ANALYZING INITIAL PUBLIC OFFERING PRICING USING META ANALYSES AND FOREST PLOTS IN NEYELOFF ET AL. 2012 FRAMEWORK: AN INVESTIGATION

Mani Jindal*

Abstract

From last decades, an initial public offering market had faced very ups and downs while investing in IPOs. The initial public offering is the first sale of the offerings to the public through stock exchanges. This research paper seeks to explain the implications of pricing an initial public offering and this study is to generalize research findings emanating from the research on the IPO pricing conducted during 2000 to 2012. This study focuses on the initial public offer pricing as to the overpricing and underpricing. To achieve the objective of this study, the previous 20 research studies data are taken as a sample and meta analysis and forests plots using as a statistical tool for analyzing the data. This paper shows that the IPOs are not fairly priced. It finds that the studies data are of fluctuating behavior. These heterogeneous studies show the increasing variability in the initial public offering market. This variability does not only come from the cause of sampling error but can also be in the form of the other factors.

Keywords: Initial public offering, stock markets, underpricing, overpricing, determinants of pricing, fixed price offer, book building, meta analyses.

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* Research Scholar, University School of Management, Kurukshetra University, Kurukshetra - 136 119 (Haryana)

Introduction

This research paper surveys the market of an initial public offering pricing. The initial public offering helps to raise capital in the companies by the way of primary market. The initial public offering refers to the sale of stock by a company to the general public for the first time that is called as an IPO. The IPO are often offering a new, young and the companies which have been working from last many years but all the companies wants to go publicly. There are commonly two types of companies like private and public companies. The private companies are wholly owned by a group or individual, who makes the decisions of the company without the approval of the outside agencies but the public companies are issued stock from at least one recognized stock exchange that is available to the general public. The public companies must disclose their decisions to the investors by the help of meetings. In the primary market, the companies want to raise capital through the initial public offering, right issue and the private placement. The companies who have no liquid market then these companies start out to raise capital with the small number of investors. Once the company's stock is traded publicly, this solved the liquidity issue and also compensates the investors. All of the private companies' needs large capital for expands their business and to go public. The IPOs are sometimes risky investment but sometimes it may be the reason of significant profits. It is very tough to predict about the behavior of the shares on its initial day of trading and in the near future because the companies often have a historical data to analyze the company. The Initial Public Offerings in India have been largely done by the two stock exchanges, for instance National stock exchange and Bombay stock exchange are regulated by the securities and exchange board of India.

In an IPO, the issuer company obtains the assistance of underwriting firms, which helps it to determine the type of security to issue, at the best offering price and at the best time to bring it into the market. These lead underwriting firms also help the issuers of the companies to go public. The selling of securities to the general public and for getting the clearance to go public in the countries requires the approval from the local government. Here are some of the approval agencies as China Securities Regulatory Commission, Securities and Exchange Commission, American Stock Exchange, New York Stock Exchange, Securities and Exchange Board of India respectively. After the approval of authorities', a legal notice and a prospectus are published which specify the number of offered shares, the price range and the date of the listing. The

prospectus mentions the use of the new funds clearly, detailed information about the firms, its controlling shareholders and the subsidiaries provided. An intermediate acts as a sponsor and declares that the issuing firm complies with the listing requirements. When the company is listed into the stock exchange, it is easy for the company to issue more shares and also have the strength to quickly raise large amount of capital from a marketplace and seeks to go public. The companies can go public, when the business is capable to raise capital at low cost, having money for future growth of the company, offers more liquidity to the existing shareholders at the time of selling shares on the stock market so that shareholders have the opportunity to turn their investment into cash and expand their investments into various options. Going public can attract the new customers as well as the new employees and also enhances the exposure and prestige of the company.

