CHAPTER 4: DATA DESCRIPTION, VARIABLE CONSTRUCTION AND RESEARCH METHODOLOGY

4.1 Data and Time Period

The study consists of all NSE and BSE listed IPOs and SEOs from April 1, 1991 to March 31, 2009. Our aim is to make the study as comprehensive as possible. We drop post-2009 years in our analysis as we intend to examine the long-run performance of issuing firms’ performance for three years after the equity issuance. We follow Loughran and Ritter (1995) and various other researchers in selecting the time interval of three years as they observe that the long-run underperformance persists beyond three years.

4.2 Variable Construction

In this section, we explain the construction and description of various variables which we intend to use in our research methodology:

a) **Number and volume of equity issues**: Number of equity issues is total number of IPOs and SEOs and volume is the total proceeds of IPOs and SEOs which took place in the time period from April 1, 1991 to March 31, 2009. Number and volume are used in two ways. One, market wide number/volume of equity issues represented by $MktIPOs$ and $MktSEO$s is total number/volume of IPOs and SEOs respectively in the overall market and other, Industry wide number/volume of equity issues represented by $IndIPOs$ and $IndSEO$s is the total number/volume of IPOs and SEOs in each Industry. We follow the CMIE’s (Centre for Monitoring Indian Economy) industry sector classification for our study.

---

1 CMIE is an Indian database having several products which provides financial data of Indian companies and also Indian macro-economic variables.
b) **Aggregate Market Timing Variables**: The variables which we use to test aggregate market timing are quarterly market (industry) BHRs and market wide (industry-wide) market-to-book ratio. Market BHRs are represented by $BHR$ which is the holding gain or loss of the overall stock market in a quarter whereas Industry BHRs are represented by $IndBHR$ which is the holding gain or loss of each industry in a quarter. The computation of BHRs is explained in research methodology section. We use COSPI\(^2\) index return as a proxy of market return and equal-weighted return of all the firms in the industry as proxy for industry returns. Market/Industry BHRs are calculated for four quarters prior to equity issuance and four quarters after the equity issuance. We follow Lowry (2003) procedure to calculate market-wide market-to-book ratio which is represented by $MktM/B$. $MktM/B$ is the equally weighted average of quarterly $M/B$ of all listed firms. Industry-wide $M/B$ ratio which is represented by $IndM/B$ is also calculated in the similar manner by taking all the firms of each Industry. Market-wide and industry-wise $M/B$ ratios are calculated for four quarters prior to equity issuance.

c) **Firm-Specific Market Timing Variables**: The variables which we intend to use to test firm-specific market timing are: initial returns (underpricing) of the issuer and post-issue buy-and-hold adjusted returns of issuer. Initial returns which is also known as underpricing is represented by $UP$ and is the average of initial returns of all the firms which issues equity in a given quarter. Underpricing of a firm is calculated as the ratio of the difference between the first trading day closing price and the offer price to its offer price. Post-Issue buy-and-hold adjusted returns of issuer which are represented by $BHAR$ are calculated for the market as well as industry. $BHAR$ of a firm is computed as $BHR$ of the firm in a particular quarter minus $BHR$ of the market/industry

---

\(^2\)COSPI index is maintained by CMIE (Centre for Monitoring Indian Economy) as a proxy for the market and it gives value-weighted and equal-weighted index prices. COSPI is considered as the most comprehensive index for India.
of the same quarter. COSPI index is taken as proxy of market return and equally-weighted average return of all the firms in the industry.

d) Variables reflecting market conditions/pseudo market timing variables: The variables reflecting market conditions which we intend to use in the study are: Sensex P/E Ratio, Gross Domestic Product (GDP) at constant prices and one month T-Bill rate. These variables are measured quarterly. Sensex P/E ratio reflects changes in the stock market before equity issuance. GDP is an indicator of growth of the economy. T-Bill rate which is also considered as risk free rate is considered to control inflationary conditions. All these variables are taken at quarterly frequency.

e) Risk-Free Rate: The proxy of risk-free rate which is used in the study is one-year Treasury Bill rate.

f) Mispricing Measure: Mispricing or misvaluation of firm’s equity is captured by market-to-value ratio, where market value is market price of equity and value is fundamental or fair of stock. The calculation of fundamental or fair value is given in methodology section.

g) Growth Opportunities Measure: Growth opportunities of a firm are captured by value-to-book ratio, where value is fundamental or fair value of equity and book is book value of equity.

h) Primary Capital: Primary capital is the total proceeds in equity issuance and is measured as offer price multiplied by number of shares offered in an equity offering.

i) Other sources of Capital: Other sources of capital are the sources of funds other than the primary capital raised in equity issuance which is measured as total sources of funds minus primary capital. Other sources of funds are sum of funds from firm’s operating activities, funds from firm’s financing activities and funds from firm’s investment activities.

j) Size: Size of the firm is measured by using log of total assets of the firm.
k) **Use of Proceeds on investment activities**: We measure changes in capital expenditure, Research & Development expenses (R&D) and total assets after the equity issuance to examine the investment motives of equity issuance.

l) **Use of Proceeds on other activities which reflect market timing as motivation of equity issuance**: We measure changes in cash holdings, inventory and debt reduction after the equity issuance to examine the market timing motives of equity issuance.

