1.1. Introduction

From the 1980s, researchers in developed and developing countries expressed a renewed interest in information about cash flows. One aspect of that interest focused on the assertion of the Financial Accounting Standards Board (FASB 1978), which pointed out that “enterprise earnings based on accrual accounting generally provides a better indication of an enterprise’s present and continuing ability to generate favorable cash flows than information limited to cash flows alone.”. This assertion was questioned, both directly and indirectly, in research that compared the predictive ability of accrual-based information to that of cash flow information in three different settings: (1) Bankruptcy prediction, (2) Predicting security returns, and (3) Predicting operating cash flows.

Previous research which motivated by FASB (1978) assertion have provided inconsistency in the results of investigating accounting data, earnings, cash flows, and the combined of cash flow and accrual components of earnings in predicting future cash flows.

In overall out of the studies which reviewed in review literature chapter, three of them have supported the FASB assertion; eleven studies have rejected the FASB assertion, and rest of them neither support the FASB view nor support the opposite view and most of this group suggested that models which use disaggregated earnings, cash flows and accrual components of earnings (third model of the current study which build based on third hypothesis) will produce accurate estimate of future cash flows.
Review of literature indicated that prior studies did not concern about some questions such as whether predictive ability of the variables are the same across the different industries, and also whether predictive ability of the variables are different in the indexed companies (small-cap, mid-cap,…) in compare with no indexed companies. Moreover no study focused on different predictive accuracy measures to compare their capabilities to test of hypothesizes, and prior studies did not concern about cyclical manners of models as tools or clue to show turning points of industries or economic conditions.

As no research has been undertaken on cash flows prediction in India, this current study intended to replicate the previous studies in order to fill gaps from previous research, by using cash flow information from cash flow statements and aim to address unanswered questions.

Based on the prior studies, and aimed to address the gaps and the unanswered questions the purpose of this study was to assess the ability of past aggregated earnings alone (first hypothesis), past cash flows from operations alone (second hypothesis), combined of past cash flows from operation and accrual components of earnings (third hypothesis), and cash flows ratios (fifth hypothesis) to predict future cash flows and comparing the first three models (forth hypothesis) by comparing predictive accuracy of these competing models in and out of sample tests to address the FASB assertion (1978) and also focus on the split industrial wise sample to check the predictive power of these models among the selected industries in the context of Indian listed companies. Moreover explore the other potential capabilities of them which would help the current and potential investors who want to price the shares based on estimated future cash flows of Indian companies listed on Bombay Stock Exchange.
This study have chosen the such design to contribute in the more than two decades studies that have been concentrating on the topic which the focus is on the comparing the abilities of accruals earnings measures and cash flows measures to predict future cash flows by using cash flows from operations as dependent variable (derived from cash flows statement prepared based on indirect method).

This study designed to use past year (t-1), two years ago (t-2), and three years ago (t-3) of annual data of independent variable in each model which is named as one-year lag, two-year lags, three-year lags respectively.

This study selected the time period from 1998 to 2008 as main time span to collect the data and also to complete the year lag data, the annual data from 1995 to 1997 added to the main data.

The main job of this study was to check the fit of models to predict accurate future cash flows. The $R^2$ measures the amount to which the models explain or account for the amount of variability in the dependent variable. To find the more accurate model in Indian context, based on in-sample comparing test, the $R^2$ is suggested by previous studies. To derive the $R^2$ of the competing models, running the regression technique is required. This study has employed the ordinary least squares approaches to estimate their regression models. To evaluate the forecasting performance of the models, both within-sample (the $R^2$) and out-of-sample forecasting tests [The mean absolute percentage errors of prediction (MAPE) , Theil’s U-statistics which used by Kim and Kross (2005), and Young's test (Z-statistic) to select the more accurate model based on the explanation of Dechow (1994) about non nested model selection] are employed.

This research utilized quantitative methods in which the data is analyzed based on statistical techniques, including descriptive statistics, Pearson’s correlation and regression analysis.
The descriptive statistics provided an initial summary data of the essential features of the sample. The correlation analysis is used to fundamentally examine the relationship between dependent and independent variables. Regression analysis, simple, multiple, and stepwise regressions are applied to test the prediction models depending upon the ability of predictor variables to explain future cash flows. All analytical techniques use the computer software package Statistical Processing for Social Scientists (SPSS) Version 11.5.

