



# AN EXAMINATION OF FACTORS INFLUENCING THE VOLATILITY OF INITIAL PUBLIC OFFERINGS – EVIDENCE FROM INDIAN MARKET

Lakshya Suhasaria

Student

School of Business and Management,  
CHRIST (Deemed to be University), Bangalore, India

**Abstract:** This article studies the relationship between aftermarket volatility and the multiple IPO oriented factors including Subscription rate, under-pricing, Price/Equity ratio, Debt/Equity ratio, age of the firm, offer size and the promoter retention rate, in the Indian IPO set up over a short term of 21 days post listing. The study uses Hierarchical regression along with OLS regression to identify and analyse factors which can help indicate aftermarket volatility with good accuracy on over 54 firms which went public via book building process from the period of Feb, 2018 to Feb, 2021. It also aims to analyse how the investor behaviour of retail and Institutional investors affects the aftermarket volatility of IPO's. The study found that Subscription rate and Aftermarket volatility show a significant relationship with Aftermarket Volatility in the short term. Further Retail Investors Subscription rate showed a positive significant relationship and Institutional investors displayed a negative significant relationship with Volatility of the IPO's in the Indian Capital Markets.

**Index Terms –** IPO, after-market volatility, Subscription rate, Underpricing, retail subscription, Institutional investors, age of the firm, Book building.

## 1 INTRODUCTION

### 1.1 Introduction to the Topic

Initial Public Offerings (IPO) have so far been one of the main unresolved questions in finance. IPO stands for Initial Public Offering. It is defined as the process by which a private company can go public by selling/issuing its shares to the public. An IPO goes beyond just raising funds it actually gives hint about the state of the economy, the progressiveness of the markets and ease of doing business as well. As important IPO is to an economy it represents equal ambiguity to the investors, issuers and the other parties involved.

Firstly the pricing of the IPO involves many ambiguities in terms of true value and has shown patterns of under pricing where issuing firm leaves money on the table for the investors, next patterns of information symmetry between different group of investors because limiting this and making the process more efficient is the ultimate goal of capital markets sustenance.

Initial Public offering has various factors affecting it which includes: Underpricing, financial indicators, Market conditions, Subscription rate, offer size and price, underwriter, regulations etc. These are factors which evolve over a period and are firm specific. It is based on this trade patterns are formed and investor trust is gained. But again, a lot asymmetry does exist owing to resources available to different investor groups. Especially in Indian market which is still developing and setting its base to compete with developing markets. All of this ultimately leads to the main topic at hand which is Volatility of IPOs in the Indian set up.

Huge amount of study and literature has been contributed but in terms of clarity of expectations be it for returns, volatility or underpricing is still mixed especially in comparison to different investor classes. IPO are methods through which companies get the required funds while investors aim to get ideal returns. Hence, it becomes crucial to analyze and criticize each factors, shortcomings, policies and practices that the industry follows for the same.

The topic of Initial public offering after market volatility provides massive scope to analyse and provide great insights to investors, bankers and underwriters in terms of future risk expectations, returns expectations and stability in terms of pricing that a particular issue can provide.

## 1.2 Initial Public Offering

IPO stands for Initial Public Offering. It is defined as the process by which a private company can go public by selling its shares to the public (Investors). The company bringing in the IPO can either be a new company or an old company. With Initial Public Offering, the company gets its shares listed on the stock exchange – In India there are mainly two stock exchanges, i.e., National stock exchange and Bombay stock exchange.

Stock market is considered as one of the most lucrative investment avenues in India. People often choose to invest in the stock market because they feel it has the potential to generate handsome returns in a small span of time. But similarly on the other side it also shows a lot of volatility, uncertainty and practices which scares away some investors.

Investors can trade in the stock market either through the main primary market or through the secondary market. The primary market involves investing in the stock market by applying to the Initial Public Offering (IPO) of a company while the secondary market involves purchasing and selling shares directly from the stock exchange.

Companies float it to raise capital for its business purposes - by issuing new shares to the public. However, the existing shareholders are permitted to sell their holding to the public without the issue of any fresh capital.

As we can observe from the table the IPO amounts have varied mainly owing to market sentiments and expectations. But the number of failed IPOs clearly show the great performance of IPOs in Indian capital markets.

(Table 1.2.1: Amount raised through IPO 2007-2020)

Year	No. of IPOs	Amount Raised (In Rs Cr)	Issues Succeeded	Issues Failed
2007	108	33,946.22	104	4
2008	39	18,339.92	36	3
2009	22	19,306.58	21	1
2010	66	36,362.18	64	2
2011	40	5,977.47	37	3
2012	13	6,834.17	11	2
2013	5	1,283.95	3	2
2014	7	1,200.94	5	2
2015	21	13,513.17	21	0
2016	27	26,500.82	26	1
2017	38	75,278.57	38	0
2018	25	31,731.28	24	1
2019	16	12,687.32	16	0
2020	16	26,628.06	15	1

### Reasons why company raises funds:

- For Funding Needs
- Funding Capital Requirements for Organic Growth
- Expansion through Projects and Funding Global Requirements
- Funding Joint Venture and Collaborations needs, Funding Infrastructure Requirements, Marketing Initiatives and Distribution Channels
- Financing Working Capital Requirements along with Funding General Corporate Purposes
- Repaying debt to strengthen the Balance Sheet and Meeting Issue Expenses

### Possible Hurdles Faced by Corporates in Making an IPO:

- Extensive public disclosure requirements.
- Significant increase in capital and human resource costs.
- Pressures on management for reporting quarterly and annual financial results.
- More complex corporate governance structure and regulations.
- Stringent eligibility and compliance norms.
- Risk of takeover bids. Co-ordination between the intermediaries
- Pressure for short performance and Substantial investment in the IPO process.

### Challenges Faced by Investors (Mainly retail) in IPO's:

- Lack of access to proper Information and Understanding of the prospectus
- Fragmented Broker Landscape in the country
- No Guarantee of any Listing Gains
- Actual Gain realized may be Low
- Finding the True/Fair Value
- High volatility in some issues
- Lack of Liquidity in some issues

### 1.3 IPO Pricing Process

Presently Indian capital market provides companies 2 options to issue IPO's through, these are:

#### A) Fixed price issue :

Under this model stocks are issued at a fixed price. This is most often considered as the second opted choice while going for an issue. The issuer offers full logic as well as proper justification for the fixed price in the key offer text. Typically, businesses opt for a fixed price problem only when the management believes that a fair price can be determined efficiently among them without having to measure it in the market, as is the case with book building.. Demand for these stocks can only be known based on the subscriptions that is received and this will only possible after the issue is complete.

As often there is lack of information on the real demand of the stock before the issue officially completes, there is often over-subscription for the stocks. This shows how Fixed Price Issue can't always come up with a fair price for the issue market. Because there always exists a chance to under or over evaluate the price of the issue than the market price for comparable offerings. This mainly happens as there are a number of variables in fixing the price and then justifying it without having a fully certain idea of the demand leads to Fixed Priced Issue being preferred less by the issuers.

This type of issue has another key barrier of information asymmetry. Here the price is fixed and allows lack of flexibility for both the investors and the firm to change their strategy based on demand during the issue or even based on new information which may get disclosed at the time of issue. Lastly under this issue investors are expected to pay the complete amount at the time of application ( That is when they bid for it).

This type of issue is seen in India mostly in SME IPO's where in firstly the liquidity is quite low for maximum stocks, this provides more clarity to issuing firm about the demand. Next these firms don't like to spend huge amounts on Investment banks and other partners required during an IPO in order to save cost. Fixed price issue limits those costs to some extent.

#### B) Book Building :

The Book Building Issue has no certain fixed price in the beginning. The process of creating, capturing, and eventually documenting investor demand is known as book building. Though the price isn't fixed, there is a range also known as price band which is set. The lowest in the price band is referred as "floor price" and the highest is known as "Cap Price". The investors are allowed to bid on prices on the number of shares that they wish to buy. The demand is known as the bids are received each and every day (In india its 3 days) - there is a much greater probability of landing at a fairer price compared to the market price of comparable offerings. Having its flexible pricing method and providing a clear sense of demand for the issues, the Book Building Issue is the most preferred method so far in the Indian market.

This is a more ideal process started in late 1990's in India. This firstly helped in creating more transparency in the issue for all the groups of investors and also ensured much more accurate pricing of the issue took place. The price of a stock is determined in a much more realistic way which is based on taking the consideration of the demand for security.

Final price which is determined via book building follows the method of Dutch auction. Hence, the underwriters do not have the discretion to lower the price in order to reduce the overall risk of unsold inventory. The process ensures that the final price fetches full subscription. In any case of undersubscription be it in any particular category, the unsubscribed portion is properly adjusted with the other category as per the mentioned regulatory guideline.

### 1.4 Types of Investor class

Under Securities and Exchange Board of India (SEBI) mentioned guidelines, there are mainly four types of investors who can bid for shares during the Initial Public Offering (IPO) process. They are:

#### a) Qualified institutional Bidders (QIBs):

- This group primarily includes mutual fund houses, commercial banks, public financial institutions, and International Portfolio Investors who are registered with SEBI.
- Underwriters attempt to sell significant volumes of IPO stock to them at a profit before the IPO starts. Selling shares to these QIBs goes a long way toward assisting underwriters in reaching their target capital.
- To ensure minimum uncertainty during the IPO process, SEBI requires institutional investors to sign a valid lock-up contract for at least 90 days.
- SEBI has developed a set of rules to ensure that IPO valuations are not skewed. That is the primary reason why the regulatory body forbids companies from allocating more than 50% of their shares to QIBs.