The IPO is the major source of capital for the firms. It has atleast three different mechanisms available for the issuing of the initial public offer through fixed price offer, auctions and bookbuilding. In the fixed price offer, the offer and allocation price can be fixed by an issuer in consultation with the merchant banker. The price at which securities are offered is known in advance by the investors. The issuer of the company is decided the price of security and that price is to be disclosed in advance into the offer document in detail. This fix price issue is offered at one price and such kind of issue is known as the fixed price issue. One next way to resolve the IPO pricing problem is to hold an auction method at the time of an initial public offering. The auctions eliminate the IPO underpricing and overpricing issues, as investors set the market value and decide how much to pay. The investors are invited to submit the bids indicating both the numbers of shares and the price that can be willingly paid. The market clearing price will be determined through the bids then the shares will be issued to all the successful bidders at a uniform price.

A company appoints a lead manager for planning an IPO, known as a book runner and to help it arrive at an appropriate price at which shares will be issued. It is a process by which a demand of securities to be issued by the body corporate is elicited and built up, and the price for the securities is assessed on the basis of the bids obtained for the securities, offered for subscriptions by the issuer. In book building, the companies do not come out with the fixed price of shares instead it indicates the price band and mentions the highest and lowest prices at which

the shares can be sold. The bids are then invited for the shares. It entertains the soliciting investors to submit the number of shares they would like to buy and at a price that has to be in a specified price band. Once the books are closed, the issue price will be set by the bookrunner. The actual price is then decided based on the bids. The issue price is determined after the closure of the bid process based on the demand generation process. This method provides an opportunity to the market to discover the price for the securities. The price band means the range of the prices under which the investors are interested to submit their bids. In the US IPOs only book building concept is used for determining the stock prices. The main difference between book building and auctions is, the merchant banker is completely alien in the allocation of shares whereas in auction they are well acquainted with the prices and allocation. Many studies have been focused on two anomalies in the pricing of IPO's stock (1) Overpricing phenomenon (2) Under pricing phenomenon.

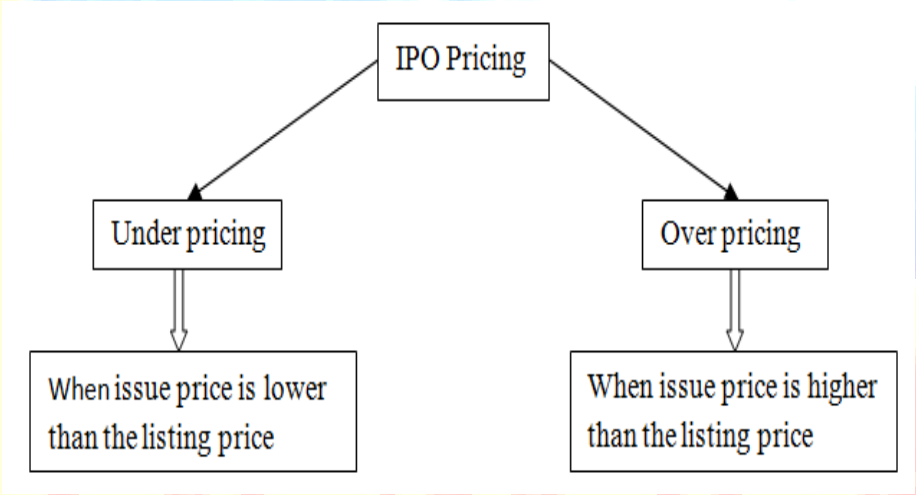

Figure 1: Implication of the IPO pricing.