In this study, for the first three hypotheses the following analysis are conducted.

In pooled-year analysis, all data for dependent and independent variables of the ten years prediction period of 1998 to 2007 was pooled and analyzed together.

For the yearly analysis, the regression model was processed to analyze each set of prediction years separately. The analysis was performed for eleven prediction years spanning 1998 to 2008. In each prediction year, three sets of data were analyzed including a set of the one-, two- and three year lags of earnings.

This study also designed to test the research hypothesis (earnings model, cash flows model, combined model, and ratios model) in a whole (pool) sample which contained varieties of firm from spectrum of industries listed on Bombay Stock Exchanges (BSE) as well as a cross sectional sample which divide base on different sectors of industries that allows to compare the abilities of independent variables in different
industry which will give us a detailed picture about cash flows prediction possibility and importance of accounting figures in each industry.

This study designed to test the research hypothesis in whole (pool) sample and also in both index wise and industry wise cross sectional sample by using two different bases: pooled-year based, yearly based as well.

Descriptive Statistics were consistent with prior research, which led that the characteristics of the accounting variables of Indian listed companies used in this study were in line with the range of the variables that applied in previous studies in other countries, developed as well as developing countries.

Correlation results suggested that the variables could be included in the regression model to predict future cash flows.

The results of pooled year and yearly analysis demonstrated that in overall, and in context of Indian sample, past aggregated earnings, past cash flows from operations, and the combined of past cash flows from operations and accrual components of earnings (which incorporated in first three objectives and hypotheses) have significant and different predictive power for predicting at least one year ahead of cash flows from operations. However, the results did not support the predictive ability of the most cash flows ratios which incorporated in this study.

The whole procedure and results of the study have led to accept the first three hypotheses and reject the fifth hypothesis (for most cash flows ratios which used in this study). In addition, the results have supported the forth hypothesis which has formulated as “Predictions based on three different models do not suggest the same directions of future cash flows”.

Moreover, this study to address and evaluate the FASB assertion have compared the results of the first three models with two different methods of analysis (pooled year
analysis and yearly analysis) in three alternative bases (whole sample base, index wise base, and industrial wise base).

The results of in-sample and out-of-sample comparisons of the models according to a pooled year analysis method (which have suggested by prior studies) and based on whole (pool cross sectional) sample have showed that past **cash flows from operations** had more predictive power in compare to past aggregated earnings and combined of past cash flows from operation and accrual components of earnings.

In addition, based on whole (pool cross sectional) sample a yearly analysis which have introduced by this study (like Chotkunakitti 2005) have demonstrated that **combined of past cash flows from operation and accrual components of earnings** had more predictive power in compare to past aggregated earnings and cash flows from operations.

**Therefore, both pooled year and yearly analysis of a pool cross sectional sample of selected Indian companies listed on Bombay Stock Exchanges have not supported the FASB assertion.**

Furthermore, the results of pooled year analysis (in sample) of the **split index wise sample** in overall, suggested that **second model**, cash flows alone (formulated based on second hypothesis) is more powerful model for predicting future cash flows among the no indexed category and followed by, other index (BSE 500 but non common with small & mid cap) mid-cap, and small-cap firms respectively. In contrast yearly analysis of one year lag model (in sample) suggested that **third model**, cash flows and accrual components of earnings (formulated based on third hypothesis) is more powerful model for predicting future cash flows. In addition, the poled year index wise analysis showed that cash flow return on equity ratio was a significant predictor for small and mid cap categories and cash flow return on assets was a significant
predictor for no index category. For other index category none of the ratios were found significant.

Moreover, this study also demonstrated other findings based on split industrial wise sample, which have not been reported earlier. These observations indicate that predictive power of past aggregated earnings (earnings model), past cash flows from operations (cash flows model), and the combined of past cash flows from operation and accrual components of earnings (third model) to predict future cash flows (operating cash flows) in the context of Indian companies are vary in different industries.

These observations have shown that the earnings model had the best result in transport equipment industry and the worse one in diversified industry. Cash flows model had shown the best result in chemicals industry and the worse one in construction industry. The combined of Cash flows and accrual components of earnings model had the best result in mining and services (other than finance) industries and the worse one in machinery industry. The reason(s) for these observations need to be explored in future studies.