#### b) Anchor investors:

- An anchor investor is a QIB (Qualified institutional Bidder) who submits an application worth at least INR 10 crore. These types of investors also bring in additional investors. According to the rules, up to 60% of the shares designated for eligible institutional investors can be sold to anchor investors..

#### c) Retail investors:

- These are the general investors who take part in issue through their Demat accounts and have an allocation of 35%.
- SEBI has mandated that if the problem is oversubscribed, all retail investors will be allocated at least one lot of shares, subject to availability. If the one-lot concept cannot be implemented, a lottery scheme is legally used to distribute IPO shares to the general public.

#### d) Non-institutional investors (NII):

- Non-institutional investors are institutions who want to subscribe for more than Rs 2 lakh. The distinction between a QIB and an NII is that the latter is not required to register with SEBI.
- NIIs are allocated shares on a proportionate basis, which means that if they apply for 10,000 shares and the problem is oversubscribed ten times, they will be allotted 1,000 shares (10,000/10,000)
- This clearly regardless of whether the issue is oversubscribed or not all are allocated shares.

The minimum allocation to different investors' category is fixed as follows:

(Table 1.4.1: Investor-wise composition of allocation)

Investor category	Percentage Allotment
<b>Qualified institutional buyers</b>	50%
<b>Retail investors</b>	35%
<b>Non-institutional investor</b>	15%

## 1.5 The Indian Initial Public offering markets

### Pre Liberalisation :

In India, the stock exchanges have a very old history – starting from the 19<sup>th</sup> century. The Indian stock market in the pre liberalization period was affected by numerous key factors, this included: regulatory issues, lesser transparency in the activity of stock market participants, and lastly the open outcry trading ecosystem.

Overtime the regulations were revamped and this resulted in improved outcome – this is further linked by the fact that during the period of pre-liberalization the total amount of investments in New Issues Market clearly depicted an increasing trend between 1951-90. The capital raised during 1951-60 was on an average to the tune of INR.285 crores which increased to a massive number of INR. 23,357 crores during the period of 1981-90. In each decade a massive rise could be observed in terms of quantum of capital raised in the capital market

### Post Liberalisation:

India's initial public offering (IPO) market exploded in the 1980s and continued to rise with the country's major economic reforms in the 1990s. As a result, average annual capital mobilised by non-governmental public corporations increased from a negligible INR 0.7 billion in the 1960s to a slightly higher INR 0.9 billion in the 1970s to a much higher figure of over INR 43 billion in 1990–1991 when the reforms were introduced.. further it crossed over INR 264 billion in the year of 1994–1995 before going into a long low from 1995–1996 owing to a massive market scam.

Amount of new money raised from the market by the Indian companies in the post- liberalization period has been on a rise year on year. It is further evident that the yearly average of capital raised in the new issues market increased from INR.10679.90 crore during the period of 1991-2000 to INR.23,338.8 crore during the period of 2001-2010

### Recent Industry Trend Analysis:

- In India the real boom of stock markets started only post 1990's. Indian IPO ecosystem has also shown pattern as often noticed globally. Most IPO trends follow the Hot and cold market system – where in hot markets refer to booming economic system which is often considered ideal time to come out with an IPO. While Cold markets represent slowing down of economy and it has a history of providing very mixed reactions to the IPO.
- India has seen many waves in terms of “Boom Period” but most have ended either with a regulatory based scam or some global crisis. Firstly in the year of 1992 - first IPO boom started which went on to a lull when the bank receipt scam came up. Then came the next big Initial Public Offering boom in the period 1994 which ended with the experience of disastrous listing of certain big name companies.
- Finally, in 1999, there was a mini-IPO boom, with companies in the software and telecom industries raising IPOs at high premiums with vague business models. With the technology tale unravelling around the globe in 2000, this, too, imploded massively. Then there was the 2006-2008 IPO boom, which coincided with the global sub-prime mortgage crisis.
- Upon analysing the period of study between 2018 and 2021 we can get great insights into the industries that have been paving the way – A similar pattern has been noticed in FY 17, FY18 and in FY 19. Firstly in FY 17 the distribution was less concentrated but financial services had the highest number with 6 while TMT with 5 and health care with 3. Together they raised over 71 percent of the funds. In all the 3 years financial services sectors led the way in terms of numbers of issue and the percentage of capital raised. This could massively be due to the reasons of growth of financial services demand and expansion-based overview in this industry.
- In FY 18 Financial services there were a total of twelve listings largely coming from the insurance sector rise which was followed by six key listings in construction and materials and lastly five coming in manufacturing and metals. While in FY 19 there was some slowdown in terms of IPO issue in comparison with previous years but the year was led by highest issues in Financial services followed by Construction and materials and hospitality was the third highest. Financial services raised over Rs. 110 Billion and constituted for over 55% of funds raised in this fiscal year.
- Coming to FY 20 a total of Rs. 209 Billion was raised out of which over 127 Billion was raised in financial services sector. This constitutes of over 61% of funds raised. Only 2 PSU's raised funds in this Financial year. When compared to FY 2019 higher funds were raised in FY 20 but it was largely affected towards the end of FY 2020 owing to rise of COVID globally.

### Future Outlook and Trends:

- With Pandemic giving a major jolt to the economy, stock exchanges were the first thing to revive over time after a crash in early April. Massive ambiguities exist in terms of when economic growth will return to old stages – but with financial aids, stimulus and opening of lockdown and international trade the economy has slowly started to grow back. The economy is important to observe as this would define the future of capital markets.
- Firstly, while companies work on their new business strategies – the industries expected to lead the growth of capital markets is the pharmaceutical, healthcare, IT and FMCG.
- Most of the companies will need funds largely to revamp and start their growth strategy again. This will require a lot of companies which did not plan to raise funds earlier to come for IPO's. These could MSME or even PE backed firms.
- Many PE and VC firms also look for exits strategies based on performance and gain expected that they make through the period of pandemic. This is a pattern that has been seen over the years in India and is expected to increase over the years.



- Increased listing of start-ups I on the agenda with SEBI because this has been a demand in order to enhance fund raising platform for Start-ups and regulations are expected to be bought in to support this form of fund raising even for start-ups.
- Rise of SPAC's – India does not have any major SPAC regulations, this would be something coming through from regulatory bodies to reduce ambiguity and make the process more smooth.
- On the supply side improved participation from retail investors be it through mutual funds or via direct investing has provided massive impetus to the capital markets. This has been one space which has benefitted in the pandemic as retail investors increased in volume.
- Massive FPI inflows are also expected to cause massive liquidity in the cap markets.

## 1.6 IPO Underpricing

Underpricing is a phenomenon in the financial markets where a company's shares are priced below their true value in preparation for an IPO (initial public offering). If a stock closes above the set/offer IPO price on the first day of trading, it is said to be underpriced.

A key point is that the underpricing does not stay for lengthy periods. In different markets different periods have been observed. Following the IPO's initial public offering (IPO), investor demand will ultimately drive the stock's price up to its market value. It is often argued that such a phenomenon is incompatible with the principle of market quality. Despite this, underpricing is a global trend that exists in both developed and developing countries.

Theories for Under pricing:

### 1. Information Asymmetry

According to this theory, the majority of investors do not have sufficient access to knowledge about the IPO. Furthermore, such investors are unconcerned about the efficiency or the quality of the IPO because their primary concern is affordability. Meaning, they may want to invest in IPOs that they can afford and that will provide them with good returns, so many are underpriced to help the same.

### 2. Investment Bank Conflict (IBC)

Many investment banks advise businesses to keep the IPO price low so that when the underwriting rate is kept low, the lower price per share tends to compensate for the lower underwriting fee they received.

### 3. Unclear on Public Demand

If the company and the underwriters do not have a clear idea about the demand for the share to be issued then they go with IPO underpricing.

### 4. Speculative-Bubble Hypothesis

According to the following theory, certain investors would be unable to obtain a share during the initial public offering (IPO) (mainly due to oversubscription). Such buyers seek to purchase stocks as soon as they are listed on the stock exchange, resulting in a speculative price increase.

### 5. Managerial Conflicts

There are two main suggestions in this theory: First, management hypes the IPO so that they can sell the shares until the official lock-up period expires, and then to ensure that the problem has enough buyers.

(Table 1.6.1: No. of Underpriced and Overpriced IPO)

Year	2018-19	2019-20	2020-21
IPO's selected	19	16	19
Underpriced IPO	9	10	15
Overpriced IPO	10	6	4
% of Underpriced IPO	47.37%	62.50%	78.95%
% of Overpriced IPO	52.63%	37.50%	21.05%
Total Underpriced IPO	34		

## 2 LITERATURE REVIEW

(Sahoo. S , 2015)

This paper studies the aftermarket volatility along with listing day volatility and its relationship with subscription rate. It studies IPO's in India from 2002-12 with a sample of over 339 companies over this period. The statistical tool used to find significant variables is OLS regression where in various independent variables namely : MAAR, offer size, P/E ratio, D/E ratio, Promoter retention, Age of the firm and the 3 subscription rates are mainly used. The findings provide extremely intuitive observation especially towards investor behaviour and their significance. Firstly subscription rate shows positive correlation and is a significant influence on aftermarket volatility. Further it provides empirical findings on how retail subscribers are more significant and powerful in influencing the volatility in comparison to institutional investors. This is a major study providing great overview on how various factors can have an effect on the volatility keeping the investor behaviour in mind.