4.3 Research Methodology

**Tests of Market Timing and Pseudo Market Timing**

In this section, we perform the following tests to examine market timing and pseudo market timing (market conditions) hypothesis. We follow Ball *et al* (2011) methodology\(^3\) to analyze the impact of market timing and market conditions on IPOs and SEOs.

4.3.1 Univariate Tests of Aggregate Market Timing

*a. Market-wide issuance activity and market returns*

First of all, we examine the relationship of equity issuance activity and market returns. This is the first and basic test of aggregate market timing. Decline in the market returns from pre-issue to post-issue period reflect the aggregate market timing attempt of firms. We compare pre-issue and post-issue mean buy-and-hold return on equal-weighted and from COSPI\(^4\). We compute market return as cumulative daily returns over quarter one, quarter two, quarter three and quarter four before and after the issuance. We test for the difference of means of market returns for Qtr -3-4 vs. Qtr +3+4, Qtr-4 vs. Qtr+4, Qtr-3 vs. Qtr+3, Qtr -2 vs. Qtr +2 and Qtr -1

---

\(^3\) Ball *et al* (2011) test market timing against pseudo market timing hypothesis to analyze the IPO and M&A exit choices of venture backed companies and to understand whether these choices are driven by market timing or market conditions.

\(^4\) COSPI index is maintained by CMIE (Centre for Monitoring Indian Economy) as a proxy for the market and it gives value-weighted and equal-weighted index prices. COSPI is considered as the most comprehensive index for India.
vs. Qtr +1. We use pair-wise $t$-test to examine the difference of mean for IPO and SEO firms separately.

**BHR** for the market is calculated in the following way:

$$\prod_{t=1}^{T} (1 + r_{mt}) = EQ1$$

where $(r_{mt})$ is the proportional daily change in the price of market index from period $t$ to $T$.

**b. Industry-wide issuance activity and industry returns**

Even if the market returns are not increasing, a firm can time the market and issue equity when industry returns (to which the firm belongs) are increasing. Similar to the above tests of difference of mean market return, we also test for the difference of mean industry returns of pre-issue and post-issue period. The industry returns are calculated for six major industries which are manufacturing industry, wholesale trade and retail industry, information and communication industry, financial institutions and insurance industry, construction industry and ‘others’ industry. We compute equal-weighted buy-and-hold return of all the firms in a particular industry. For each industry, we compute cumulative daily returns over quarter 1, quarter 2, quarter 3 and quarter 4 both-before and after the issuance. We test for the difference of means of industry returns for Qtr -3-4 vs. Qtr +3+4, Qtr-4 vs. Qtr+4, Qtr-3 vs. Qtr+3, Qtr -2 vs. Qtr +2 and Qtr -1 vs. Qtr +1. We use pair-wise $t$-test to examine the difference of mean for IPO and SEO firms separately for each industry.

**4.3.2 Univariate Analysis of Firm-Specific Market Timing**

Under this, we carry out univariate analysis for two firm-specific market timing variables which are BHARs and underpricing of the issuing firm. Quarterly BHARs are computed for four quarters after equity issuance which are Qtr+1, Qtr+2, Qtr+3 and Qtr+4 and also cumulative BHARs for 3rd and 4th quarter i.e. Qtr+3+4. We use $t$-test to examine if quarterly BHARs are
significantly different from 0. The negative BHARs are evidence of firm-specific market timing. We also test if the average underpricing of IPOs/SEOs is significantly different from 0. Underpricing of IPOs/SEOs is also an evidence of firm-specific market timing. Both the test are carried out on overall market as well as for each industry.

BHAR for the firm i is computed in the following way:

$$\prod_{t=1}^{T}(1 + r_{it}) - \prod_{t=1}^{T}(1 + r_{mt})$$  \hspace{1cm} EQ2

where \((r_{it})\) is the proportional daily change in the price of security of firm i for period t.

a. **Regression Analysis to examine the differences in market timing in different time regimes, ownership types and industries**