In the line to fulfill the purpose for exploring the other potential capabilities of the variables, this study, by concentrating on the $R^2$ of the models from 1998 to 2008 (yearly analysis of one-year lag models), have shown that cyclical manners of the first three models suggest a new capacity of the explanatory power evaluation and predicting future cash flows studies which the previous studies did not mention about it. These cyclical manners of three models reveal new capacity of the explanatory power evaluation and predicting future cash flows studies. This finding suggested that regression analysis on accounting variable could use as a method to give early warning about turning points of industries and economic condition. Moreover, based
on this observation, it could be say that earnings and cash flows are not substitute variables in predicting future cash flows otherwise they can use as complementary variables in the procedure of predicting future cash flows.

This study was administrated only for the companies which listed on Bombay Stock Exchange. The study was conducted for the non financial companies. The sample not included the financial companies. The sample only included the companies which had the cash flows data entire time span of the study. Therefore, the results of this research may not be generalized to financial as well as unlisted Indian companies.

The results in this study are consistent with hypothesis that the combined of past cash flows from operation and accrual components of earnings is the best predictor of the future cash flows.

This study is one of the first studies in India that assess and compare the ability of past aggregated earnings; past cash flows from operations; past combined of past cash flows from operation and accrual components of earnings, and ratios calculated based on past cash flows to predict future cash flows (operating cash flows). whilst regression - based studies such as this one do have certain drawbacks, nonetheless assess and compare the ability of accounting variables to predict future cash flows paves a new way forward to understand future cash flows and its importance better in India.

Some of the findings in this study have been reported in earlier studies from across the world, and therefore reiterate the importance of these variables to predict future cash flows in an Indian context.
While this study did show the importance of some variables to predict future cash flows, it can help the current and potential investors who want to price the shares based on estimated future cash flows of Indian companies listed on Bombay Stock Exchange. Identification of the variables as reported in this study has several practical applications. whilst these observation need to be replicated in further studies, and that merely showing a correlation does not mean that it is causal in nature, nonetheless, these observation offer a potential platform for the possible avoidance of making under optimize or wrong investment decisions. Whilst the combined model was found to be the best predictor for predicting the future cash flow, past aggregated earnings and past cash flows are equally important.

From a finance perspective, the positive correlation between future cash flow and accounting variables suggest that investors can access future cash flows of companies they are interested in for estimating future return, by using the prediction model; creditors can employ the prediction model to determine their customers’ ability to pay interest and repay amounts borrowed, and other related parties, such as company managers can apply the findings of this research to decision making. For instance, the prediction model can be applied to forecast future cash flows of a reinvestment project. It is important in reducing the risks which inherent in the financial markets. Moreover, the stock exchange policy setters can use the findings of this research to regulate policy in financial information disclosures of Indian listed companies, and accounting Standard setters should continually develop Indian accounting standards to promote quality and reliable accounting information based on these findings.
Finally, the findings of testing the models in an out-of-sample period suggested that the combined of cash flow and accrual component of earnings model (third model) is a better predictor of future cash flows than the other models in the context of Indian companies listed on BSE. Furthermore, additional year lags of accounting data can improve the predictive power of the model. However, the results indicate that most of cash flow ratios which incorporate in the study are not a good predictor of future cash flows. In addition, this study showed that there are cyclical manners in three models which suggest a new capacity for the explanatory power evaluation and predicting future cash flows studies that the previous studies did not mention about it. This observation suggested that earnings and cash flows are not substitute variables in predicting future cash flows otherwise they can use as complementary variables in the procedure of predicting future cash flows. Moreover regression analysis on accounting variable could use as a method to give early warning about turning points of industries and economic condition which helps the players in share markets and money market as well.

This chapter has shown and explained in sequence objectives, questions, hypothesis and related models, scope, methodology, definition of variables and measurement, applications, limitations, and structure of the thesis
1.2. Research Objectives

1. To Assess the Ability of Past Earnings (aggregated) to predict Future Cash Flows.
2. To Assess the Ability of Past Cash Flows to Predict Future Cash Flows.
3. To Assess the Ability of Past Cash Flows and Accrual Components of earnings (disaggregated) to predict Future Cash Flows.
4. To introduce the industrial wise models (by comparing predictive accuracy of competing models in and out of sample) and potential capabilities of the models which would help the current and potential Investors who want to price the shares based on Estimated Future Cash Flows of Indian companies listed on Bombay Stock Exchange.
5. To Assess the Ability of the Ratios that calculated basis on Past Cash Flows to Predict Future Cash Flows.