(Agarwal, Sumit and Liu, Chunlin and Rhee, S. Ghon)

The following study covers the relation between the pre-IPO investor demand and aftermarket short and long term. It has analysed over 256 IPO's which had been divided into 3 levels based on demands which are – low, medium and high. The study is divided into 2 parts, initially OLS regression was used to analyse the influence of oversubscription which shadows investors demand on initial returns. Post which another test is done between long term returns and other key controlling factors like size, age, subscription ratios, dividend, initial returns, to understand how long term and short term performance varies based on investor demand. The

empirical findings are essential showing how high pre-ipo investor demand results in large initial returns but negative returns over the long term while low investor demand provides great long term returns but negative short term results.

**(Ghosh Saurabh, 2005)**

This study focuses on providing key evidence towards what causes under pricing in IPO. It makes use of various models focusing on information asymmetry, risk measures proxies and the extent of under pricing. It uses factors like age, size, cold/hot market, standard deviation post issue. Further it also focuses on subset of companies' decision to raise funds subsequently depended on the initial returns and/or on the aftermarket returns. This paper concludes that the uncertainty played a major role in the underpricing in Indian IPO market over the decade. The extent of uncertainty was dependent on the ex-ante information available to the investors. There was a clear gap on the information available on offer date to the investors. This further became evident through the discrepancy between ex-ante and ex-post (post listing) measures of risk and their impact of underpricing. The information dissemination between the period of offer and issue was also found to play a key role. The empirical findings indicate that the private companies could have taken the advantage of investors optimism during the hot period as shown by the data.

**(Jog, Vijay & Wang, Liping., 2002)**

This paper investigates the study relationship between the aftermarket volatility and IPO underpricing in the Canadian Stock market ( Toronto stock exchange ) between 1990-99. This study is unique as it breaks down after market volatility into market, industry and firm specific factors to understand it better. Next it studies how volatile an IPO is in comparison to other stocks in the similar industry. It provides surprising result showing how IPO shows lower volatility in comparison to other seasoned stocks in the industry. Although the final results showed an overall positive relationship between IPO underpricing and aftermarket volatility. But this result went on becoming weaker as time it came closer to 2000 - not providing any clear evidence for the same.

**(Khurshed, Arif & Pande, Alok & Singh, Ajai , 2009)**

This paper discusses and analyzes the bookbuilding process in Indian stock markets. Focusing towards the timing and subscription patterns of different investor groups in the ecosystem. Further it also focuses on dissecting underpricing into 2 key parts – pre and post market. The analysis was significant and showed how sequential learning exists among investors. This basically implies one investor group learns and gets influenced by the movement of the other. It shows observations of how retail and non institutional investors follow the lead of institutional investors subscription pattern while investing. OLS regression is conducted to understand the factors playing a key role in deciding maximum offer and price and the underpricing of issue. The existing transparency in the book building process has lead to winner's curse effect on retail investors. Paper further shows that market underpricing is primarily driven by the unmet demand of the non-institutional and retail investor groups.

**(Mishra.A.K and Asim, 2012)**

This study provides unique insights towards how Book building and Fixed price offerings are fundamentally different practices but ultimately satisfy a similar goal. Stressing on the aspect of how the Indian stock markets were at crossroads when it started to include the Book building process into the mix. It also compares on how the book building process is structurally different from western countries as the auction system is absent here and each investor group applies for their category of shares. The study covers a period from 1997 to 2008 and analyses how the underpricing varies in both the categories. It provides a contrasting conclusion showing how underpricing is in the same range for both the types of offerings – but it does provide supporting proof that book building process reduces information asymmetry between different investment groups. Even though this has not been able to reduce underpricing effect on the IPO.

**(Reber, B. and C. Fong, 2006)**

This study uses elaborate techniques to dig deep and find ideal factors and best fit models that cause the mispricing of IPO's. This study has been conducted in Singapore over the period of 1998-2000. It has constructed over 7 models to identify the best fit model by using OLS regression along with Bivariate correlation matrix to understand the multi collinearity aspect. The broad range of independent variables included : Age, Offer size, promoter retention, subscription level along with a number of dummy variables such as industry risk, volume of shares traded etc. This helped in providing a very clear and transparent outlook on the factors which were causing mispricing even in a well regulated system of Singapore. Overall the key of subscription levels on mispricing was clear from the results . The result also indicated a statistically significant negative correlation between subscription levels and disclosure requirements of Main Board offerings along with a strong positive correlation between subscription level and further flipping of IPOs in the secondary market. This implies that having found IPOs that are underpriced, investor demand is high which leads to rationing in the primary market and then subsequent flipping in the secondary market – which has been repetitively been noticed in the IPO segment The level of flipping may also signify the extent to which investors disagree about the values. The evidence also crucially suggests that underwriter reputation is positive, but only is marginally related with mispricing.

**(Siew, Mike & Leong, Wei & Taylor, & Sundarasan, Sheela. , 2015)**

The purpose of this study was mainly to identify the significance of 3 key variables which were identified - signalling variables (auditors/underwriters' reputation, ownership retention & over-subscription rate), firm characteristics (firm size, age & industry) and financial indicators (price-earnings ratio & earnings per share) on IPOs' initial returns and volatility of the initial returns. This study provided a unique approach to understand the various outlooks that exist to an investor. Hierarchical analysis along with Stepwise regression was done to find that initial returns are affected largely by subscription rates while volatility is affected by dividend rate. Signifying that investors get excited for stocks with high subscription rates leading to higher demands and showing positive connection while dividend rate carries negative coefficient as higher dividend pay-out shows more confidence and more stability in the stock in terms of investor retention.

**(Officer, Micah S. and Lowry, Michelle B. and Schwert, G. William, 2006)**

This study is considered a great benchmark in terms of understanding the factors affecting the returns and volatility of the IPO over the short term. It covers a period between 1965 to 2005 showcasing how information asymmetry has contributed largely towards wide ranging initial returns. The paper observes high initial returns and underpricing especially over 'hot markets'. This also signifies that underwriters don't pass on every information they come through during the book building process. This paper uses OLS regression along with GARCH model to develop accurate relationship. The log of variation in error terms of returns is used as the dependent variable to analyze the variance relationship. It makes use of factors like age of the firm, underwriter rank, bubble period etc. It provides insights towards how auctions system can be more efficient in terms of accurate pricing.

**(Rock, K., 1986)**

The adverse selection model assumes that the issuing company and its underwriters are unsure of the firm's true worth, but that certain investors are aware of the following: Since there are few agency issues between issuers and underwriters, underwriters aren't involved. An IPO allows each of the two categories of investors (informed and uninformed) to invest a fixed sum. If there is excess demand, the issuer sets an offer price and number of shares to be offered, and shares are distributed on a pro rata basis, i.e., if the offer is oversubscribed by a factor of three, each investor who requested shares receives one-third of the requested amount. Since the educated can only send purchase orders when the sale price is at or below what they know to be the true value, informed investors will often try to establish a negative externality for uninformed investors (mostly retail).. Uninformed buyers are therefore subject to the winner's curse, which means that when the bid is overpriced, they will receive all of the shares at auction, but only a fraction of the total shares when the offer is underpriced. On average, IPOs are underpriced to compensate uninformed investors for this adverse selection pattern.

**(Miller, R.E. and F.K. Reilly, 1987)**

The purpose of this study was to effectively examine the speed of market adjustment to mispricing, and explore the relationship of underpricing to uncertainty. The data set allowed to not only to study these characteristics in more detail, but also to relate and understand the relationship between two additional measures of uncertainty to underpricing. The result indicated that the mispricing effect was corrected on day one. Hence implying no excess returns were available for intake post day one. This stood true for both underpriced and overpriced group of stocks. Underpricing. Further Bid-ask spread was also examined for both the under- priced and overpriced groups. It was found that the same inventory risk model was appropriate for both groups after the first day of trading. Under this study regression was done for the 5 five days to study independently and compare. Allowing for a time effective study to take place.

**(Saar, G. 2001)**

This paper discusses and analyses investor uncertainty and its effect on the bid and ask spread. This investor uncertainty results in prices moving on trade and therefore creating a spread between the bid and the ask. Greater the investor uncertainty more impact on the spread, decreasing expected trading volume, and lowering the welfare of all types investors in the market. Under this model uncertainty is not based on information available about the future cashflows – but rather its focused on an investors risk aversion and endowment choices. Hence, a simple sequential trade model with two types of investors who differ in terms of their risk aversion and endowments is developed. This gives great insights to understand at varying price ranges how do different investors profile engage and order. Finally it provides a key mechanism that relates liquidity to welfare, and showing how investor uncertainty can cause both worsened liquidity and lower welfare.

**(Alberto, J. G. C., Cota, L. H. S., Neves, O. F., & Santos, L. M. D , 2011)**

The authors used a multivariate direct relapse model with a blend of factors covering IPO explicit data, showcase related elements, and even full scale parameters in this study of IPOs in emerging markets such as Brazil, India, and China. This paper uses a methodology of doing a comparative study by employing linear regression, descriptive statistics and MMAR test. Independent variables included : Offer size, investment bank reputation, last offer value, showcase execution, funding expense, FDI, GDP, swelling, and other main factors are used. The market-adjusted monthly return (MMAR) was one of the key performance measure that was calculated for the IPOs of all the three countries. MMAR for Brazil, India and China was 1.06%, -0.66% and 3.65% respectively. These results signified that IPOs of China and Brazil over perform market benchmarks while india did not. Specifically For Indian offers, the variables of aftermarket, beformarket and hightech had high explanatory power. Both aftermarket and Beformarket are the variables of market performance, signifying that market performance influences strong first-day returns in Indian IPOs.