   In order to examine how market timing differs from one regulatory regime to other regulatory regimes, one ownership type to other and one industry to another, we use regression in which the dependent variable is market timing variable and dummy variables representing different time regimes, ownership types and industries as independent variables. We estimate following regression equation to differentiate market timings in three regulatory regimes:

   $$Y = \alpha + \beta_1 TD2 + \beta_2 TD3 + \varepsilon$$  \hspace{1cm} EQ3

The above regression is estimated three times for three market timing variables. In this way, \(Y\)=Underpricing/BHARs/Difference between pre-issue market BHRs and post-issue market BHRs. The regression makes use of two dummy variables: \(TD2\) and \(TD3\). \(TD2\) take the value 1 if IPO is issued in regime II i.e. 1997-2002 and 0 otherwise. Similarly, \(TD3\) takes the value 1 if IPO is issued in regime III i.e. 2003-2009 and 0 otherwise. Intercept in the regression captures the value of \(Y\) for Regime I i.e. 1991-1996. The model is estimated in a similar way for SEOs with one regime dummy for 1997-2009.
The following regression model is used to examine the difference in market timing of different ownership categories:

$$Y = \alpha + \beta_1 SA + \beta_2 Others + \varepsilon$$  \hspace{1cm} \text{EQ4}$$

EQ4 is also estimated three times for three market timing variables. Again, $Y=$ Underpricing/BHARs/Difference between pre-issue market BHRs and post-issue market BHRs.

The regression makes use of two dummy variables: $SA$ and $Others$. $SA$ takes the value 1 if IPO is a standalone firm and 0 otherwise. Similarly, $Others$ takes the value 1 if IPO belongs neither to $BG$ category nor to $SA$ category and 0 otherwise. Intercept in the regression captures the value of $Y$ for business group affiliated firm. The model is estimated in a similar way for SEOs.

In order to know, how market timing differs from one industry to another, we estimate the following regression equation:

$$Y = \alpha + \beta_1 WRT + \beta_2 IC + \beta_1 FII + \beta_1 CS + \beta_1 OH + \varepsilon$$  \hspace{1cm} \text{EQ5}$$

In EQ6, $Y=$ Underpricing, BHARs and Difference between pre-issue market BHRs and post-issue industry BHRs. The above regression makes use of five dummy variables: $WRT$, $IC$, $FII$, $CS$ and $OH$. $WRT$ takes the value 1 if IPO belongs to wholesale & retail trade industry and 0 otherwise, $IC$ takes the value 1 if IPO belongs to information & communication industry and 0 otherwise, $FII$ takes the value 1 if IPO belongs to financial institution and insurance industry and 0 otherwise, $CS$ tale the value 1 if IPO belongs to construction industry and 0 otherwise and lastly, $OH$ takes the value 1 if IPO belongs to any industry other than above 5 industries including manufacturing industry and 0 otherwise. Intercept in the regression captures the value of $Y$ for manufacturing industry IPO. The model is estimated in a similar way for SEOs.
4.3.3 Multivariate Analysis: Effect of market timing and pseudo market timing on equity issuance

In this section, we directly examine the impact of market timing and pseudo market timing on number/volume of equity issues by using the time series regressions. We run time series regressions at aggregate level (for overall market) and at industry level (for each industry).

a. Market Level Time Series Analysis

The impact of aggregate market timing, firm-specific market timing and pseudo market timing (market conditions) variables on equity issuance at market level is analyzed by estimating following time series regression model:

\[ MktIPOs_t = \alpha + \sum_{k=1}^{4} \beta_k BHR_{t-k} + \sum_{k=1}^{4} \beta_{k+4} BHR_{t+k} + \beta_9 (MktM/B)_{t-1} + \beta_{10} UP_{t-1} \]
\[ + \sum_{k=1}^{4} \beta_{k+10} BHAR_{t+k} + \beta_{15} \ln GDP_{t-1} + \beta_{16} (P/E)_{t-1} + \beta_{17} TBill_{t-1} + \varepsilon_t \quad EQ6 \]

In the EQ6, \( t \) represents a quarter. We run EQ6 for IPOs and SEOs independently. In EQ6, \( MktIPOs_t \) is the market-wide number of equity issues (IPOs/SEO) in each quarter for the complete sample period. \( BHR \) and \( MktM/B \) are aggregate market timing variables, \( UP \) and \( BHAR \) are firm-specific market timing variables and \( GDP, P/E \) and \( TBill \) are pseudo market timing or market conditions variables. \( BHR_{t-k} \) is pre-issue buy-and-hold market returns for each quarter from \( t-4 \) to \( t-1 \) and \( BHR_{t+k} \) is post-issue buy-and-hold market returns for each quarter from \( t+1 \) to \( t+4 \). We use equal-weighted COSPI index returns as a proxy for market returns. \( MktM/B_{t-1} \) is the market wide market-to-book ratio for the prior quarter i.e. \( t-1 \). \( UP_{t-1} \) is the underpricing/average initial returns of all the firms which issued equity in the quarter prior to equity issuance quarter. \( BHAR_{t+k} \) is the post-issue market adjusted buy-and-hold returns of the issuers for each quarter from \( t+1 \) to \( t+4 \). \( \ln GDP_{t-1} \) is the natural log of GDP at constant prices for the quarter prior to the equity issuance quarter. \( P/E_{t-1} \) is the price earnings ratio of BSE.
Sensex for quarter prior to the equity issuance quarter. $TBill_{t-1}$ is the is the one-month T-Bill rate for the quarter prior to the equity issuance quarter.