1.3. Research Questions

1. Are past earnings significant predictors of future cash flows of Selected Indian Companies listed on Bombay stock exchange?
2. Are past cash flows significant predictors of future cash flows of Selected Indian Companies listed on Bombay stock exchange?
3. Are past cash flows and accrual components of earnings significant predictors of future cash flows of Selected Indian Companies listed on Bombay stock exchange?
4. Are three prediction models, earnings, cash flows and cash flows and accrual components of earnings models different in predictive powers?
5. Are past cash flow ratios significant predictors of future cash flows of Selected Indian Companies listed on Bombay stock exchange?
1.4. Research hypothesis and related models

This study is in the line of third setting strategy (predicting operating cash flows) which addresses the FASB assertion directly, and based on the questions and objectives of the study, first it has tried to test of three hypothesis in context of Indian industries as bellow:

1. (Past) earnings have significant predictive power in estimating future cash flows of Selected Indian Companies listed on Bombay stock exchange.

Table 1.1: Models for first hypothesis

<table>
<thead>
<tr>
<th>HYPO</th>
<th>Models</th>
<th>Regression equation</th>
<th>Type of regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Earnings models</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>One-year lag</td>
<td>$CFO_{n,t} = \alpha_0 + \beta_1 EARN_{n, t-1} + \varepsilon$</td>
<td>Simple</td>
</tr>
<tr>
<td></td>
<td>Two-year lags</td>
<td>$CFO_{n,t} = \alpha_0 + \beta_1 EARN_{n, t-1} + \beta_2 EARN_{n, t-2} + \varepsilon$</td>
<td>Multiple</td>
</tr>
<tr>
<td># 1</td>
<td>Three-year lags</td>
<td>$CFO_{n,t} = \alpha_0 + \beta_1 EARN_{n, t-1} + \beta_2 EARN_{n, t-2} + \beta_3 EARN_{n, t-3} + \varepsilon$</td>
<td>Multiple</td>
</tr>
</tbody>
</table>

2. (Past) cash flows have significant predictive power in estimating future cash flows of Selected Indian Companies listed on Bombay stock exchange.
### Table 1.2: Models for second hypothesis

<table>
<thead>
<tr>
<th>HYPO</th>
<th>Models</th>
<th>Regression equation</th>
<th>Type of regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cash flows models</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>One-year lag</strong></td>
<td>$\text{CFOn}<em>t = \alpha_0 + \beta_1 \text{CFOn}</em>{t-1} + \varepsilon$</td>
<td>Simple</td>
</tr>
<tr>
<td></td>
<td><strong>Two-year lags</strong></td>
<td>$\text{CFOn}<em>t = \alpha_0 + \beta_1 \text{CFOn}</em>{t-1} + \beta_2 \text{CFOn}_{t-2} + \varepsilon$</td>
<td>Multiple</td>
</tr>
<tr>
<td></td>
<td><strong>Three-year lags</strong></td>
<td>$\text{CFOn}<em>t = \alpha_0 + \beta_1 \text{CFOn}</em>{t-1} + \beta_2 \text{CFOn}<em>{t-2} + \beta_3 \text{CFOn}</em>{t-3} + \varepsilon$</td>
<td>Multiple</td>
</tr>
</tbody>
</table>

# 2

3. (Past) cash flows and accrual components of earnings have significant predictive power in estimating future cash flows of Selected Indian Companies listed on Bombay stock exchange

### Table 1.3: Models for third hypothesis

<table>
<thead>
<tr>
<th>HYPO</th>
<th>Models</th>
<th>Regression equation</th>
<th>Type of regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mixed models</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>One-year lag</strong></td>
<td>$\text{CFOn}<em>t = \alpha_0 + \beta_1 \text{CFOn}</em>{t-1} + \beta_2 \text{ACCn}_{t-1} + \varepsilon$</td>
<td>Simple</td>
</tr>
<tr>
<td></td>
<td><strong>Two-year lags</strong></td>
<td>$\text{CFOn}<em>t = \alpha_0 + \beta_1 \text{CFOn}</em>{t-1} + \beta_2 \text{ACCn}<em>{t-1} + \beta_3 \text{CFOn}</em>{t-2} + \beta_4 \text{ACCn}_{t-2} + \varepsilon$</td>
<td>Multiple</td>
</tr>
<tr>
<td></td>
<td><strong>Three-year lags</strong></td>
<td>$\text{CFOn}<em>t = \alpha_0 + \beta_1 \text{CFOn}</em>{t-1} + \beta_2 \text{ACCn}<em>{t-1} + \beta_3 \text{CFOn}</em>{t-2} + \beta_4 \text{ACCn}<em>{t-2} + \beta_5 \text{CFOn}</em>{t-3} + \beta_6 \text{ACCn}_{t-3} + \varepsilon$</td>
<td>Multiple</td>
</tr>
</tbody>
</table>
Based on Indian sample, test of these three hypothesis help to show whether the mentioned variables have power to predict future cash flow or not.