**(Shikha Sehgal & Balwinder Singh (2007)**

This paper researched the initial and long-run performance of a total - 438 IPOs listed on the Bombay stock exchange from 1992 to 2006. To examine the long-run performance of Indian IPOs 2 key thigs were calculated Buy-and-Hold Abnormal Returns (BHAR) and Cumulative Abnormal Returns (CARs) for over 10 years (120 months). It gave insightful findings as Buy-hold (BHAR) returns was found to be representing a negative relationship between the period of 18 to 40 months of holding. After 40 months though the underperformance of IPOs had disappeared. This suggests that in India, underperformance persists for about one-and-a-half years to a little more than three years after which it evaporates.

**(Bandgar and Atul Rawal, 2012)**

The aim of this study was to look at the long and short term effects of pricing for bank IPOs. The researchers also looked at the influence of IPO size and issue existence (par, premium, or discount) on pricing. During the period 2000–2010, a total of over ten banks were chosen at random to issue their equities via an initial public offering (IPO). The average return in the short run was - 8%, and the average return in the long run was -53 percent. Other key results from the study observed that larger issue size IPOs had a higher listing price, while smaller issue size IPOs had a lower listing price. On the listing day, IPOs with a lower issue price produced higher returns than IPOs with a higher issue price. Banks in the private sector IPOs outperformed public sector banks in terms of returns. This gives clear overview that lower offer sizes showed more underpricing in order to attract more investors for its IPO.

**(Mikkelson, W. H., Partch, M. M. & Shah, K. , 1997)**

This paper discusses and analyses the operating performance and its relationship with ownership pre and post IPO. This is a unique study as it focuses on the managerial changes that would occur in terms of decision making and control post IPO. Under this median ownership stakes is analysed – this includes stakes held by directors and officers of the firm. It finds that 10 years post the issue the stake is much lower when compared to one year before the issue. It also finds that there is a change in operating performance in comparison of one year of pre and post issue, but after that it does not decline. Based on the tests conducted it was found that there exists no significant relationship between ownership of stock by officers and directors with the operating performance.

**(Boehmer, Beatrice & Boehmer, Ekkehart & Fishe, Raymond P. H., 2006)**

This study analyses in detail the allocations to institutional and retail investors using over 441 initial public offerings. It provides unique results by showing how intuitional investors get more allocations in IPO's with better long term performance. This is largely aided by the fact that QIB have resources and at least some key information about the firm going into an IPO. As a whole the findings illustrate the importance of the after market relationship which exists between underwriters and investors. Also giving crucial insights on how underwriters go beyond providing first day returns to compensate the investors.

**(Kenourgios, Dimitris & Papathanasiou, Spyros & Melas, Emmanouil., 2006)**



This paper provides good quality of international evidence oriented around IPO's in Greece by covering over 169 IPO's between 1997-2002. This study uses excess returns /raw returns of 1st 5th and 21st day is used as dependent variables while proxy is used to rank the underwriters prestige along with the number of times of subscription. Multiple sets of regression were used along with cross sectional analysis to provide insights that both the variables underwriters' prestige and the times of oversubscription significantly affect the underpricing level of the IPOs. Further it also provides great outlook on how IPO's still show huge amounts of underpricing. This paper ultimately helps in providing investors to understand the role of an underwriters reputation in the Greek public process..

### 3 RESEARCH DESIGN

#### 3.1 Problem Statement

In India the Equity markets ( Secondary Market ) has made massive growth over the past decade. Coming through rough patches through 1990's over the years it has been developing and setting a strong foothold as an investment choice. Even with upcoming stock analysis techniques and skills – they have still found it hard to reduce the uncertainty revolving around an IPO issue and its performance.

Different types of investors look at the key factors varying this creates a vacuum where in it becomes hard to understand which factor carries how much influence on the returns and the volatility of returns.

Every investor is bound to lose money when the market is extremely volatile which leads to lower investor confidence and a pessimistic view of the situation. Especially for retail investors who face information asymmetry owing to which they often end up overpaying or investing into the wrong issues.

Book building process was introduced to reduce information asymmetry and allow more equitable/fair pricing of the IPO's based on participant analysis. But papers have suggested this has failed to provide any massive relief to these targets. Such studies allow to analyze how different processes, factors and variables cause movements in terms of returns and volatility. Better access and understanding of information proves key to more sustainable investing.

Hence, it becomes key to understand and evaluate various relationships which exist between the factors and the volatility of the returns in the short term. So that uncertainty can be reduced and IPO process can be made more ideal for a fairer market.

#### 3.2 Objectives of the study

This paper aims to achieve the following objectives:

1. Understanding how various factors affect the volatility of returns in the short term for an IPO
2. To identify the effect of Retail and Institutional Investor participation on an IPO aftermarket volatility
3. To identify hierarchical relationship of Firm, Signalling, and financial Variables with aftermarket volatility.
4. Based on the model find key insights for relevant market participants

#### 3.3 Scope of the study

This paper has been made keeping in mind the strong rise in the equity participation. IPO forms the base of any solid stock market and being a participant of the same It becomes key to understand how various factors be it external or internal affect any IPO issue. Due to the abnormal initial returns, also known as under-pricing, the uncertainty surrounding the IPO ecosystem has often piqued academicians' and analysts' interest over the years.

In capital markets of India where investors are slowly but steadily growing it becomes key to reduce this ambiguity and provide enhanced knowledge and clarity to investors. This paper hence tries to specialize on the relationship between Institutional and Retail investors towards the IPO volatility. Largely because retail investors have been growing at a very high pace since 2018, while the information asymmetry between these 2 groups is very large. So by focusing on these groups under the study it will give us very contrasting and insightful findings.

This study aims to be different as firstly it purely focuses on short term after market volatility. Presently in India research on this topic has been limited and requires more insight. Next the study breaks down and analyses the relationship and effect of Retail and Qualified institutional Investor group on each other and on the Aftermarket volatility. Giving improved insight on information asymmetry and the investing pattern followed by both. Finally in this period of study Indian market was growing rapidly with various macro economic changes – this prompted this study to be more insightful and unique

There is still a gap in examining the volatility of IPOs' initial returns, except for some work undertaken by Lowry et al. (2010) and Seshadav Sao (2014). This obviously necessitates more in-depth research into the presence and causes of these fluctuations in IPO initial returns, and the aim of this study is to fill that void.



## 3.4 Variables and Operational Definitions:

VARIABLE		
Dependent Variable		
Volatility of IPO Stocks		Volatility can be defined as the standard deviation of excess returns over the market benchmark returns for the first 21 days which includes the listing day. Standard deviation will be calculated for the returns day by day over the market benchmark. This allows the market effect to be subdued to some extent. This acts as a proxy for aftermarket pricing risk/volatility.
Independent Variables		
Market Adjusted Abnormal Return (MAAR)		<p>This is estimated as the market adjusted rate of return for the IPO on the initial day also know as market adjusted initial day returns. Technically meaning initial day returns subtracted by the market index returns. This is key to show the under-pricing effect that exists.</p> <p>To calculate stock return :</p> $R_i = (CP - OFP)/OFP \quad (3.4.1)$ <p>CP – Closing Price of the stock on the initial/Listing day ( Day 1 )  OFP – Offer price ( Maximum price of the price band is selected)  We find R<sub>m</sub>, here R<sub>m</sub> represents – First/Listing day's equivalent market return.  Market adjusted abnormal rate of return (also knows as MAAR) for the IPO share on the listing day by using the following formula :</p> $MAAR(i) = ((1 + R_i)/(1 + R_m)) - 1 * 100 \quad (3.4.2)$ <p>Here a positive MAAR value signifies high initial day returns showing underpricing. While negative MAAR signifies overpricing of the issue</p>
Subscription Rate ( SUB - Rate )		Subscription rate is defined as the size/magnitude of response received from the investors for the IPO issued. This is calculated based on the amount of application received divided by the No. of shares available for issue. Whenever the demand is higher than the supply it showcases a pattern known as oversubscription. Further there are 3 sections : retail investors (RII), Non institutional investors (NII) and Institutional Investors (QIB) who form the whole group of investors and carry individual weight under each of them as per the allocation percentage.
Promoter Group Retention ( Prom - Ret )		This factors talks about the percentage of shares that are retained by the promoters and promoter groups in the company post issue. This is a significant aspect in winning confidence of investors and numerous studies have been conducted to understand the effect of the same.
Age of the firm ( AGE )		Age is basically found out as the difference between the year of incorporation and the year of listing of the IPO ( Goes Public ). This is a very key factor especially to understand how investors view a older company in comparison with a younger one.
P/E Ratio of the Firm (P/E-Rat)		P/E ratio - Price/Earnings ratio is a key ratio not only to understand any stock but also to understand the earnings position of the firm. Any company stands upon its past earnings and future expected cash flows. The latest earnings announced in the prospectus is crucial to understand the outlook. hence, P/E has been calculated using Offer price upon Latest EPS.
D/E Ratio ( Debt by Equity )		Debt by equity gives a view on the leverage level in the firm. That is the long term debt divided by the paid up equity capital on issue date. The amount of leverage that a company carries also has historically shown a certain level of influence towards investor uncertainty.
Offer Size (OS)		Offer value is the amount of capital the company wants to via an IPO. This can easily be calculated by multiplying the total no. of shares floated with the final offer price.

