tested.

1. There exists an ‘event day’ which signifies the establishment of true price and signals the day to sell the short run investment. This is unique and identifiable.
2. Listing gains are more than the short run excess gains (SrExg³) or abnormal gain.
3. None of the shares that have a high listing gain have a rising price trend. This means that they are ‘overpriced’ and not ‘underpriced’ as purported by literature.

¹ Daily compound growth rate – statistically significant at 5% level.

² Daily compound growth rate – statistically significant at 5% level.

³ Defined below.

Definitions and Measures

Measuring capital gains:

- Listing day gain is defined as:

$$Lg = ((\text{Listing Day High Price} - \text{Issue Price (Prev. Close)}) / \text{Issue Price (Prev. Close)}) * 100$$

- Short run gain is defined as:

$$Srg = ((\text{Event Day Average Price} - \text{Listing Day Average Price}) / \text{Listing Day Average Price}) * 100$$

- Market Gain (opportunity loss) is:

$$((\text{Event Day Market Index} - \text{Listing Day Market Index}) / \text{Listing Day Market Index}) * 100$$

- Short run excess gain is defined as:

$$SrExg = [((\text{Event Day Average Price} - \text{Listing Day Average Price}) / \text{Listing Day Average Price}) * 100 - ((\text{Event Day Market Index} - \text{Listing Day Market Index}) / \text{Listing Day Market Index}) * 100]$$

Measuring growth rates:

For studying the trend of the permanent component of price we used the following semi-log equation:

$$\ln Pt = a + b * \text{Time} + Ut$$

Here,

Ln stands for Log to base 'e'.

b = daily compound growth rate

Ut = error term

Event Day

We have measured and identified an ‘event day’. It is reckoned as the day when the true price is established and the short term investor sells the newly bought IPO share on the listing day.

The basis is to identify the day when there is maximum agreement amongst investors over the share price. This can be captured by a measure of standard deviation proposed by us. This called the 5-Day “Moving Standard Deviation”.

$$\text{Stdev (Day1:Day5)} = \sqrt{\{(\Sigma [(Pd1 - Pd (\text{mid}))^2]/5)\}}$$

Where,

Pd1 = Price on Day1,

Pd (mid) = Mid-value of the price during 5 days⁴,

The minimum variance day often has a variance that could in a relative sense be 10th of any other day even within a week or fortnight.

Indices of gain:

- a. Index of Listing Gain(in Rs.): ILG = 100(+/-)Lg
- b. Index of Abnormal Gain(in Rs.): IAbG = 100(+/-)SrExg

The purpose of these indices is to gauge and compare the two gains, across of different scrips and periods. The concept is that an investor invests Rs. 100/- and either losses or gains a certain percentage return. When added/ subtracted from 100, the index gives the net payback in Rupees.

⁴ There is an assumption that the mid-value lies against day 3.

Section V: Results

The following Table 1 & 2, which show our consolidated results. Tables 5 & 6 give a general overview of the selected sample of IPOs.

The following propositions were tested and were found to be true.

1. Clearly, one of the days within a month has minimum 5-day standard deviation. The range of the 'event day' this day varies from one week to three weeks. This day is unique. There is no other day that has similarly low standard deviation. The observation of the price trend also corroborates this fact.
2. The listing gains are more than the short run excess gains (Tables 1 & 2). This is corroborated by the t-tests which show that there are statistically significant differences between the two returns (as displayed by the indices of gain). In the first period we had tried a t-test with equal variance but in fact the variances differed. Therefore, in this case we used a t-test with unequal variances. This shows that irrespective of boom or downturn the listing gain is greater than short-run excess gain. The only difference is that during boom the difference is more (60%) as compared to downturn (32%). Moreover, it shows that during boom variance of listing gains is much greater (12 times). This may be because under such conditions pricing becomes even more arbitrary. 'Insiders' are able to push listing gains even further. However, it is interesting to note that despite this uncertainty (high variance) the listing gain is statistically significantly greater than short-run excess gain.
3. None of the shares that have a high listing gain have a rising price trend. Most of them have negative trends that are statistically significant daily exponential growth

rates or are deemed to be zero because they are statistically insignificant (Tables 4 & 5).

Table 1

Jan. to July 2007

IPO	LG	AbG	ILG	IAbG	
Auto		27.86	51.57	127.86	151.57
Techno		33.33	-1.36	133.33	98.64
DLF		11.22	4.84	111.22	104.84
Visal		190.51	-4.8	290.51	95.2
Nit		172.1	-5.41	272.1	94.59
For		1.85	-20.35	101.85	79.65
ICRA		163.63	18.11	263.63	118.11

Bina	2.66	-11.71	102.66	88.29
IDEA	22.66	9.08	122.66	109.08
Raj	-4.02	-29.3	95.98	70.7
PFC	40.47	0.41	140.47	100.41
Red	54.33	-6.53	154.33	93.47
			159.7166667	100.3792