The forth hypothesis has formulated as bellow to contribute with prior studies to evaluate FASB assertion.

4. Predictions based on three different models do not suggest the same directions of future cash flows.

Test of the forth hypothesis helps to select the more powerful model among the three models (which built based on first three hypothesis). It helps to demonstrate the finding and evaluating FASB assertion in Indian context.

To check more variables, based on primary review of literatures, This study like Chotkunakitti (2005 in Thailand) added the fifth hypothesis as bellow to check whether other accounting variables have power to predict the future cash flow or not.

5. Ratios calculated based on past cash flows are significant predictors of future cash flows of Selected Indian Companies listed on Bombay stock exchange.

Table 1.4: Models for fifth hypothesis

<table>
<thead>
<tr>
<th>HYPO</th>
<th>Models</th>
<th>Regression equation</th>
<th>Type of regression</th>
</tr>
</thead>
<tbody>
<tr>
<td># 5</td>
<td>One-year lag</td>
<td>CFO_{on,t} = \alpha_0 + \beta_1 \sum_{i=1}^{10} CFR_{t-1} + \epsilon</td>
<td>stepwise procedure</td>
</tr>
</tbody>
</table>

The fifth hypothesis formulated to know among selected cash flow ratios which ratio has more power to predict future cash flows.
Explanation of the models

Based on the research hypotheses, the study focuses on five major variables: future cash flow, earnings, cash flows, accrual components of earnings and cash flow ratios. Future cash flows are investigated as the dependent or criterion variable caused by independent variables.

Independent or explanatory variables are earnings, cash flows, accrual components of earnings and cash flow ratios. The independent variables are expected to provide predictive power to predict a dependent variable in the prediction model.

Future cash flows of firms are defined as net cash flows from operations (CFO) reported in cash flow statements for the year t, represented by the symbol of CFO t. under the indirect method form and reported by adjusting earnings for non-cash items and for changes in current assets and current liabilities.

Earnings of firms are defined as net income before extraordinary items and discontinued operations reported on income statements for year t-i symbolized by EARNt-i.

Cash flow is defined as net cash flows from operations reported on the cash flow statements for year t-i, denoted by CFOt-i. The following models are constructed to develop the research issues. These models will consider relationships between concepts and be used to guide data collection.
1.5. Scope of the current study

This current study designed to use the annual accounting data of selected Indian companies listed on Bombay Stock Exchanges which needed in the current study from Center for Monitoring Indian Economy (CMIE) data base (14, May, 2009), called “Prowess”, which available in Research center of Sinhgad Institute of management of Pune University in India.

This study designed to use past year (t-1), two years ago (t-2), and three years ago (t-3) annual data of independent variable in each model which is named as one-year lag, two-year lags, three-year lags respectively.

The study selected the time period from 1998 to 2008 as main time span to collect the data and to complete the year lag data, the annual data 1995 to 1997 also add to main data.

The study designed to select sample from non financial firms available on CMIE data base according to following criteria, that means the non financial firms which satisfy the criteria will be in the sample.

- Availability of cash flow from operation data (as dependent variable) for the firm in entire main time span (1998 to 2008) for non indexed firm (indexed firms usually satisfy this condition but for rare case it will ignore this point for them).