Signalling variable ( Ownership retention, Subscription rate): This set of variable is most of key out of the 3 as it provides outlook on what the promoters and investors signalling to the market. especially in times of information asymmetry these set of variables carry massive influence on the performance post listing both in short and long term. Ownership retention means the stake retained

post IPO by the Promoters and promoter groups. Past research has shown higher the promoter group retention higher is the investor confidence. This often varies from industry to industry and can be influenced by other key decision making matrix. Subscription rate is very important as it signals on the investor response and interest to the issue. Hence, regressing this will give massive insights on how much they manage to influence the volatility of returns.

**Firm characteristics** ( Firm age, Offer size): These are the characteristics which are company specific and cannot be influenced by any external market force. This is again an important block of variables providing important signs to investors about the basic information of the company. Firstly the offer size gives good hint about the firm size ( In terms of Valuation ) – this provides good hint as bigger the size of the company more safer the investment is seen. Again investors have varying views and using this in the model allows for good insights. Next Firm age – this basically means the Date of incorporation to the day of listing. Providing a outlook on the size of the history of the company and the experience it carries in that particular business and industry. Usually based on past research higher the age greater is the investor confidence.

**Financial indicators** ( P/E and D/E ratio ): These set of variables indicate the financial information/health about the firm. Especially for informed analysts and investors financial information in the prospectus helps form a strong base for decision making. Under our model we will be using latest P/E and D/E ratio, i.e, P/E ratio – defined by offer price divided by latest EPS announced and D/E ratio – Long term debt divided by Paid up capital on day of listing. Many analysts also look at future EPS prediction but in our model we stuck to present data because future projections are often not ideal and may be far fetched. Hence, even the company prospectus and Pre IPO financial health often are made to look good in order to attract good investments.

### 3.5 Method of data collection (primary / secondary)

Under this study sample is covered for over 3 years (2018 – 2021). Secondary sources were used to collect all the relevant information for the dependent and independent variables. Primarily Ace Analyser, NSE and BSE databases were used. Maximum of the information collected was cross referenced and cross verified to ensure good quality of database is being evaluated provide relevant insights.

To collect certain key data Red herring prospectus of those companies which was retrieved from available at Securities Exchange Board of India (SEBI) website.

### 3.6 Sampling Type / size

#### Sample type

The example comprises of 54 Book Building issues. The sample collected is only for mainboard IPO's. NIFTY 50 Index is chosen as an agent (benchmark index) of the market. NIFTY 50 is The NIFTY 50 covers major sectors of the Indian economy and offers investment managers exposure to the Indian market in one efficient portfolio approximately 65% of its float-adjusted market capitalization and is a true reflection of the Indian stock market

Certain conditions and filters were added to the type of IPO's being analysed, which are :

- No MSME IPO'S were taken into the analysis
- IPO's listed on NSE and BSE were both taken into analysis
- Fixed-priced issues were omitted from the analysis because they lack the ideal market-assessment provision, making it more difficult to arrive at a reasonable valuation.

(Table 3.6.1:Sample size break up)

Particular	Stat
Total IPO's in the period	255
IPO's selected for the study	54
IPO's Not selected	201
% of IPO's selected	21.18%
% of Mainboard IPO's Selected	100.00%

Sample Size

The sample size for our study is 54 Indian listed Companies, which issued their respective IPO's in the period of Feb 2018 – Feb 2021. The sample determination is guided largely by the accessibility of key information.

(Table 3.6.2 : Factor wise sample size)

Particulars	Period of collection
Market Prices for each Firm	For each of the 54 companies 21 days of post listing prices will be collected (Inclusive of listing day)
Age of each firm	For all the 54 firms Age of the firm based on the date of IPO listing and date of incorporation will be found
Market Index Prices	While calculating market adjusted returns benchmark index prices will be used – the period will be specific to each firm
D/E AND P/E Ratio for each firm	D/E ratio and P/E ratio will be calculated for all the 54 companies in the sample size.
Offer Size	Offer size ( Excluding the Offer on sale (OFS) ) will be calculated for each firm in the sample size
Promoter group Retention	Promoter group retention will be calculated based on data provided in the prospectus
Offer price	Offer price – the higher band price shall be taken in order to use for calculations
Subscription rate : As a whole, QIB, RII	Three sets of subscription rates will be found: Overall SUB rate, QIB category SUB rate and RII category SUB rate. This rate will be at the end of 3 <sup>rd</sup> and final day of bidding process.
Volatility of market adjusted initial 21 day returns	Volatility will be calculated as Standard deviation of post listing 2 day returns. This will include listing day.

**3.7 Hypothesis**

Following hypothesis have been developed to study and analyse the relationship and significance of each of these factors with the short-term aftermarket volatility of the IPO. These are only focused on the OLS regression to be carried out.

- [1] H0: There is no significant relationship between MAAR and Short-term after-market volatility  
H1: There is a significant relationship between MAAR and Short-term after-market volatility
- [2] H0: There is no significant relationship between Firm Age and Short-term after-market volatility  
H1: There is a significant relationship between Firm Age and Short-term after-market volatility
- [3] H0: There is no significant relationship between Promoter ownership retention and Short-term after-market volatility  
H1: There is a significant relationship between Promoter ownership retention and Short-term after-market volatility
- [4] H0: There is no significant relationship between P/E Ratio and Short-term after-market volatility  
H1: There is a significant relationship between P/E Ratio and Short-term after-market volatility
- [5] H0: There is no significant relationship between D/E ratio and Short-term after-market volatility  
H1: There is a significant relationship between D/E ratio and Short-term after-market volatility
- [6] H0: There is no significant relationship between qualified institutional buyers (QIBs) Subscription rate and Short-term after-market volatility  
H1: There is a significant relationship between qualified institutional buyers (QIBs) Subscription rate and Short-term after-market volatility
- [7] H0: There is no significant relationship between retail individual investors (RIIs) Subscription rate and Short-term after-market volatility  
H1: There is a significant relationship between retail individual investors (RIIs) Subscription rate and Short-term after-market volatility.

**3.8 Statistical design**

Descriptive Statistics: Descriptive statistics of a variable helps the reader understand factors such as mean, median, mode, standard deviation, variance among other statistical measures. It helps provides a statistical summary of the variable and its data.

Multi Collinearity tests : When independent variables in a regression model are correlated, this is known as multicollinearity. Since independent variables should be independent, this correlation is a problem. If the level of association between independent variables is high enough, it can trigger issues when fitting the model and interpreting the results. The variance inflation factor (VIF) and tolerance values are used to determine the intensity of a correlation between independent variables.

Heteroscedastic test : Homoscedasticity is a key assumption in OLS regression- The fact that the standard errors are skewed is a significant issue associated with heteroscedasticity (opposite of homoscedasticity). Since the standard error (S.E.) is so significant when performing regression tests and measuring confidence intervals, two tests are conducted namely : Breusch-Pagan test and White test:

Hierarchal Regression: A hierarchical linear regression is a type of multiple linear regression analysis in which additional variables are applied to the model in separate steps called "blocks." Rather than being a mathematical method, this is mainly a structure for



model comparison. Multiple regression models are built using this method by adding blocks of variables to a previous model at each level. The main target is to understand which block of variables shows significant improvement in R squared.

**OLS regression :** The regression model is used to further understand the relationship between the variables. Regression analysis also helps determine the regression equation which can be used for prediction. The ordinary least squares (OLS) approach to regression allows us to estimate the parameters of a linear model. The main aim of this method is to determine the linear model that will minimize the sum of the squared errors between the observations of a dataset and those predicted by the final model.

Econometric model:

Under our model of analysis we will be having a 2 pronged approach. One will be a nested approach using Hierarchical Regression analysis to understand and evaluate how different set of variables have an effect in variability of the returns in the short term. This will help in deeper analysis of which set of variable carries greater influence and will be more ideal in making the final model. This will also allow us to make a better OLS regression model which will provide much higher R squared value along with best use of the available set of variables. The three blocks will be :

- Signalling Variables
- Firm Characteristics
- Financial Indicators

Post hierarchical regression analysis an OLS regression will be conducted find the best fit model and get insights on relationship of different factors with the short term volatility of the IPO. Based on the study of past literature and market analysis these factors have been selected. These are all key factors which carry some influence on the dependent variable and will give great insights towards investor behaviour and the market reaction to various set of information.