Overpricing means when the opening price exceeds the closing price, the IPO is said to be overpriced. When the offer price is higher than the listing price and the issue price is overestimated, the phenomenon is known as overpricing. The issuer usually allows the underwriters as an option to increase the size of the offerings known as the green shoe option or the overallotment option. The overallotment option gives the right of registered securities for selling additional shares at the offering prices by the underwriters. The SEBI has introduced the green shoe option on August 14, 2003 to protect the investors and also assure the investors that

the merchant bankers and the issuer company would be taken care of the interests of the investors. The under pricing refers to the positive initial returns over the offer to the listing dates of the new issues. It is defined as the difference between the closing price on the listing date and the offer price of the issue. When offer price is lower than the listing price and the issue price is observed as underestimated, this phenomenon is called as underpriced. The under pricing is the difference between the issue price of a new share and the listing price on the secondary market. At the underpricing level, the shares are less liquid and less predictable and the more underpriced the IPOs in order to compensate investors for the risk they are taking. The IPOs issuer tends to know more about the value of the shares than the investor therefore, the company's stock is to be underpriced to encourage investors to participate in the initial public offering. In the concept of winner's curse, informed investors will compete with the uninformed investors. The informed investors will withdraw from the market and the uninformed investors will receive a larger allocation, when the IPO market is overpriced. Simultaneously, if the IPO market is underpriced, the uninformed investors will receive a smaller allocation because the informed investors come to join the market. When the issue is underpriced, more the investors are likely to buy the shares, thus the IPO demand will be higher when there is more underpricing and more the companies going public. The higher the underpricing, greater the amount of money made by the investors who got allocations in the IPO and this phenomenon is referred as leaves money left on the table by the firms. It is the cost of the company and at the same time a gain for the investors in the form of positive initial returns on the underpriced shares. High initial return tends to be followed by raising the IPO volume. The periods of high average initial returns and raising IPO volume are known as a hot issue markets. Higher the initial returns of stock, more the shares are demanded in the overpriced than in the underpriced markets. This research paper wants to evaluate either the IPO market is overpriced or underpriced with the help of meta analysis.

Review of Literature

In the studies, many determinants were taken into consideration while evaluating the IPO price performance that how it was overpriced and underpriced. The IPO price performance analyses were conducted to know the influence of the factors like age of the IPO firm, demand for capital, offer size, board prestige, post issue promoter holding, ex-ante uncertainty and volatility of the firm. Cassia et al. (2004), Ellul and Pagano (2006), Sharma and Seraphim

(2010), Kipngetich et al. (2011) documented about the age of the firm which signaled the level of the maturity of the company. Older firms were longer operating and financial history which supported high fund requirements, lower the level of uncertainty and lower the underpricing. But the younger firms faced more uncertainty.

Michelle (2003) and Larry (2004) explained that the issuer helped to issue capital when the investors were bullish about the growth potential of the companies which were going public and found large IPO demand. Cassia et al. (2004), Ghosh (2005), Ellul and Pagano (2006), Sharma and Seraphim (2010), Kipngetich et al. (2011) specified that the firm size was a significant impact on the IPO pricing. Larger firms were easier to value because of ease of forecasting the cash flows. The larger sized offerings were tended to be less risky and less underpriced markets. The underpricing was more pronounced for smaller offer sized firms than the bigger sized firms. Sharma and Seraphim (2010), Kipngetich et al. (2011) investigated that the prestigious board was a signal of effective control and enhanced the value of firm going public and hence offered high price. The large sized issuers demanded a large sized syndicate. The IPOs for younger firms were managed by the least prestigious investment banks. The IPOs preferred to select more prestigious investment banks to manage issue.

Sharma and Seraphim (2010), Kipngetich et al. (2011) observed that the post issue promoters played an important role in an evaluation process of the IPO. The higher retention level means that fewer shares were available for trading and hence the IPO price was high. Cassia et al. (2004), Pastor and Veronesi (2005), Ellul and Pagano (2006), Lin and Hsu (2008), Lowry et al. (2010) documented that the IPO volume responded to the market conditions and their worsening, diminishing IPO prices and the IPO volume declines because the private firms waited for more favorable market conditions before going public. A high trading volume stands for better liquidity, reflected in larger underpricing. The larger IPO proceeds enjoyed much higher trading volume. The firms who had higher uncertainty should have a higher volatility of initial returns and making it harder for the underwriters and the investors to accurately value the IPOs. The IPO underpricing was lower for the issues of older and larger companies, which were generally, show less risk.