- The firms which their standard value (Z standard) cash flows from operations data (within the time span) are more than + 2 will exclude from the sample. Outliers will identify

The sample includes 1894 companies listed on the Bombay Stock Exchange between 1998 and 2008 which selected
1.6. Methodology

The main job of this study was to check the fit of models to predict accurate future cash flows. The $R^2$ measures the amount to which the models explain or account for the amount of variability in the dependent variable. To find the more accurate model in Indian context, based on in-sample comparing test, the $R^2$ is suggested by previous studies. To derive the $R^2$ of the competing models, running the regression technique is required. This study has employed the ordinary least squares approaches to estimate their regression models. To evaluate the forecasting performance of the models, both within-sample (the $R^2$) and out-of-sample forecasting tests [The mean absolute percentage errors of prediction (MAPE), Theil’s U-statistics which used by Kim and Kross (2005) Voung's test (Z-statistic) to select the more accurate model based on the explanation of Dechow (1994) about non nested model selection] are employed. This research utilized quantitative methods in which the data is analyzed based on statistical techniques, which include descriptive statistics, Pearson’s correlation and regression analysis.

The descriptive statistics are designed to provide an initial summary data of the essential features of the sample. The correlation analysis is used to fundamentally examine the relationship between dependent and independent variables. Regression analysis, simple, multiple, and stepwise regressions are applied to test the prediction models depending upon the ability of predictor variables to explain future cash flows. All analytical techniques use the computer software package Statistical Processing for Social Scientists (SPSS) Version 11.5.
In this study, for the first three hypotheses the following analysis are conducted.

In pooled-year analysis, all data for dependent and independent variables of the ten years prediction period of 1998 to 2007 was pooled and analyzed together.

For the yearly analysis, the regression model was processed to analyze each set of prediction years separately. The analysis was performed for eleven prediction years spanning 1998 to 2008. In each prediction year, three sets of data were analyzed including a set of the one-, two- and three year lags of earnings, cash flows, and combination of cash flow and accrual components of earnings.

This study designed to test the research hypothesis based on character of the firms share (stock) in Bombay Stock Exchanges (BSE) which demonstrated by CMIE data base as bellow:

- BSE small-cap (non financial cases)
- BSE mid-cap (non financial cases)
- Other share in BSE 500 which are not small-cap or mid-cap (non financial cases )
- Non indexed firms (which are not included in the above indexes)

This study also designed to test the research hypothesis (earnings model, cash flows model, combined model, and ratios model) in a whole (pool) sample which contained varieties of firm from spectrum of industries listed on Bombay Stock Exchanges (BSE) as well as a cross sectional sample which divide base on different sectors of
industries that allows to compare the abilities of independent variables in different industry which will give us a detail picture about cash flows prediction possibility and importance of accounting figures in each industry.

Based on pooled-year and yearly analysis, this study designed to test the first three research hypothesis according to a split industrial wise sample. To find the best predictor in each industry, in the first, models will be rank according to the $R^2$ produced by the three models in each industry. After that, by comparing the ranks of three models, the lowest rank will show the suitable predictor for the each industry.

This study designed to test the forth hypothesis, comparing predictive ability of competing models (first, second, and third hypothesis) by using In-sample and Out-of-sample tests

1. **In-Sample test for comparing predictive ability of competing models**

The adjusted $R^2$ value has been employed by previous prediction research to evaluate the explanatory power between models. The model producing a high adjusted $R^2$ value is a good explanatory model and it can be an important predictive model.

2. **Out-Of-Sample test for comparing predictive ability of competing models**

In addition to adjusted $R^2$, current study employed the analysis of residuals involving the mean absolute percentage error to evaluate the predictive abilities of the prediction models.

The mean absolute errors generate from the out-of sample period. That is, the sample split into two parts. The first sample, the estimated sample, to create regression equations of each prediction model and the second sample, the-out-of sample, to test the estimated equation of the three models; earnings, cash flows and cash flows and accrual components of earnings models (first, second, and third hypothesis).
After calculating the predicted values of cash flows from the out-of-sample, the \( r^2 \), mean absolute percentage errors of prediction (MAPE) and Theil’s U-statistics used by Kim and Kross (2005) calculate for the out-of-sample period. A model producing relatively low MAPE would be considered to be a better predictor than model yielding higher MAPE. Moreover, based on explanation of Dechow (1994) about non nested model selection, in out-o-sample testing, this study also applied Voung’s test (Z-statistic) to select the more accurate model.