Prior research clearly demonstrates that certain main issue characteristics have an impact on the IPO firm's aftermarket pricing risk. As independent variables, oversubscription variables, post-issue promoter party retention, underpricing (MAAR), P/E of the firm at bid, age of the firm, debt-equity ratio, and offer size are considered. The following econometric model is used to enumerate the determinants of post listing price risk (VOLATILITY).

$$\text{Log (VOLATILITY)} = \text{Alpha} + \beta (\text{MAAR}) + \beta \text{Log (D/E comp)} + \beta \text{Log (P E comp)} + \beta \text{AGE} + \beta (\text{PIPH}) + \beta \text{Log (QIB sub)} + \beta \text{Log (RII sub)} \quad (3.8.1)$$

#### Selection methodology:

Under this study we have 3 clear conditions :

- Using only Mainboard IPO's for analysis : This is an important condition because there is huge gap in terms of norms, valuations, fund size and even ratios of the two types of IPO issue. We focus our study on Mainboard IPO as this allows us to base our study on issues which raise almost all the funds in the market. Further they show higher liquidity – until market exchange does not show liquidity volatility will be very low or the volatility will be very disperse not giving ideal results or effective analysis. Presently SME IPO exchanges are still growing but are no where close to the Mainboard exchanges. Hence by using Mainboard IPO we use better quality of information with ideal market characteristics.
- Using only Book Building issues: In our study we use only Book Building Type of Issues as this has an ideal market assessment provision which not only helps in valuation but also provides certain benefits in terms of eliminating information asymmetry between different investor groups at least to some extent. Further in Indian markets Bookbuilding dominates the proceedings and fixed pricing is mainly only used by SME. Hence, in order to provide higher quality of analysis we have book building process which is much more efficient process of issuing taking into consideration the market practices.
- In our study we have used only Retail and Institutional Investor subscription rates as we wanted to keep our study specialized in order to develop a relationship between these 2 sets of investors specifically. This will help us develop and come out with unique findings.

### 3.9 Limitations of the Study

One of the limitations of the model is that we have only taken Mainboard IPO into consideration. Leaving out SME IPO limits the total scope of analysis. Next certain company's lacked proper information due to which they had to be dropped.

Lastly the study could have accommodated certain dummy variables but owing to smaller time period of study that was not taken up.

## 4 RESULTS AND DISCUSSION

#### Descriptive Statistics:

(Table 4.1: Descriptive Statistics)

Statistic	Volatility	P/E ratio	Debt/equity ratio	Promoter group retention	Age of the firm	Maar	Subscription	QIB	RII
Nbr. of observations	54	54	54	54	54	54	54	54	54
Minimum	1.3	0.0	-5.8	29.2	3.0	-21.5	0.8	1.0	0.0
Maximum	28.4	700.0	7.6	90.0	86.0	128.1	198.0	192.3	70.9
Median	4.8	22.4	0.3	68.9	22.5	4.6	6.4	11.0	2.9
Mean	7.3	60.1	0.9	65.9	26.5	21.6	38.1	38.5	10.9
Standard deviation	7.2	111.6	1.7	16.4	17.7	39.1	54.0	50.1	16.5
Skewness	1.8	3.9	0.6	-0.5	1.5	1.5	1.4	1.5	2.1
Kurtosis	1.9	18.1	6.4	-0.6	2.5	1.1	0.9	1.7	4.1

The table above gives an overview of the statistics of multiple variables and the data associated with the same. It gives a complete summary of the data of 54 firms which took up an IPO between Feb 2018 – Feb 2021. Volatility which is the dependent variable is measured in percentage along with MAAR which has been calculated as per the formula () is represented in percentage too. P/E ratio and Debt/Equity Ratio is being represented in terms of ratio/times. Similarly Subscription including the Retail and Institutional investors subscription is given in terms of number of times. Age of the firm is given in numerical number terms while Post issue promoter retention is given in terms of percentage.

Volatility as defined is shown for a period of 21 days for all the 54 firms under this study. With a maximum of 28.934 and minimum of 1.318 it shows the broad range that the firms show over this period. But with a standard deviation of 7.2 it is very moderate range of variability. With a mean of 7% and median of 4.8% its right to say the volatility in the 21 day period clearly does exist for most of the firms which can be explained by various variables available.

Promoter group retention post IPO on average over the sample is at 65.8%. Clearly showing a sign of how promoters show a great deal of interest in their firms post IPO and how they are serious about their share retention and decision making. This is a key factor while explaining the promoters confidence in the operations. With a standard deviation of 16% its right to say that maximum firms show retention in this range showing an important sign of confidence. Maximum of 89% and minimum of 29 largely exists due to the different types of companies taking up IPO – be it PSU or even VC handled firms each show a very different structure.

With a mean age of the firm being 26.5 and median of 22.5 it shows how larger number of companies issue their IPO's below the mean age of 26.5 but these statistics gives a clearer range where most companies like to issue IPO's. With a moderate standard deviation it is fine to accept this as an ideal range over this sample.

2 key firm specific financial characteristics which has been collected – firstly Debt/Equity ratio – this includes the latest Pre IPO debt by equity ratio for all the firms. This acts as a proxy for financial risk and gives a good overview of the leverage aspect to the investors. With a mean of 0.873 it shows how greater number of firms carried a lower D/E ratio while going into an IPO. With a small standard deviation of 1.73 it give more clarity and confidence that firms prefer to keep lower leverage ratio before going into an IPO.

Second key ratio is Price by Earnings – which shows the pre-IPO latest ratio to give an idea on the earnings potential that the company carries. As the data shows a high variance between the minimum and maximum value along with a very high standard deviation of about 110 it shows how highly skewed the data is. This is further confirmed by high values of skewness and kurtosis. Such high variances exist largely because EPS is taken as the latest one as per their prospectus – where in some companies could have had announced very different values owing to their internal policies. To ensure normality is there in data – logarithm of P/E ratio will be used in regression.

Next key statistics from the sample is on Subscription rate – this includes 3 key things which have been analysed these includes : Total subscription rate which covers the subscription rate as number of time. The minimum and maximum value differ largely this is expected as it's a number which depends on investor behaviour. Out of the 54 firms over 50 were oversubscribed ( Greater than 1 ) showing great interest from investors towards IPO. Mean is clearly very high when compared to median showing greater positive skewness and hence larger share of higher over subscription. Almost the same observation is made in Subscription of QIB and RII. The standard deviation is greatest for overall subscription when compared with QIB and RII. But to ensure normality exists during the statistical test logarithmic values will be taken for their respective tests.

Market Adjusted Actual returns (MAAR) – this shows the returns due to underpricing on the first day. Conveying that if you buy IPO allocation at issue price and sell at closing price of Day 1 these will convey the market adjusted returns. This sample shows a high mean of over 21.5% which conveys a considerable underpricing existing in the IPO pricing. While median is at 4.598 showing much smaller value compared to mean – clearly showing us how a considerable number of overpriced issues also exist. Out of 54 IPO's in the sample 34 had underpricing giving positive returns on listing day while 20 carried an overpricing effect giving negative returns. The range existing between minimum and maximum along with a high standard deviation, clearly showing the distinction in performance of IPO's and the underpricing they carry.

### **Hierarchical Regression Analysis:**

(Table 4.2: Hierarchical Regression results)

#### **Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change
1	.703 <sup>a</sup>	.494	.474	.25585	.494	24.846
2	.713 <sup>b</sup>	.508	.468	.25728	.014	.719
3	.734 <sup>c</sup>	.539	.481	.25414	.032	1.608

(Table 6 : Hierarchical Regression results)

#### **Model Summary**

Model	Change Statistics df1	df2	Sig. F Change
1	2	51	.000
2	2	49	.492
3	2	47	.211

(Table 7 : Hierarchical Regression results)

a. Predictors: (Constant), Subscription, Promoter\_Retention

- b. Predictors: (Constant), Subscription, Promoter\_Retention, Offer\_size, Firm\_Age  
 c. Predictors: (Constant), Subscription, Promoter\_Retention, Offer\_size, Firm\_Age, DE, PE

Hierarchical Regression was performed using 3 blocks of variables. Its clear from the tables (4.2) above that block 1 which is the signalling variables is the most significant out of the blocks entered. This block includes promoter retention and Subscription rate as the variables. This is confirmed by analysing the change statistics values derived.

Firstly the maximum R squared value comes from the first block upon comparing the three blocks ( R square change in table (4.2) ). Next we need to analyse whether the F statistic value contributed by each block is significant or not for the model. Here its further verified that only block 1 is having significant influence on the model as  $\alpha < 0.05$ . While for Block 2 and 3  $\alpha > 0.05$  leading to a conclusion of No significance.

#### **Multi Collinearity test:**

(Table 4.3: Multi Collinearity test results)

	<b>Tolerance</b>	<b>VIF</b>
<b>LOG P/E</b>	0.706	1.417
<b>LOG FR_Total Debt/Equity(x)</b>	0.858	1.165
<b>PROMOTER GROUP RETENTION</b>	0.914	1.094
<b>AGE OF THE FIRM</b>	0.822	1.217
<b>MAAR</b>	0.401	2.493
<b>LOG QIB</b>	0.290	3.453
<b>LOG RII</b>	0.384	2.606

Multi Collinearity test is conducted to ensure that the independent variables in the model do not show multicollinearity. This can be analysed through VIF and Tolerance values. As we can see from above table (4.3) that VIF for all the variables is less than 4 which signifies that multicollinearity is not an issue in our model.

Similarly tolerance values shall be above the threshold of 0.2 which is again observed in all our variables. This provides us with the conclusion that the model is fit and free from any form of multicollinearity.