Welch and Ritter (2002), Cassia et al. (2004), Lin and Hsu (2008) indicated the existence of higher degree of underpricing. On average many studies declared that the IPOs were

underpriced. Lowry et al. (2010), Pastor and Vernonest (2005), Kumar (2008), Lee et al. (1990) documented the overpriced market and the optimistic sentiment of investors. Larry (2004) concluded that the issuers helped to issue the IPOs when the investors were optimistic about the growth potential of companies going public, resulted in the large initial public offering demand. Thus firms going public in high volume periods were more likely to be overvalued. Leite (2004) documented that the lower the level of ex-ante uncertainty, the more the market was overpriced. The IPO market was overpriced in equilibrium relative to an equally weighted average of aftermarket prices, but it was never being overpriced, relative to float weighted benchmark used. The number of securities that floated in the offerings was higher in hot offerings than in cold offerings. Chatzinas et al. (2009) found that the firms going public in high volume periods were more likely to overvalue than the other IPOs. Lin et al. (2010) found that if the IPO was overpriced, the informed investors were withdrawn from the market and the uninformed investors became more likely to receive larger allocation.

Cassia et al. (2004) analyzed that the IPOs were intentionally highly underpriced with the use of fixed priced IPOs than bookbuilding IPOs. Ghosh (2005) demonstrated that underpricing was less during high volume boom periods than the slump period. It showed less underpricing for the issues that collected large amount of funds from public compared to the smaller issues. Ljungqvist et al. (2006) showed that the cold IPO market was neither underpriced nor long run underperformance. Ellul and Pagano (2006) documented that the IPO underpricing was higher for the shares, the lower expected liquidity and the higher liquidity risk. The IPO underpricing was lower for issues of the older and the larger companies, which generally had less risk. Adams et al. (2008) showed that when the IPOs were significantly underpriced the issuing companies lost money, called money left on table. It was determined as a number of shares offering multiplied by difference between the first day opening price and the offer price. Lin and Hsu (2008) analyzed that the IPO market was consistently underpriced. The investment firms were more underpriced but the trading and service firms were overpriced in the IPO market. The liquidity appeared positively related to the initial underpricing of the IPO firms. New issues were less underpriced due to lower level of uncertainty on the firms. Chatzinas et al. (2009) documented that when the IPO market was underpriced, the firms performed negatively. When

the firms were hesitant to enter into the market, it was indicated as a reason for an inconsistent performance.

Objective and Research Methodology

This research paper focuses on the study of initial public offer pricing as to the overpricing and the underpricing. Keeping this into consideration, it was hypothesized as:

H_0: IPO is fairly priced as it is neither overpriced nor underpriced.

This hypothesis depends on the calculated value of the chi square with respect to the significance level. The data has been collected based on the share prices of the IPOs quoted in the different approved stock exchanges. Lee and Seokhoon (2011) there is an average of 30% total studies on the overpriced IPO and 70% average of the total studies on the underpriced IPOs in which five studies are of the overpriced and fifteen studies are of the underpriced out of the total 20 studies have been collected through google browser which are qualitative and suitable for the meta analyses from the period 2000 to 2012 in this paper. In the studies, the underpricing and the overpricing are measured by taking the difference between the closing price at the specific date and with the offering price. This research paper is collected the 20 independent research studies for the further analyses. This study is based on the previously research data and the sample which is already taken by the previous studies, chosen some listed companies out of the total listed IPO companies were taken as a sample quoted by the different countries researches in their stock exchanges. This sample data are tested with the help of Neyeloff meta analyses and forests plots as a tool. The meta analyses are a set of the statistical methods for combining the results of independent studies.