Since there were many cash flow ratios considered to be predictors in the model, variable selection technique was used to choose which cash flow ratios are important. Stepwise regression was selected to examine each cash flow ratio. Each predictor variable is considered for addition prior to developing the regression equation. In the procedure, each possible predictor variable in simple regression was examined. Then the explanatory variable providing the largest partial F statistic was chosen to add to the model. Finally, the stepwise procedure generated suitable equations for the model.
1.7. Definition of variables and measurement

Dependent variable in this study

Prior studies could be divided in two groups based on how the studies derived the cash flow from operation variable in their works. First group contains those studies which did not use the cash flows statement for derived the cash flow from operation in their works, such as the studies of Bowen, Burstahler and Daley (1986 in USA);  Greenberg, Johnson & Ramesh (1986 in USA); Espahaodi (1988 in USA); Murdoch and Krause (1989 in USA); Arnold and et al (1991 in UK); Percy and Stokes (1992 in Australia); Finger (1994 in USA).

The rest of the studies such as McBeth (1993 in US);; Seng (1997 in New Zealand); Kim and Kross (2005 in USA); Zhao and et al (2006 in Australia); Farshadfar and et al (2008 in Australia), and Lorek and Willinger (2009 in USA) have used the cash flows statement for derived the cash flow from operation in their works.

In the analysis, Future cash flows are investigated as the dependent or criterion variable caused by independent variables.

Future cash flows of firms are defined as net cash flows from operations (CFO) reported in cash flow statements for the year t, represented by the symbol of CFO t. under the indirect method form and reported by adjusting earnings for non-cash items and for changes in current assets and current liabilities.

Independent variable and measurement in earnings model (first hypothesis)

Net income before extraordinary items and discontinued operations derived from income statements for the previous years is used as the measure of past earnings
Earnings of firms are defined as net income before extraordinary items and discontinued operations reported on income statements for year $t-i$ symbolized by $EARN_{t-i}$.

**Independent variable and measurement in cash flows model (second hypothesis)**

The definition of past cash flow variable is net cash flow reported on statements of cash flows for the previous years.

Cash flow is defined as net cash flows from operations reported on the cash flow statements for year $t-i$, denoted by $CFO_{t-i}$.

**Independent variable and measurement in combined model (third hypothesis)**

The accrual components of earnings are obtained from cash flow statements for the previous years. Earnings can be disaggregated into cash flow and the component of accruals. Accrual component include: change in accounts receivable; change in accounts payable; change in inventory; change in other short-term assets and liabilities and depreciation and amortization.

\[
CFO = EARN - ACC
\]

\[
ACC = EARN - CFO
\]

or

\[
ACC = \Delta AR + \Delta INV + \Delta AP + DEP + \Delta OTH
\]

Whereas,

\[
\Delta AR = \text{Change in accounts receivable during the period}
\]

\[
\Delta INV = \text{Change in inventories during the period}
\]

\[
\Delta AP = \text{Change in accounts payable during the period}
\]

\[
DEP = \text{Depreciation and amortization during the period}
\]

\[
\Delta OTH = \text{Change in other current assets and liabilities during the period}
\]
This research investigated the predictive ability of the aggregated accrual components of earnings for the year lags (t-i), was denoted as ACC,t-i.

**Independent variable and measurement in ratios model (fifth hypothesis)**

1) **Cash flow sufficiency ratios**

Cash flow sufficiency ratios are aimed at assessing a company’s relative ability to generate sufficient cash to meet its cash flow needs. All ratios indicate whether a company’s cash flows are sufficient for the payment of debt, acquisitions of assets and payment of dividends. These ratios are cash flow adequacy, debt coverage, and repayment of borrowing and dividend payment ratios.

- **Cash flow adequacy ratio**

  The cash flow adequacy ratio is an attempt to assess the entity’s ability to produce sufficient operating cash flows to cover its main cash requirement, specifically, the payment of debt, the acquisition of assets, and the payment of dividends.

  \[
  \text{Cash flow adequacy} = \frac{\text{Cash flow from operations}}{\text{Repayment of borrowings} + \text{Assets acquired} + \text{Dividends paid}}
  \]

- **Debt coverage ratio**

  The debt coverage ratio shows the ability of a company to generate cash flow from operating activities to pay its long-term debt commitment.

  \[
  \text{Debt coverage ratio} = \frac{\text{Total debt}}{\text{Cash flow from operations}}
  \]

- **Repayment of borrowings ratio**

  This ratio indicates the ability of a firm to generate cash from operating activities for the purpose of covering long-term debt commitments in the current year.

  \[
  \text{Repayment of borrowings ratio} = \frac{\text{Repayment of borrowings}}{\text{Cash flow from operations}}
  \]