#### **OLS REGRESSION TEST:**

The Table (4.4) ,(4.5) & (4.6) provides results of OLS regression of the variables. Table (4.4) mentions statistics which helps in analysing the fitness statistics of the model. While Table (4.6) helps in analysing the relationship of each independent variable with the dependent variable ( After Market Volatility)

Table (4.6) reports coefficient estimates and t-values for OLS regressions for Aftermarket Volatility of the IPO firm. Aftermarket Volatility has been estimated by finding the standard deviation of excess returns (after the adjustment with benchmark return) of IPO stocks for initial 21 trading days. Explanatory variables include MAAR, Age of the firm, SUB (RII), SUB(QIB), P/E comp, D/E Comp, and Promoter Group retention. The Sample data comprises of 54 IPO firms which went on public between the period of Feb 2018 to Feb 2021. The Statistical significance for the independent variables is adjudged using a two-tailed test at the 1 per cent, 5 per cent and 10 per cent levels.



**Fitness Statistics:**

(Table 4.4: OLS Regression Fitness Statistics)

<b>Observations</b>	<b>54</b>
<b>Sum of weights</b>	54
<b>DF</b>	46
<b>R<sup>2</sup></b>	0.816
<b>Adjusted R<sup>2</sup></b>	0.788
<b>MSE</b>	0.026
<b>RMSE</b>	0.162
<b>MAPE</b>	27.797
<b>DW</b>	1.778
<b>Cp</b>	8.000
<b>AIC</b>	-188.904
<b>SBC</b>	-172.992
<b>PC</b>	0.248

**ANOVA Analysis:**

(Table 4.5: OLS regression ANOVA result)

<b>Source</b>	<b>DF</b>	<b>Sum of squares</b>	<b>Mean squares</b>	<b>F</b>	<b>Pr &gt; F</b>
<b>Model</b>	7	5.377	0.768	29.089	<b>&lt;0.0001</b>
<b>Error</b>	46	1.215	0.026		
<b>Corrected Total</b>	53	6.592			

Firstly we interpret the result of fitness statistic of our model as a whole post which table (4.4) covers the variable wise analysis: Based on the results tabulated we can analyse that our model is successful at explaining 81.6% of variation in the dependent variable (Aftermarket Volatility). This clearly shows how our model is much more significant and carries high explanatory power with respect to predicting the aftermarket volatility using the aforementioned variables. Even the adjusted R squared value gives a result of 78.8% which is again a very good result for a regression model.

The f-statistics value derived from the ANOVA test shows that our model is significant at 1% level. Which shows that our model carries high explanatory power and has a significant relationship in explaining the variation in the dependent variable.

Durbin Watson Statistics is 1.778 which lies in the ideal range if 1.5 – 2.5 showing relative normality in the data. This further implies that regression results are reliable from the interpretation aspect of the matrix.

AIC ( Akaike's Information Criteria ) – This is a key statistic criteria to evaluate the error and ensure that the model selected carries and provides the ideal results with effective use of variables. Lower the AIC value better the model is - As our AIC value is -188.9 we can further conclude that our model is best fit in terms of variables as well.

Lastly, Mean Square Error (MSE) should be as close as to zero to indicate , RMSE, on the other hand, is a criterion for evaluating how well a model predicts an answer and is considered a critical criterion for determining how well a model matches the goal. Our model's RMSE value is 0.162, which is very similar to zero and a great value to have.

**OLS Regression Independent Variable Analysis:**

(Table 4.6: OLS regression Variable Analysis)

<b>Source</b>	<b>Value</b>	<b>Standard error</b>	<b>t</b>	<b>Pr &gt;  t </b>	<b>Lower bound (95%)</b>	<b>Upper bound (95%)</b>
<b>Intercept</b>	0.689	0.104	6.639	<b>&lt;0.0001</b>	0.480	0.898
<b>LOG P/E</b>	-0.004	0.028	-0.15	0.877	-0.061	0.052
<b>LOG FR Total Debt/Equity(x)</b>	-0.009	0.014	-0.68	0.497	-0.037	0.018
<b>PROMOTER GROUP RETENTION</b>	-0.171	0.141	-1.21	0.230	-0.454	0.112
<b>AGE OF THE FIRM</b>	0.001	0.001	0.738	0.464	-0.002	0.004
<b>MAAR</b>	0.766	0.089	8.584	<b>&lt;0.0001</b>	0.586	0.945
<b>LOG QIB</b>	-0.096	0.057	-1.69	<b>0.097</b>	-0.211	0.018
<b>LOG RII</b>	0.118	0.046	2.584	<b>0.013</b>	0.026	0.211

Interpretation and analysis will be done based on Hypothesis constructed for each variable:

#### **Market Adjusted Abnormal Returns (MAAR) and Aftermarket Volatility :**

H0: There is no significant relationship between MAAR and Short-term after-market volatility

H1: There is a significant relationship between MAAR and Short-term after-market volatility

Based on our analysis its clear that they have a significant relationship at 1% confidence level. This basically means that this variables has massive influence on the volatility of the stock. Further it carries a positive co-efficient implying that both move in the same direction, i.e, when MAAR is high the volatility is high and vice versa. Looking at the results its clear that this is a key variable in terms of explanatory power and is an important variable of the model.

Hence as Alpha Value  $< 0.01$  it has signifinace at 1% level. Therefore, Ho can be rejected and H1 can be accepted.

#### **Qualified Institutional Investors (RII) Subscription Rate and Aftermarket Volatility :**

H0: There is no significant relationship between qualified institutional buyers (QIBs) Subscription rate and Short-term after-market volatility

H1: There is a significant relationship between qualified institutional buyers (QIBs) Subscription rate and Short-term after-market volatility

Based on the analysis this variable has an Alpha value of less that 10% showing significance at 10% level towards the dependent variable. This implies that this variable has some extent of explanatory power in the model. Not as strong as MAAR but still carries a significant relationship. This interpretation means that this variable is key contributor to the model. Further the coefficient has a negative sign which shows that when Subscription rate is high for this group of investors the aftermarket volatility remains low and vice versa.

Hence as Alpha value  $< 0.10$  we can say that the model is significant at 10% level and therefore, Ho can be rejected and H1 can be accepted.

#### **Age of the Firm and Aftermarket Volatility :**

H0: There is no significant relationship between Firm Age and Short-term after-market volatility

H1: There is a significant relationship between Firm Age and Short-term after-market volatility

Based on the results from the test we can interpret that this variable does not show significant relationship as alpha value is clearly bigger than 0.01, 0.05, 0.10. This means that this variable does carry major explanatory power for our study ( for this specific model and this specific time period pf study). But we can interpret the sign of the co-efficient which is positive as per our analysis. Which implies that higher the age higher is the after market volatility.

Hence its right to conclude that this variable does not have a significant relationship with the dependent variable in our model as Alpha  $> 0.05$ . Therefore, Ho cannot be rejected.

#### **Promoter group retention and Aftermarket Volatility :**

H0: There is no significant relationship between Promoter ownership retention and Short-term after-market volatility

H1: There is a significant relationship between Promoter ownership retention and Short-term after-market volatility

Based on our analysis it can be concluded that Promoter group retention as an independent variable does not show significant relationship with aftermarket volatility.

#### **P/E ratio and Aftermarket Volatility :**

H0: There is no significant relationship between P/E Ratio and Short-term after-market volatility

H1: There is a significant relationship between P/E Ratio and Short-term after-market volatility

Based on our analysis we can conclude that this variable does not have a significant relationship with dependent variable under our model. The alpha value is well above 0.05/0.10 and hence no significant relationship can be confirmed. But we can still analyze the sign of the coefficient which is negative. Implying lower P/E ratio shows higher after market volatility and vice versa.

Hence, we can say that P/E ratio does not have a significant relationship with After market volatility in our model. Therefore, Ho cannot be rejected.

#### **D/E Ratio and Aftermarket Volatility :**

H0: There is no significant relationship between D/E ratio and Short-term after-market volatility

H1: There is a significant relationship between D/E ratio and Short-term after-market volatility

Based on the results this variable does not show a significant relationship with the aftermarket volatility. Implying that it does not significantly influence the dependent variable and has low explanatory power in the model. The coefficient shows a negative sign directing that the variables move in opposite direction in the model.

Hence as alpha  $> 0.05/0.10$  we can conclude that they don't share a significant relationship. Therefore we cannot reject Ho.

#### **Retail Investor (RII) Subscription Rate and Aftermarket Volatility :**

H0: There is no significant relationship between retail individual investors (RIIs) Subscription rate and Short-term after-market volatility

H1: There is a significant relationship between retail individual investors (RIIs) Subscription rate and Short-term after-market volatility

Based on the results from the test we can interpret that it shares a significant relationship with the dependent variable at 5% confidence level. This implies that the respective variable carries high explanatory power in this model. The coefficient carries a positive sign which means that both move in the same direction in the market. Implying that higher the retail subscription higher will be the aftermarket volatility for the IPO and vice versa. This variable can be seen as an important part for the model which can be very useful in explaining the aftermarket performance.

Hence we can conclude that as Alpha  $< 0.05$  this variable shows a significant relationship with the dependent variable. Therefore we can reject that Ho and accept H1.

## 5 SUMMARY OF FINDINGS

Based on the OLS regression model developed our analysis provided us with key insights for our period of analysis. Out of the 7 independent factors 3 showed significant relationship with the dependent variable. But beyond that all 7 variables helped us find out various insights and finding attached with their coefficient sign that allowed to develop a relationship and come out with intricate observations which will be helpful to all sets of investors.