### b. Industry-wise Time Series Analysis

The impact of aggregate market timing, firm-specific market timing and pseudo market timing (market conditions) variables on equity issuance at each sector level is analyzed by estimating following time series regression model for each sector:

$$
IndIPOS_t = \alpha + \sum_{k=1}^{4} \beta_k IBHR_{t-k} + \sum_{k=1}^{4} \beta_{k+4} IBHR_{t+k} + \beta_9 (IndM/B)_{t-1} + \beta_{10} UP_{t-1} \\
+ \sum_{k=1}^{4} \beta_{k+10} IBHR_{t+k} + \beta_{15} \ln GDP_{t-1} + \beta_{16} (\frac{P}{E})_{t-1} + \beta_{17} TBill_{t-1} + \varepsilon_t
$$

\text{EQ7}

In \text{EQ7} also, $t$ represents a quarter. For each industry, we estimate \text{EQ7} for IPOs and SEOs independently. In \text{EQ7}, $IndIPOS_t$ is the total number of equity issues (IPOs/SEOs) in each industry for the quarter $t$ for the complete sample period. $IBHR$ and $IndM/B$ are aggregate market timing variables, $UP$ and $BHAR$ are firm-specific market timing variables and $GDP$, $P/E$ and $TBill$ are pseudo market timing or market conditions variables. $IBHR_{t-k}$ is pre-issue buy-and-hold industry returns for each quarter from $t-4$ to $t-1$ and $BHHR_{t+k}$ is post-issue buy-and-hold industry returns for each quarter from $t+1$ to $t+4$. We calculate equal-weighted BHRs for all the firms in an industry. $(IndM/B)_{t-1}$ is the equal-weighted market-to-book ratio of all the firms in the industry for the prior quarter i.e. $t-1$. $UP_{t-1}$ is the underpricing/average initial returns of all the firms which issued equity in the quarter prior to equity issuance quarter. $BHAR_{t+k}$ is the post-issue industry adjusted buy-and-hold returns of the issuers for each quarter from $t+1$ to $t+4$. $UP_t$ is the underpricing/average initial returns of all the firms which issued equity in the given quarter. The other variables are same as described in \text{EQ6}. BHR for the industry is also calculated in the same way as we calculate market BHR using \text{EQ1}. The only difference is, here
we first calculate BHR for each firm then we take the equal-weighted average of BHRs of all the firms in the industry in order to get IBHR. We calculate IBHAR in a similar way as of BHAR using EQ2 and we adjust with industry returns instead of market returns.

In EQ6 and EQ7, positive significant values of $\beta_1$ to $\beta_4$ show that there is no evidence to reject Hypothesis 1a/1b; negative significant values of $\beta_5$ to $\beta_8$ show that there is no evidence to reject Hypothesis 1c/1d; and similarly positive significant value $\beta_9$ shows that there is no evidence to reject Hypothesis 1e. Positive significant value of $\beta_{10}$ indicates that there is no evidence to reject Hypothesis 2a and negative significant values of $\beta_{11}$ to $\beta_{14}$ show that there is no evidence to reject Hypothesis 2b. Also, positive and significant values of $\beta_{15}$ to $\beta_{18}$ indicate that there is no evidence to reject Hypothesis 3b. Hypothesis 3a is examined using $t$-test. If the difference of mean test for pre minus post-issue market BHRs is significantly positive then we do not have evidence to reject Hypothesis 3a.

4.3.4 Long-run Performance of IPOs and SEOs

In this section, we examine the long-run performance of IPOs and SEOs. The observation of long-run underperformance (negative abnormal stock returns) following equity issuance of IPO firms by Ritter (1991) has been confirmed by various other researchers\(^5\) in the context of IPOs and SEOs in different countries. This negative long-run performance after equity issuance has been widely interpreted as market timing attempts by managers. However, recent studies\(^6\) challenge this interpretation on the ground of the validity of the assumptions of event-