Calculation of Q (chi square)

The symbol Q is developed as a chi-square statistic in which k denoted as the total number of studies and degree of freedom represented when k measured with minus 1. In this research paper, the null hypothesis is that the studies are fairly priced as it is neither overpriced nor underpriced. To verify the hypothesis, it needs to calculate the chi square and compare chi square against the chi square table values. If the calculated value of the chi square is less than the table's value then the study accepts the null hypothesis otherwise rejects the same.

Values through using fixed effect model

The formula of Q $= \sum(w * es^2) - \frac{[\sum(w*es)]^2}{\sum w}$

Q= 13809.6 and rejects the null hypothesis.

1		Theoretical study: Meta analysis of 20 cross sectional studies.												
2	Author Name and Year	Events	Sample size	Mean (es)	Standard Error	Variance	Weights	w*es	$w*(es^2)$	w^2		W_v	W_v*es	$W_v*(es^2)$	W_v^2
3	Aggarwal and Conroy, 2000	169	188	0.898936	0.069148936	0.0047816	209.136095	188	169	43737.906		10.762101	9.67444222	8.69670604	115.822827
4	Welch and Ritter, 2002	231	6249	0.036966	0.002432179	5.915E-06	169047.623	6249	231	2.858E+10		11.345201	0.41938573	0.01550298	128.713583
5	Michelle, 2003	5349	12821	0.417206	0.005704458	3.254E-05	30730.6115	12821	5349	944370484		11.341775	4.73185819	1.97416032	128.635858
6	Larry, 2004	314	1287	0.243978	0.013768489	0.0001896	5275.06051	1287	314	27826263		11.321611	2.76222678	0.67392324	128.178877
7	Cassia et al., 2004	182	259	0.702703	0.05208779	0.0027131	368.576923	259	182	135848.95		11.007128	7.73473871	5.4352218	121.15687
8	Ghosh, 2005	1500	1842	0.814332	0.021025968	0.0004421	2261.976	1842	1500	5116535.4		11.289336	9.19327002	7.48637624	127.449098
9	Ellul and Pagano, 2006	295	337	0.875371	0.050966065	0.0025975	384.979661	337	295	148209.34		11.021152	9.64759553	8.44522457	121.46578
10	Zheng, 2006	1404	2493	0.563177	0.015030079	0.0002259	4426.67308	2493	1404	19595435		11.316956	6.37344813	3.58937873	128.073492
11	Lin and Hsu, 2008	274	1521	0.180145	0.010882936	0.0001184	8443.21533	1521	274	71287885		11.330736	2.0411714	0.36770609	128.385582
12	SSS Kumar, 2008	156	319	0.489028	0.039153592	0.001533	652.314103	319	156	425513.69		11.151991	5.45363836	2.66698302	124.366909
13	Chatzinas et al., 2009	32	135	0.237037	0.041902624	0.0017558	569.53125	135	32	324365.84		11.124348	2.63688243	0.6250388	123.751113
14	Sharma and Seraphim, 2010	43	102	0.421569	0.064288613	0.004133	241.953488	102	43	58541.491		10.837746	4.56885381	1.92608543	117.456744
15	Sohail and Raheman, 2010	73	87	0.83908	0.09820694	0.0096446	103.684932	87	73	10750.565		10.226864	8.58116191	7.20028528	104.588751
16	Gupta and Samdani, 2010	1501	6600	0.227424	0.005870112	3.446E-05	29020.6529	6600	1501	842198295		11.341528	2.57933847	0.5866041	128.630263
17	Islam et al., 2010	191	310	0.616129	0.044581532	0.0019875	503.141361	310	191	253151.23		11.09575	6.83641397	4.21211313	123.115678
18	Chemmanur et al., 2010	909	934	0.973233	0.032280114	0.001042	959.687569	934	909	921000.23		11.213391	10.9132471	10.6211366	125.740146
19	Lowry et al.,2010	8759	11734	0.746463	0.007975927	6.362E-05	15719.4607	11734	8759	247101444		11.337779	8.46323557	6.31749449	128.545232
20	Kipngetich et al., 2011	13	15	0.866667	0.240370085	0.0577778	17.3076923	15	13	299.55621		6.8533117	5.93953676	5.14759853	46.9678806
21	Alle and Parab, 2012	304	365	0.832877	0.047768756	0.0022819	438.240132	365	304	192054.41		11.05963	9.21130861	7.67188443	122.315425
22	Chen et al., 2012	784	814	0.963145	0.034398034	0.0011832	845.147959	814	784	714275.07		11.195663	10.783046	10.3856364	125.34286
23															
24	k	20				Sums:	270218.975	48412	22483	3.074E+10		218.174	128.5448	94.0450602	2398.70297
25	df	19													
26												v	0.08813708		
27	Q (chi square)	13809.6			Q_v	18.308421									
28	I^2	99.8624			I^2_v	-3.777384									
29															
30	es(fixed)	0.17916			es (random)	0.5891848									
31	SEes (fixed)	0.00192			SEes (random)	0.0677015									
32	CI (fixed)	0.17539	0.1829289		CI (random)	0.4564898	0.72187979								