### Market Adjusted Abnormal Returns (MAAR) and Aftermarket Volatility :

Market Adjusted Abnormal Returns (MAAR) which is used often to represent the rate of under-pricing shows high level of significance and also carries a positive coefficient with the dependent variable. This means that higher under-pricing leads to greater market volatility as they both move in the same direction as per our study. This provides us with key insights – firstly investors are always looking to take the advantage of under-pricing, this leads to greater oversubscription as larger number of people tend to apply for the same. Ultimately a huge number does not get allocated and this leads to a huge demand which lines up on the listing day on stock exchanges. This plays a massive role in contributing to higher aftermarket volatility.

Next it clearly shows how highly under priced issues provide higher profits to investors. Higher the under-pricing higher the investor interest which finally leads to greater uncertainty in pricing and leading to larger volatility.

Another key observation is that Under-pricing leads to greater market uncertainty. Heavily under priced IPOs always tend to generate more investor interest and leads to greater aftermarket trading. This increased aftermarket trading results in increased volatility in the prices.

### Qualified Institutional Investors (RII) Subscription Rate and Aftermarket Volatility :

This carries a negative coefficient and also manages significance at 10 % confidence level. A negative sign implies that wider the participation from this group of investor leads to lower market volatility/greater market stability. This is a key finding as it means more qualified and knowledgeable set of investors ideally invest towards quality issues. This again attributes to the fact that this set of investors have massive resources through which knowledge, forecasts and various insights can be made. This provides them better insight towards what a good and a bad investment would be. Quality investments are often highlighted with stability. This set of investors know their investment strategy and tend to stick to it and even their time duration.

Further they use superior pricing mechanisms along with access to superior information allows to make best use of any scenario of under-pricing and ultimately remove the under-pricing effect quickly from the market. This again helps in providing short term stability. This is also aided by the fact that they have 50% allocation in the issue.

Thirdly, its often been observed that institutional investors tend to buy for long term – especially a section them. A higher subscription rate shows better quality for long term growth and appreciation. This leads to lower volume of trades in the short term. Which again signifies into lower volatility in the prices of the stock post issue.

### Retail Investor (RII) Subscription Rate and Aftermarket Volatility :

Under our analysis the co-efficient carries a positive sign which is as per our expectations. This implies that higher the demand of subscription in this category higher will be the aftermarket volatility. This finding provides various key market observations such as, Firstly retail investors are high in number and have an allocation percentage of 15% only out of the total issue. When the subscription percentage is high it leads to 2 things – Primarily a number of investors go unallocated and this leads to massive unmet demand that builds up on the listing date. This huge unmet demand leads to high numbers of bids post listing which ultimately results in greater fluctuation and higher volatility in the end. It's a pattern that high number of retail investors are uninformed and lack knowledge about the issue. They too may start to gain interest on such issue looking at the signal they receive from the other retail investors. This only goes on to increase the demand in the market.

Secondly, it shows how retail investors don't miss a chance at under priced securities. When they deem an issue to be feasible and profitable based on their information level they tend to hoard in the money to increase the demand and the volatility.

Third, it shows how retail investors are starting to play a greater role in the markets. Earlier this influence would be much lower but with time there has been calls for retail investors should be provided greater percentages of allocation.

Fourth most retail investors are weak in predicting and analysing the IPO performance and its forecast – they tend to rely on other investor group ( largely QIB ) which has been proven in earlier studies as well. Based on their (QIB) investing pattern during the book building process, retail investors tend to pick signs from this. This is also based out of information asymmetry which has been researched deeply in the past – talking about how retail investors don't have the resources to gain such information while institutional investors do. This is what makes book building process more ideal as it allows other investor groups to pick information during the 3 issue days and invest accordingly. This process allows some information flow to take place and ensure there is some level playing ground for all groups.

### Age of the Firm and Aftermarket Volatility :

The relationship between the 2 variables is not significant and the coefficient carries a positive sign. The positive sign implies that there exists greater demand for firms which have higher age – ultimately a firm with more experience in the industry is often considered to be a ideal investment. Hence higher the age higher will be the volatility and more and more investors will be trying to get hand on the limited stocks in the market. This relationship is largely expected to exist over the short term as such companies tend to provide returns over a longer period and people tend to hold them for longer in their portfolios. But in the short term traders may sell it to make short term gains which are cheaply available in the market post the issue.

Other key variables in the study like D/E ratio fail to show significant relationship but provide certain insights like a negative relationship which may imply that higher the D/E ratio lower is the after market volatility as investors are not looking to invest in such risky undertaking – as higher the leverage more risky the stock. With lower interest lower trading would be involved which would curtail the price movement and even interest of traders to such stocks. While P/E ratio again carries a negative insignificant relationship which provides unique contrasting insight that lower P/E leads to higher volatility – this could be owing to the fact that in markets lower P/E is often seen as underpriced this leads to investors trying to pick the quality stock up for a undervalued price. This can lead to higher activity for lower P/E stocks and ultimately leading to higher volatility.

Hierarchical regression provides unique block based outlook. Firstly out of the 3 identified blocks of variables only the first provides significant contribution/influence on the dependent variable. Other Blocks of variables do make the model better but they don't carry a significant weight and influence in comparison to the first one. This provides us with a massive insight that during this period



subscription rate played a massive role in predicting/affecting the after market volatility. This clearly signifies that higher the investor demand higher will be the volatility in after market returns. Subscription is a process that takes place Pre-listing and hence is a very strong signalling variable. As the number of shares to be allocated is limited looking at high subscription numbers – various investors who went unallocated and investors who seek interest in the stock post review of subscription ratio will also put in their bids in the secondary stock exchanges. This higher demand leads to more fluctuation in the prices and ultimately leads to higher fluctuation. Next high subscription rate signals to the market that the issue is most likely of good quality with good ratios, fundamentals and positive future prospects. This leads to a wave of demand in the market and creates higher volatility based on high amounts of optimism.

Next under firm specific variables comes the offer size – this did not have a significant relationship but carried a negative co-efficient which showed that higher the offer size lower is the volatility implying bigger this offer greater is the liquidity in the market which ensures more investors can be accommodated and the demand can be settled. This will lead to reduced volatility as greater demand can be allocated..

## 6 RECOMMENDATIONS

After thorough analysis of multiple statistical tests the author can provide key recommendations which provide improved clarity and add on new inputs for this for the following period.

Firstly out of the key firm oriented block variables – Signalling variables showed significant relationship with the aftermarket volatility. Signalling variables include Subscription rate and promoter retention rate – this implies that market participants look at these two variables with significant importance. They consider this as signal to whether this is an ideal/quality investment or not. For example when we look at subscription rate – not all investors would ideally be interested in a certain issue, but looking at high rates of subscription an uninformed investor could get excited and be ready to invest on a premium price on the listing day. This creates additional demand and ultimately higher volatility. Hence, we clearly recommend subscription rate as a key variable in predicting and forecasting post listing volatility and trade patterns.

Second, its clear from the OLS regression that under-pricing (MAAR) shows significant relationship with aftermarket volatility. This observation provides a key recommendation that even though Book building is considered to be a process which tries to limit underpricing, but clearly based on analysis its not been too successful at it. Hence, it becomes key to develop better auction based flexible models which can accommodate underpricing better and reduce volatility.

Thirdly, based on the relationship observed between QIB subscription rate and aftermarket volatility – the author would recommend any investor who is looking to invest in any newly listed stock who values stability in prices ( Lower volatility ) shall opt for issues which had higher subscription rate for QIB category. It was very evident from the relationship that highly subscribed QIB rate for any issue showed lower volatility and vice versa.

Fourth recommendation would be in line with the outcome can be used by the market participants in general and retail investors in particular to understand the potential fluctuations in the prices is most often due to their category based demand – this is not always ideal as they may end up investing in bad issues following the noise. Hence it becomes key for them to utilise resources more efficiently and may more importance to information so that they can reject bad investment choices.

Fifth, this research is crucial for investment banks and other market makers who will have great model insights to set benchmark on what level of after market risk they are willing to take up with an issue.

As a conclusive recommendation the author would suggest that all the market participants be it any category of investors, the issuing firm or the underwriters they should give greater importance to 2 key factors : Subscription rate and Underpricing to set their post listing risk consideration. Because if they successfully analyze those 2 factors in consensus with other information available they can limit their exposure and set clear objectives for their investments. While going a little deeper – QIB subscription rate has a negative relationship while RII has a positive relationship.

## 7 CONCLUSION

It can be concluded that After market Volatility is best explained by 2 key variables which are : Subscription rate and MAAR. These 2 variables carry the highest explanatory power in the model which will prove very insightful to all market participants while predicting the post listing price fluctuations.

This study will definitely help the market participants on both sides be it for investors to assess risk more smartly and make their investments strategies based on that. While this research would prove to be helpful for the investment banks to comprehend that they are going to sponsor an IPO that have what kind of aftermarket price risk.

Along with key recommendation given based on the model along with the findings for this period, the author feels it provides the market participants with insights directing them to build their investment strategies while keeping these factors in mind – which will be fruitful in limiting their aftermarket exposure.

Other than these other key variables like Age of the firm, P/E ratio, D/E ratio, promoter group retention even though important failed to show significant relationship with the dependent variable. But their Co-efficient helped in delivering a model that predicts the after market volatility at a high R square of 80%..

Therefore, the author believes he has added good quality of literature of helpful literature to the vast bank of IPO studies. He supports and promotes the use of Subscription rate ( even category wise) and Initial returns are key variables to suggest, analyze and forecast after market volatility in Indian Capital markets.

The author hopes that he has done justice to the analysis and recommendations and the author also acknowledges that everything in this paper is true to the best of his knowledge and ability.

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