\(^6\) Fama (1998) reviews literature on various corporate events like SEOs, share repurchase, stock splits, exchange listings, dividend announcements, mergers, etc. which have used event time methodology to measure abnormal long-run stock performance around these events. Mitchell and Stafford (2000) examine long-run abnormal stock performance around various corporate like SEOs, share repurchase, and mergers by using event-time and calendar-time approach and show that calendar-time approach has more power to detect abnormal performance as compared
time approach and Schultz’s (2003) pseudo market timing hypothesis which reflects market conditions. These studies advocate the use of calendar-time approach to measure the abnormal performance and have shown that use of calendar-time approach tends to reduce the underperformance and in some cases, the underperformance disappears. The difference between event-time and calendar-time approach is event-time approach weights offerings (events) equally whereas in calendar time approach, months are weighted equally even though offerings or events cluster in time. In other words, event-time approach is a technique of investing equal amount in each offering whereas calendar-time approach is a technique of investing equal amount in each IPO month. The event-time approach assumes that there is no cross-sectional correlation between abnormal returns of event firms. However, Grav et al (2003) and Mitchell and Stafford (2000) show positive cross-sectional correlation between abnormal returns (buy-and-hold) of event firms. Out of three approaches suggested by Mitchell and Stafford (2000) to deal with this dependence problem is to use calendar-time approach which make use of calendar-time portfolios giving equal weight to each calendar month. Despite, accounting for dependence problem, he also raises one problem with the use of calendar-time approach that is weighting months equally may average out the heavy issuance activity effects. In other words, heavy issuance activity is treated as low issuance activity. Nevertheless, he advocates the use of calendar-time approach. We address this issue by measuring abnormal performance of firms in hot issue time period and cold issue time period separately by using calendar-time approach. Hence, we examine long-run underperformance of IPOs and SEOs using calendar-time approach. Both the authors advocate the use of calendar-time approach to measure abnormal performance. They show that the event time methodology is extensively flawed because it is based on the assumption of independence of multiyear abnormal returns of event firms. This inflates the abnormal performance in event time by about 4 times. Brav et al (2000) also show less underperformance of IPOs and SEOs in calendar-time as compared to event-time approach.
We follow the methodology of Brav et al (2000) to calendar-time long-run stock returns of IPOs and SEOs separately for three years following issuance activity.

a. Calendar time long-run performance of IPOs and SEOs (Factor Regressions)

As mentioned above that cross-correlation between the return of event firms pose a problem in the measurement of long-run returns. Mitchell and Stafford (2000) observe that the significance levels of the event-time returns increased substantially with a small cross-sectional correlation. He advocates that the computation of abnormal returns in calendar-time can avoid the cross-section correlation problem because in calendar-time, we calculate abnormal return in each calendar month. The cross-correlation of returns across event firms is accurately captured by time series variation of monthly abnormal returns. Also, the use of calendar-time approach to measure abnormal performance is in agreement with Schulz’s (2003) argument to test pseudo market timing hypothesis against market timing. In other words, if pseudo market timing produces favorable market conditions for firms to issue equity then we should not see negative abnormal stock performance even if such underperformance exists in event-time. If we observe negative abnormal performance in calendar-time also then it reflects the market timing attempts of managers. We measure the abnormal performance of IPO and SEO firms following equity issuance by using Four-Factor model given by Carhart (1997) which is a combination of Capital Asset Pricing Model (CAPM) and Three-Factor Model given by Fama and French (1993).

The procedure to calculate abnormal returns in calendar-time approach is as follows:

First of all, every month, we create portfolio of firms which issued equity in the previous $T$ months which is here 36 months or three years. After this, monthly portfolio returns are calculated. In this way, each calendar month is weighted equally. Since, number of issuing firms is not the same every month therefore; we calculate equally-weighted portfolio returns. Mitchell
and Stafford (2000) show that the use of equally-weighted portfolio returns is more likely to
gauge the abnormal performance. Also, the use of equally-weighted portfolio returns increase
the power of tests as it produces portfolios which are more diversified but have less noise. These
portfolio returns calculated in each calendar month is used as dependent variable in all the
regression models mentioned above which we use to measure the abnormal performance. The
Carhart (1997) four factor model is given as under in **EQ8**:

Carhart (1997) four factor model:

\[ R_{pt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \beta_4MOM_t + \epsilon_t **EQ8** \]

Carhart (1997) four factor model given in **EQ8** is a combined form of CAPM and Fama-French
three factor model. In **EQ8**, \( R_{pt} \) is the monthly portfolio returns calculated for the month \( t \) and
\( R_{ft} \) is the one year risk-free rate.\(^8\) \((R_{mt} - R_{ft})\) is the market risk premium, where \( R_{mt} \) is the
market return for the month \( t \), which is COSPI index return in this case.\(^9\) \( SMB_t \) is the monthly
return on the portfolio of small stocks minus monthly return on the portfolio of large stocks.
\( HML_t \) is the monthly return on the portfolio of high book-to-market minus the monthly return on
the portfolio of low book-to-market returns. The forth factor added by Carhart (1997), \( MOM_t \) is
the momentum factor which is returns on the portfolio of high momentum stocks (high past returns i.e. winners) minus returns on the portfolio of low momentum stocks (low past returns i.e. losers). Momentum is computed on the basis of previous one year returns. The intercept \( \alpha \) is
a measure of abnormal performance. In case of no abnormal performance \( \alpha \) should be zero. A
**positive \( \alpha \) shows positive abnormal performance whereas a negative \( \alpha \) shows negative
abnormal performance.** We follow the standard procedure of construction of all the factors