Jan. to July 2007

t-Test: Two-Sample Assuming Unequal Variances

	ILG	IAbG
Mean	159.7166667	100.3791667
Variance	5185.17677	418.0260992
Observations	12	12
Hypothesized Mean Difference	0	
df	13	
t Stat	2.746007344	
P(T<=t) one-tail	0.008332241	
t Critical one-tail	1.770933383	
P(T<=t) two-tail	0.016664482	
t Critical two-tail	2.160368652	

Table 2

Jan. to July 2008

	LG	AbG	ILG	IAbG
FU	41.3	-13.17	141.3	86.83
TWL	33.33	9	133.33	109
IRB	8.1	11.47	108.1	111.47
ON	31.39	13.54	131.39	113.54
SR	25.66	-14.33	125.66	85.67
BGR	92.22	-16.36	192.22	83.64
RP	17.77	-6.31	117.77	93.69
BRI	25.61	-8.11	125.61	91.89

GO	15.23	-1.16	115.23	98.84
KNR	23.52	-44.92	123.52	55.08
VG	20.67	6.37	120.67	106.37
REC	23.71	37.18	123.71	137.18
			129.8758	97.76667

Jan. to July 2008

t-Test: Two-Sample Assuming Equal Variances

	ILG	IAbG
Mean	129.8758333	97.76666667
Variance	460.5364811	411.8323697
Observations	12	12
Pooled Variance	436.1844254	
Hypothesized Mean Difference	0	
Df	22	
t Stat	3.765906927	
P(T<=t) one-tail	0.000532832	
t Critical one-tail	1.717144335	
P(T<=t) two-tail	0.001065663	
t Critical two-tail	2.073873058	

Table 3
Profile of Selected IPOs from
Jan. 2007- July 2008

S.no	Name of the company	Price Trend	Event day
1	Autoline industries ltd	<0	14
2	Technocraft industries ltd	-0.009	11

3	Redington India Ltd.	-0.011	14
4	Power Finance Corporation Ltd	-0.002	14
5	Raj Television Network Ltd	-0.006	26
6	Idea Cellular Ltd	0.008	6
7	Binani Cement Ltd.	-0.0023	22
8	ICRA Ltd	0.0027	33
9	Fortis Health Care Ltd	-0.005	31
10	Nitin Fire Protection Industry Ltd	<0	16
11	Vishal Retail Ltd	-0.006	12
12	DLF Ltd	0	19

Table 4
Profile of Selected IPOs from Dec.
2007-May 2008

S.no	Name of the company	Price Trend	Event day
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1	Rpower Ltd.	-0.005	8
2	Rural Electrical Corporation Ltd	0.004	15
3	Future Capital Ltd.	-0.02	19
4	Titagarh Wagon Wheel Ltd	0	26
5	IRB Infrastructure Developers Ltd.	-0.008	7
6	V-guard Industries Ltd.	0	18
7	Shriram EPC Ltd.	-0.01	27
8	On Mobile Ltd.	0	25
9	KNR Construction Ltd.	-0.03	7
10	BGR Energy Ltd.	-0.01	19
11	Gokul Refoil and Solvent Ltd.	0	20
12	Brigade Ltd.	-0.01	10

Table 5

1 Jan. 2007 to 31 July 2007

Name of the company	Issue Open	Issue Close	List Date	Lower Price Band	Upper Price Band	Issue Price	List/Op. Price	High price	Cl. Price	Industry	No. of times oversubs	No. of shares traded	Turnover (in lacs)
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Autoline industries ltd	08.Jan	12.Jan	31.Jan	200	225	225	230	288	257.15	Auto Ancillary	19	5335774	14248.14111
Technocraft industries ltd	18.Jan	23.Jan	12.Feb	95	105	105	137	140	100.05	Steel	11	13121403	14461.89752
Redington India Ltd.	22.Jan	25.Jan	15.Feb	95	113	113	130	174	163.7	Computer	43	37494246	57628.17277
Power Finance Corporation Ltd	31.Jan	06.Feb	23.Feb	73	85	85	113	119	111.65	Power	77	92113982	102264.0167
Raj Television Network Ltd	14.Feb	23.Feb	16.Mar	221	257	257	225	247	226	Entertainment	2	9967722	22264.34584
Idea Cellular Ltd	12.Feb	15.Feb	09.Mar	65	75	75	85	92	85.7	Telecommunication	50	174944156	153458.2281
Binani Cement Ltd.	07.May	10.May	28.May	75	85	75	73	77	69.05	cement	1	7454087	5218.074461
ICRA Ltd	20.Mar	23.Mar	13.Apr	275	330	330	540	870	803.25	Miscellaneous	73	19108425	135690.8365
Fortis Health Care Ltd	16.Apr	20.Apr	09.May	92	110	108	110	110	100.15	Health care	3	22950815	23621.01599
Nitin Fire Protection Industry Ltd	15.May	18.May	05.Jun	171	190	190	333	517	484.85	Engineering	48	16874632	76973.34241
Vishal Retail Ltd	11.Jun	13.Jun	04.Jul	230	270	270	473	784	753.1	Retail	76	19079150	142598.6332
DLF Ltd	11.Jun	14.Jun	05.Jul	500	525	525	527	584	569.8	Real Estate	3	78025942	434669.7882