- **Dividend payment ratio**
The dividend payment ratio presents the ability of a company to generate cash from operating activities for the purpose of covering dividend commitments to both ordinary and preference shareholders. If the ratio is greater, it means that the company paid a smaller portion of its cash from operating activities in dividend payments.

\[
\text{Dividend payment ratio} = \frac{\text{Dividends paid}}{\text{Cash flow from operations}}
\]

- **Reinvestment ratio**

The reinvestment ratio presents the ability of a company to generate cash from operating activities for the purpose of covering asset acquisition payments.

\[
\text{Reinvestment ratio} = \frac{\text{Payment for property, plant and equipment}}{\text{Cash flow from operations}}
\]

2) **Cash flow returns ratios**

This group is sometimes called efficiency ratios. It shows the ability of a company to generate operating cash flows. Cash flow efficiency ratios are used to assess the relationship between items in the income statement and balance sheet with cash flow from operations as disclosed in the cash flow statement. These ratios are as follows.

- **Cash flow on revenues ratio**

This ratio is aimed at showing the ability of the company to turn revenue into cash. The higher ratio is the better the ability. This ratio employs information provided by the statement of cash flow and the income statement. It is computed by dividing cash from operating activities by revenues.

\[
\text{Cash flow to revenues} = \frac{\text{Cash flow from operations}}{\text{Revenues}}
\]

- **Cash flow to net income ratio**

This ratio is sometimes called the operating index. It compares the company’s profit with cash flow from operations and attempts to provide an index of the cash-
generating productivity of operations. It is calculated as cash flows from operations divided by profit after income tax.

\[
\text{Operations index} = \frac{\text{Cash flow from operations}}{\text{Profit}}
\]

- **Cash flow return on assets ratio**

This ratio attempts to measure the company’s return on assets in term of the cash flow generated from operations.

\[
\text{Cash flow return on assets} = \frac{\text{Cash flow from operations} + \text{Income tax paid} + \text{Interest paid}}{\text{Average total assets}}
\]

- **Cash flow return on stockholders’ equity ratio**

This ratio shows the ability of the company to generate a sufficient cash return for stockholders.

\[
\text{Cash flow return on stockholders’ equity ratio} = \frac{\text{Cash flow from operations}}{\text{Average Stockholders’ Equity}}
\]

- **Cash flow per share ratio**

This ratio indicates the operating cash flow attributable to each common share. It is defined as cash available to common stockholders divided by the weighted average number of common shares outstanding.

\[
\text{Cash flow per share ratio} = \frac{\text{Cash flow from operations} - \text{Preferred Dividends}}{\text{Average number of shares of Common Stock outstanding}}
\]
1.8. Applications of the Research

Knowing that accounting variables can be used to predict future cash flows of Indian listed companies provides some implications for practice and policy relating to Indian accounting standards and the capital market.

The Stock Exchange policy setters can use the findings of this research to regulate policy in financial information disclosures of Indian listed companies.

Accounting Standard setters should continually develop Indian accounting standards to promote quality and reliable accounting information.

Moreover, the research findings are meaningful to financial analysts. Creditors can employ the prediction model to determine their customers’ ability to pay interest and repay amounts borrowed. Investors can access future cash flows of companies they are interested in for estimating future return, by using the prediction model. Other related parties, such as company managers can apply the findings of this research to decision making. For example, the prediction model can be applied to forecast future cash flows of a reinvestment project.

1.9. Limitations of the study

The study was administrated only on companies listed on Bombay Stock Exchange. The study was conducted on non financial companies. The sample not included financial companies. The sample only included the companies which had the cash flows data entire time span of the study. Therefore, the results of this research may not be generalized to financial as well as unlisted Indian companies.
1.10. Structure of the Thesis

This research study contains five chapters. The first chapter provided an introduction to the study. Chapter 2 reviewed the prior empirical research in predicting future cash flows. This chapter indicated existing theories and concepts which enable the researcher to identify research gaps and lead to the development of the research hypotheses. The methodology chosen to test the models is described in Chapter 3 in which the data correction and research design, and the analytical techniques used to gain the results are explained. The actual results of the data analysis and hypothesis testing are presented in Chapter 4. The summary, discussions, conclusions of the research findings and implications for the research, areas for possible further research are discussed in Chapter 5.