---

<table>
<thead>
<tr>
<th>Footnote</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>As the previous literature has shown that the underperformance is mainly concentrated in small firms. Use of equal weighted returns will give equal weight to all the firms and average out the small-size firm effect.</td>
</tr>
<tr>
<td>8</td>
<td>We use one-year T-Bill rate as a proxy of risk-free rate.</td>
</tr>
<tr>
<td>9</td>
<td>Here, we use value-weighted COSPI index return as a proxy of market return.</td>
</tr>
</tbody>
</table>
given in Fama and French (1993) and Jegadeesh and Titman (1993). The above regressions are run by using Ordinary least square (OLS) and weighted least square (WLS) method. In WLS, number of firms which issued equity in each month is used as weight and hence, it is similar to event-time approach which gives equal weight to firms. The regressions are run for IPOs and SEOs separately. The intercept in $EQ_8$ is a measure of long-run performance. If the intercept is negative and significant then it shows long-run underperformance of firms whereas if the intercept is positive and significant then it shows positive long-run performance of firms. So, the intercept in $EQ_8$ examines our Hypotheses 4a, 4b and 4c.

4.3.5 Independent effects of mispricing and growth opportunities on equity issuance and long-run stock returns

In this section, we explain the methodology which we use to examine the investment motives of firms for equity issuance. Apart from market timing, firms may issue equity in order to finance their future investments. If market-to-book ratio has a positive relation with equity issuance then it is interpreted as that firms issue equity in order to sell their overvalued equity. However, positive relation of market-to-book ratio with equity issuance also means that firms have greater growth opportunities. In order to examine the independent impact of misvaluation and growth opportunities, we follow methodology developed by RKRV’s (2005) to decompose market-to-book ratio into two components which are mispricing/misvaluation component and growth component. It is given as under in (9):

$$\frac{M}{B} = \frac{M}{V} \times \frac{V}{B} \ldots \ldots \ldots \ldots (9)$$

where, $M$ is the market value of equity or the market price of stock, $B$ is the book value of equity and $V$ is the fundamental/fair value of equity. $M/V$ measures misvaluation or mispricing of equity by the market and $V/B$ measures growth options of the firm. Ideally, if the equity is correctly
priced, this component should be equal to 1 which means market value is equals fair value. $M/V$ greater than 1 means that the firm is overvalued and if it is less than 1 then it means that the firm is undervalued. Similarly, if $V/B$ is more than 1 then it means firm has growth opportunities.

All the variables $M$, $B$ and $V$ are considered at time zero when the equity is issued. For SEO firm, $M$ is the stock price at the end of month prior to equity issuance and for IPO firm; $M$ is the offering price since there is no price of stock before listing of an IPO. $B$ at time zero is the book value of equity as of fiscal year end preceding the equity issuance date. Calculation of fair or intrinsic value i.e. $V$ is an important concern. We use Residual Income Model (RIM)\textsuperscript{10} to calculate the fair value of equity for SEO firm. RIM requires stock data of firm prior to equity issuance which will not be available for an IPO firm so we follow the procedure which Purnanandam and Swaminathan (2004) used to compute the fair value of IPO firms based on price multiples of industry peers.

\textit{a. Computation of Price-to-Value and Value-to-Book of a firm in an IPO (IPO Valuation)}

We follow methodology of Purnanandam and Swaminathan (2004) to compute the valuation of an IPO firm. Valuation of an IPO firm is computed by using three price multiples of non-IPO match firm in the same industry. Match firm is selected from non-IPO listed firms in the same industry on the basis of similar sales and profits. The three price multiples namely price to sales, price to earnings and price to $EBITDA$ are calculated for IPO firm and match firm. For IPO firm, the price is offering price and for a match firm, the market price is the price of stock on the closing date prior to offer date of IPO. Each price multiple of an IPO firm when divided by the price multiple of match firm gives $P/V$ or $M/V$ ratio of IPO firm. In this way, we get three

\textsuperscript{10} Residual Income Model is identical to commonly used dividend discount model for the determination of the value of equity. RIM is the standard method to calculate the fair value of equity and has been used by various researchers.
The computation of offer price multiples for an IPO firm is as follows:

\[
\frac{Price}{Sales}^{IPO} = \frac{Offer\ Price \times Number\ of\ shares\ outstanding}{Previous\ year\ Sales}
\]

\[
\frac{Price}{EBITDA}^{IPO} = \frac{Offer\ Price \times Number\ of\ shares\ outstanding}{Previous\ year\ EBITDA}
\]

\[
\frac{Price}{Earnings}^{IPO} = \frac{Offer\ Price \times Number\ of\ shares\ outstanding}{Previous\ year\ Earnings}
\]