Table 6
1 Jan. 2008 to 31 July 2008

Name of the company	Issue Open	Issue Close	List Date	Lower Price Band	Upper Price Band	Issue Price	List/Op. Price	High price	Cl. Price	Industry	No. of times subscribe	No. of shares traded	Turnover (in lacs)
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Rpower Ltd.	15.Jan	18.Jan	11.Feb	405	450	450	530	530	373	Power	62	134392544	560250
Rural Electrical Corporation Ltd	19.Feb	22.Feb	12.Mar	90	105	105	125	130	121	Finance	27	111680940	136449.7
Future Capital Ltd.	11.Jan	16.Jan	01.Feb	700	765	765	1044	1081	908	Finance	132	12542842	110399.1
Titagarh Wheel Ltd	24.Mar	27.Mar	21.Apr	540	610	540	550	735	707	Engineering	7	5384541	36932.19
IRB Infrastructure Developers Ltd.	31.Jan	05.Feb	25.Feb	185	220	185	170	200	189	Construction	4	22521617	41594.6
V-guard Industries Ltd.	18.Feb	21.Feb	13.Mar	80	85	82	82	99	73	Electricals	2	19513848	16185.66
Shriram EPC Ltd.	29.Jan	01.Feb	20.Feb	290	310	300	290	377	294	Engineering	4	9597045	29655.73
On Mobile Ltd.	24.Jan	29.Jan	19.Feb	425	450	440	440	579	522	Telecom	11	25896008	136637
KNR Construction Ltd.	24.Jan	29.Jan	18.Feb	170	180	170	180	210	154	Construction	1	5446069	8807.56
BGR Energy Ltd.	05.Dec	12.Dec	03.Jan	425	480	480	801	922	901	Engineering	115	8229039	73959.8
Gokul Refoil and Solvent Ltd.	08.May	13.May	19.Jun	175	195	195	203	225	181	Refractories	4	16759269	34729.28
Brigade Ltd.	10.Dec	13.Dec	31.Dec	351	390	390	400	490	379	Construction	11	6688161	25510.85

Section V: Conclusion

The IPO pricing is flawed in as much as it is based on asymmetric information and causes inefficiency and mis-allocation. In the process it distorts market incentives and defeats the purpose of the IPO market which is meant to mobilize real saving for capital formation, through investment in the long term capital market.

The preceding analysis makes it clear that many concepts need revision in IPO literature. Firstly, 'underpricing' needs to be redefined with respect to 'true' price which is an *ex-ante* price and not the issue price which is an *ex-post* price. Secondly, the concept of 'market period' needs to be explored and understood better. Thirdly, IPO pricing needs to be viewed from the point of view of an 'information theoretic' approach, with special emphasis on 'informational inefficiency' and 'mis-allocation'. Fourth, IPO pricing needs to be seen from the long term perspective of the development of the capital market. Further research needs to be done with a larger data base in the direction laid out above.

Bibliography

- 1) Aggarwal, Deepak (2008) "IPO Pricing-Book building and efficient pricing Methodology." papers.ssrn.com. 1311749.
- 2) Aggarwal R. K., Krigman and Womack (2002), "Strategic IPO underpricing information momentum and lockup expiration selling" *Journal of Financial Economics*, 66, 105-137.
- 3) Dimovsk ,William and Robert Brooks (2008) The underpricing of gold mining initial public offerings, *Research in International Business and Finance* 22 1–16
- 4) Jegadeesh Narasimhan, Mark Weinstein, Ivo Welch (1993): "An empirical investigation of IPO returns and subsequent equity offerings", *Journal of Financial Economics*, 34, 153-75.
- 5) Kunz, R.M. and Aggarwal, R. (1994), "Why initial public offerings are underpriced: Evidence from Switzerland", *Journal of Banking and Finance*, 705-723.
- 6) Levis, M. (1995) "Seasoned equity offerings and the short and long –run performance of Initial public offerings in the UK", *European financial Management*, 1,125-146.
- 7) Madhusoodanan, T. P. and Thiripalraju M. (1997): "Underpricing in initial public offerings: The Indian evidence", *Vikalpa*, 22, 17-30.
- 8) Ritter, J.R. (1991), "The long – run performance of initial public offerings". *Journal of finance*, 46(1), 3-28.
- 9) Rock, Kevin (1986) "Why new issues are underpriced?" *Journal of Financial Economics*.
- 10) Tore Leite (2004) "Excess initial returns in IPOs". *Journal of Financial Intermediation* 13, 359–377.
- 11) Kumar, S.S.S. (2000), "Is book-building An Efficient IPO Pricing Mechanism? The Indian Evidence." papers.ssrn.com. 1252982.