Figure 2: Combined 20 research studies meta analysis calculation which containing the chi square analysis by both fixed effect and random effect model.

1	Theoretical study: Meta analysis of 20 cross sectional studies.										
2	Author Name and Year	Events	Sample siz	Mean (es)	Standard Errc	Lower Cor	Upper Cor	Ordin	% of Mear	Central Tendency	
3	Aggarwal and Conroy, 2000	169	188	0.8989362	0.06914894	0.7634	1.03447	21	89.8936	0	58.91848
4	Welch and Ritter, 2002	231	6249	0.0369659	0.00243218	0.0322	0.04173	20	3.69659	1	58.91848
5	Michelle, 2003	5349	12821	0.4172061	0.00570446	0.40603	0.42839	19	41.7206	2	58.91848
6	Larry, 2004	314	1287	0.2439782	0.01376849	0.21699	0.27096	18	24.3978	3	58.91848
7	Cassia et al., 2004	182	259	0.7027027	0.05208779	0.60061	0.80479	17	70.2703	4	58.91848
8	Ghosh, 2005	1500	1842	0.8143322	0.02102597	0.77312	0.85554	16	81.4332	5	58.91848
9	Ellul and Pagano, 2006	295	337	0.8753709	0.05096607	0.77548	0.97526	15	87.5371	6	58.91848
10	Zheng, 2006	1404	2493	0.5631769	0.01503008	0.53372	0.59264	14	56.3177	7	58.91848
11	Lin and Hsu, 2008	274	1521	0.1801446	0.01088294	0.15881	0.20148	13	18.0145	8	58.91848
12	SSS Kumar, 2008	156	319	0.4890282	0.03915359	0.41229	0.56577	12	48.9028	9	58.91848
13	Chatzinas et al., 2009	32	135	0.237037	0.04190262	0.15491	0.31917	11	23.7037	10	58.91848
14	Sharma and Seraphim, 2010	43	102	0.4215686	0.06428861	0.29556	0.54757	10	42.1569	11	58.91848
15	Sohail and Raheman, 2010	73	87	0.8390805	0.09820694	0.64659	1.03157	9	83.908	12	58.91848
16	Gupta and Samdani, 2010	1501	6600	0.2274242	0.00587011	0.21592	0.23893	8	22.7424	13	58.91848
17	Islam et al., 2010	191	310	0.616129	0.04458153	0.52875	0.70351	7	61.6129	14	58.91848
18	Chemmanur et al., 2010	909	934	0.9732334	0.03228011	0.90996	1.0365	6	97.3233	15	58.91848
19	Lowry et al., 2010	8759	11734	0.7464633	0.00797593	0.73083	0.7621	5	74.6463	16	58.91848
20	Kipngetich et al., 2011	13	15	0.8666667	0.24037009	0.39554	1.33779	4	86.6667	17	58.91848
21	Alle and Parab, 2012	304	365	0.8328767	0.04776876	0.73925	0.9265	3	83.2877	18	58.91848
22	Chen et al., 2012	784	814	0.963145	0.03439803	0.89572	1.03057	2	96.3145	19	58.91848
23	Summary			0.5891848	0.0677015	0.45649	0.72188	1	58.9185	20	58.91848