Sales, EBITDA and Earnings in above multiples are yearly data prior to the issuance of IPO. Offer price is the price at which IPO firm offers its share. EBITDA is earnings before, interest, tax, depreciation and amortization. Earnings refer to profit after tax (PAT). Number of shares outstanding refers to the shares of an IPO firm outstanding at the closing of the offer date.

\[
\frac{Price}{Sales}^{Match} = \frac{Market\ Price \times Number\ of\ shares\ outstanding}{Previous\ year\ Sales}
\]

\[
\frac{Price}{EBITDA}^{Match} = \frac{Market\ Price \times Number\ of\ shares\ outstanding}{Previous\ year\ EBITDA}
\]

\[
\frac{Price}{Earnings}^{Match} = \frac{Market\ Price \times Number\ of\ shares\ outstanding}{Previous\ year\ Earnings}
\]

Market price is the closing stock price of match firm on the day immediately prior to the offer date of IPO. Number of shares outstanding refers to the shares outstanding of the match firm at the close of the day prior to the offer date of IPO. On the basis of various price multiples, we calculate P/V ratio of IPO firm in the following way:

\[
\frac{Price}{Value}^{Sales} = \frac{\frac{Price}{Sales}^{IPO}}{\frac{Price}{Sales}^{Match}} \quad \cdots \cdots \cdots (10)
\]
We compute $V/B$ ratio of an IPO firm by dividing $P/V$ ratio by $P/B$ ratio and in this way, we get three types of $V/B$ ratios based on three price multiples. The computation of $V/B$ ratios of IPO firm is given as under:

\[
\frac{\text{Price}}{\text{Value}}_{\text{EBITDA}} = \frac{\left(\frac{\text{Price}}{\text{EBITDA}}\right)_{\text{IPO}}}{\left(\frac{\text{Price}}{\text{EBITDA}}\right)_{\text{Match}}} \quad \ldots \ldots \ldots \ldots \quad (11)
\]

\[
\frac{\text{Price}}{\text{Value}}_{\text{Earnings}} = \frac{\left(\frac{\text{Price}}{\text{Earnings}}\right)_{\text{IPO}}}{\left(\frac{\text{Price}}{\text{Earnings}}\right)_{\text{Match}}} \quad \ldots \ldots \ldots \ldots \quad (12)
\]

We compute $V/B$ ratio of an IPO firm by dividing $P/V$ ratio by $P/B$ ratio and in this way, we get three types of $V/B$ ratios based on three price multiples. The computation of $V/B$ ratios of IPO firm is given as under:

\[
\frac{\text{Value}}{\text{Book}}_{\text{Sales}} = \frac{\left(\frac{\text{Price}}{\text{Book}}\right)}{\left(\frac{\text{Price}}{\text{Value}}\right)_{\text{Sales}}} \quad \ldots \ldots \ldots \ldots \quad (13)
\]

\[
\frac{\text{Value}}{\text{Book}}_{\text{EBITDA}} = \frac{\left(\frac{\text{Price}}{\text{Book}}\right)}{\left(\frac{\text{Price}}{\text{Value}}\right)_{\text{EBITDA}}} \quad \ldots \ldots \ldots \ldots \quad (14)
\]

\[
\frac{\text{Value}}{\text{Book}}_{\text{Earnings}} = \frac{\left(\frac{\text{Price}}{\text{Book}}\right)}{\left(\frac{\text{Price}}{\text{Value}}\right)_{\text{Earnings}}} \quad \ldots \ldots \ldots \ldots \quad (15)
\]

In (13), (14) and (15) \textit{Price} represents offer price of IPO and \textit{Book} represents book value of share at the end of the month prior to offer date. The denominators in (13), (14) and (15) are taken from (10), (11) and (12) respectively.

\textbf{b. Computation of Price-to-Value and Value-to-Book of a firm in a SEO (SEO Valuation)}

We use RIM to calculate fair value of equity of SEO firm. In RIM, fair value of the equity is the sum of book value of equity, present value of expected future abnormal earnings, and a terminal value. Abnormal earnings are the earnings in excess of normal returns required by shareholders and terminal value measures long-term growth opportunities. The RIM for the
computation of fair value as presented in Elliott et al (2008)\textsuperscript{11} is given as under in the equation \textit{EQ16}:

\[
V_0 = B_0 + \sum_{t=1}^{T} \frac{E_0[X_t - r(B_{t-1})]}{(1 + r)^t} + \frac{TV}{r (1 + r)^T}
\]

\textit{EQ16}

Where, \( V_0 \) is the fair value of equity at time 0 (in this case, time zero is the fiscal year end preceding the equity issuance), \( B_0 \) is the book value of equity at time 0, \( T \) is total time which is two years, \( r \) is the cost of equity (the calculation of cost of equity is given in subsequent section), \( E_0(X_t) \) are the expected future earnings at time 0 for year \( t \) (proxy for expected future earnings is earnings before interest and tax – EBIT), and \( TV \) is the terminal value of equity which is computed as under in the equation \textit{EQ17}:

\[
TV = \frac{E_0[(X_T - r \times B_{T-1}) + (X_{T+1} - r \times B_T)]}{2}
\]

\textit{EQ17}

We calculate cost of equity, \( r \) by using single factor model given below in \textit{EQ18} on firm by firm basis:

\[
R_{it} - R_{ft} = \alpha_{it} + \beta_{it}(R_{mt} - R_{ft}) + \epsilon_{it}
\]

\textit{EQ18}

Where, \( R_{it} \) is the return on of stock I for the month \( t \), \( R_{ft} \) is the risk-free rate which is one year T-Bill at the end of month \( t \), \( R_{mt} \) is the monthly market return which is value weighted monthly return of COSPI index. We run rolling regressions for past 36 months (3 years) stock returns, which is a standard approach. The \( \beta \) estimated in \textit{EQ18} is used to calculate the cost of equity of firm \( i \) i.e. \( r_i \) by using following equation:

\[
E(r_i) = R_f + \beta_i(E[R_m] - R_f)
\]

\textit{EQ19}

\textsuperscript{11} Elliott et al (2008) use RIM to calculate fair value of equity in to analyze the impact of mispricing and growth opportunities on the equity and debt issuance choice.
After calculating fair value $V$, we calculate mispricing component $M/V$ and growth component $V/B$ for all the firms at time 0.

Next, we analyze the impact of misvaluation and growth component on the use of actual process of equity issuance after controlling primary capital raised in equity issuance, other sources of funds (internally generated) and size by estimating following regression with industry and time effects in a way similar to Hertzel and Li (2010).

$$Y_{it} = \alpha + \beta_1 (M/V)_i + \beta_2 (V/B)_i + \beta_3 \ln \left( \frac{PC_i}{A_{i0}} \right) + 1 + \beta_4 \ln \left( \frac{OSC_i}{A_{i0}} \right) + 1 + \beta_5 \ln[A_{i0}] + D_T + D_I + \epsilon_i \quad EQ20$$

where, $Y_{it} = ((S_{it} - S_{i0})/A_{i0})$ for $S_i$ = inventory, cash and total assets, for $ith$ firm and for $t=1$ to 4 years. $Y_{it} = (\sum_{j=1}^{t} S_{ij}/A_{i0})$ for $S_i$ = Capital expenditures, R&D and long-term debt reduction, for $ith$ firm and for $t=1$ to 4 years. We regress changes in six accounting variables which are cash, inventory, total assets, capital expenditure, R&D and long-term debt measured over post-issue four years $+1$, $+2$, $+3$, and $+4$ year. $PC_i$= Primary Capital raised (Offer Price * No. of shares issued) for $ith$ firm, $OSC_i$ = Other sources of capital (Total Funds $- PC_i$) for $ith$ firm. Total sources of funds are sum of funds from operations, funds from financing and funds from investment activities. $A_{i0}$= Total Assets at time zero for $ith$ firm. $D_T$ and $D_I$ are year and industry dummies respectively.

Last, we analyze the long-run performance of issuing firms by creating portfolio of high and low $M/V$ and high and low $V/B$ components by using calendar-time approach which we discussed in section II of methodology. The hypotheses stated in the previous section to analyze the independent effects of mispricing and growth options on equity issuance and long-run returns are examined as follows: Positive and significant value of $\beta_2$ in $EQ20$ when dependent variable is capital expenditure, R&D and total assets shows that there is no evidence to reject Hypothesis 5b, Hypothesis 5c and Hypothesis 5d. Similarly, positive and significant
values of $\beta_1$ in the $EQ20$ when dependent variable is change in inventory, cash and long-term debt reduction shows that there is no evidence to reject Hypothesis 5e, Hypothesis 5f and Hypothesis 5g. Hypotheses 6a and 6b are examined by using $EQ8$ in the same way as we examine Hypotheses 4a to 4c.

4.4 Sources of Data

The data for this study is collected from different sources. The data on individual equity issuance for IPOs and SEOs like company name, filing date, issue date, offer price, deal size, etc. is collected from Prime Database and Thomsonone Database of Securities Data Corporation. The stock price data for all the firms will be collected from PROWESS database maintained by CMIE. Data on value-weighted COSPI index prices and industry return are also collected from the PROWESS database. The data on macro-economic variables is collected from BUSINESS BEACON database maintained by CMIE and EPWRF (Economic and Political Weekly Research Foundation) maintained by Economic and Political Weekly. The remaining data on accounting and financial variables is collected from PROWESS database.