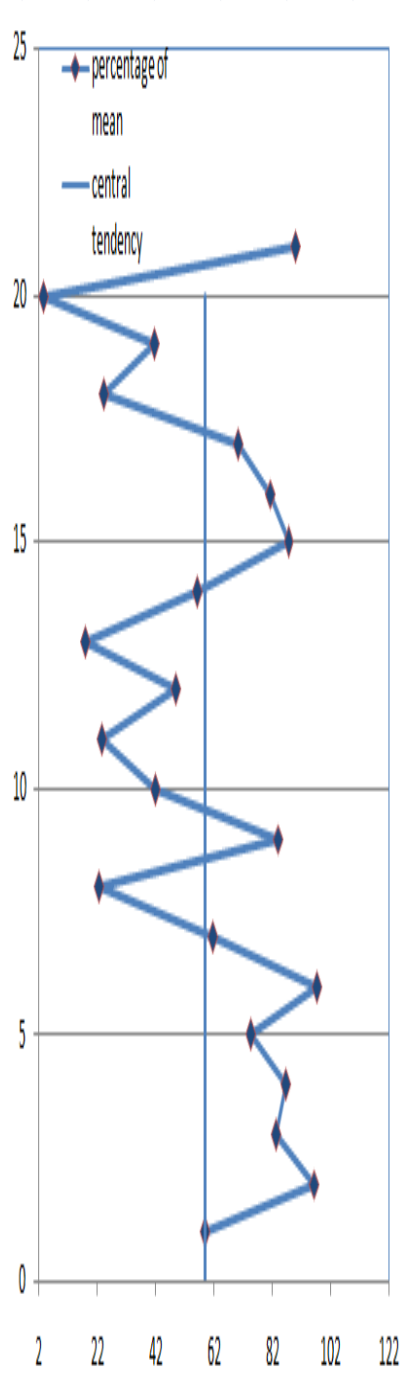

Figure 3: With the help of random effect model values and the forest plots.

Calculation of I^2

This I^2 is considered as a method to measure the heterogeneity between the independent studies in the meta analysis.

The formula of I^2 = (Q - df) Q*100

I^2 = 99.8624

In the case of low heterogeneity, the fixed effect model can be used, but in this study the value of I^2 is more than 26% so the data is containing high heterogeneity. Now it's the time to proceed with the random effect model and after applying this model, the value of chi square is again higher from the table's value 10.117 at 5% significant level and at 19 degrees of freedom found in a chi- square distribution but the value of I^2 is very low.

Results and Discussion with meta analyses

The initial public offering generally explains that it is a marketplace where corporate offers the shares to the public for the first time. This paper has focused on two areas of the IPO: underpricing and overpricing. The IPO pricing studies are calculated by using the meta analyses and analyze that the IPO price is not so much a reflection of the true value of a firm, as it is a screening device which affects the firms' decisions to go public. The collected data is presented by using the previous studies and analyzed through the meta analyses. In this study, fixed effect model gives the results of very high variability in the studies and rejected the hypothesis of IPO is fairly priced. But with the use of random effect model, the studies are again found heterogeneity in data which is rejected as the hypothesis. By use of the previous research studies on the IPO pricing Q value 18.308421 that is higher than that of the table's value 10.117 at 5% significant level, at the 19 degrees of freedom found in a chi- square distribution, it rejects the null hypothesis therefore there is a significant difference between the IPO pricing in different countries over the study period. It results that the study is heterogeneous so the variability is not only coming from the sampling error but also from the other consequences. This paper finds that the uncertainty plays a role in the IPO pricing in the market all over the countries.

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