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# The Performance Evaluation of ICB Mutual Funds: An Empirical Study

Islam, Md. Ashikul

University of Rajshahi

# The Performance Evaluation of ICB Mutual Funds: An Empirical Study

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Fellow
Md. Ashikul Islam
Session: 2010-2011

Supervisor
Dr. Rustom Ali Ahmed
Professor
Department of Finance and Banking
University of Rajshahi

Department of Finance and Banking
University of Rajshahi

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# CERTIFICATE

This is to certify that the thesis entitled **"The Performance Evaluation of ICB Mutual Funds: An Empirical Study"** submitted to the department of Finance and Banking by **Md. Ashikul Islam** for the award of the degree of **MASTER OF PHILOSOPHY (M.Phil)** is an original work. To the best of my knowledge, this work has not been previously submitted for the award of any degree or diploma or associate fellowship of the Rajshahi University or of any other University.

Date: 09 May, 2013

**Professor Dr. Rustom Ali Ahmed**
Supervisor
Department of Finance & Banking
Rajshahi University

# DECLARATION

I hereby declare that the thesis entitled **"The Performance Evaluation of ICB Mutual Funds: An Empirical Study"** is a result of research work carried out by me under the supervision of Professor Dr. Rustom Ali Ahmed of Finance & Banking department in Rajshahi University. I declare that it has not been previously submitted, in part or full, to this or any other university for any degree. Anything borrowed or citied from other sources is duly acknowledged.

Date: 09 May, 2013

**Md. Ashikul Islam**
Department of Finance & Banking
Rajshahi University

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Date 09 May, 2013

**Md. Ashikul Islam**

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## Acronyms

| | |
|---|---|
| ADF | Augmented Dickey Fuller |
| AMCL | Asset Management Company Limited |
| APT | Asset Pricing Theory |
| BSEC | Bangladesh Security and Exchange Commission |
| CAPM | Capital Asset Pricing Model |
| CDBL | Central Depository Bangladesh Limited |
| CEO | Chief Executive Officer |
| CML | Capital Market Line |
| CRSP | Center for Research in Security Prices |
| CSE | Chittagong Stock Exchange |
| DF | Dickey Fuller |
| DPS | Dividend Per Share |
| DSE | Dhaka Stock Exchange |
| EAFE | Europe, Australia and Far East |
| EGLS | Estimated General Least Square |
| EPS | Earnings Per Share |
| eSDAR | Excess Standard Deviation Adjusted Return |
| ETF | Exchange Traded Fund |
| FCGT | Foreign and Colonial Government Trust |
| FIS | Fixed Income Securities |
| GLS | General Least Square |

| | |
|---|---|
| ICB | Investment Corporation of Bangladesh |
| ICI | Investment Company Institute |
| IMA | Investment Management Agreement |
| IPO | Initial Public Offering |
| IRA | Insurance Regulatory Authority |
| LSDV | Least Square Dummy Variable |
| MIP | Monthly Income Plan |
| NASDAQ | National Association of Securities Dealer Automated Quotation |
| NAV | Net Asset Value |
| OLS | Ordinary Least Square |
| SML | Security Market Line |
| SUR | Seemingly Unrelated Regression |
| UK | United Kingdom |
| US | United States |

# Contents

## Abstract

In the context of development of capital market in Bangladesh, Mutual Funds of Investment Corporation of Bangladesh (ICB) play an important role. Very few researchers in Bangladesh work under mutual funds so far. Therefore, the present study tries to evaluate the performance of mutual funds in Bangladesh with a special reference of ICB. For this purpose, required data are collected from secondary sources. Mutual fund has a vital role to play in the economic growth and development of a developing country like Bangladesh through the development of capital markets. It is not so easy task to evaluate the performance of ICB Mutual Funds. However, attempts are taken to analyze the performance of ICB Mutual Funds. This work also examines and analyzes various aspects of mutual funds including concept of mutual funds, objectives and functions of mutual funds and so on with a view to observe what extent its basic operations are successful. It also finds out deviations, their causes and suggests the remedies. However, the specific objectives of the study are: (a) to analyze the growth and development of ICB Mutual Funds; (b) to evaluate ICB Mutual Funds' risk-adjusted returns with respect to market return; (c) to analyze the selectivity, diversification and market timing ability of fund managers and (d) to test the impact of some major determinants on mutual fund growth.

The study is primarily based on secondary data and information in relation to the ICB Mutual Funds. The secondary sources of data are different annual reports of ICB Mutual Funds, different monthly, quarterly and annual reports of DSE, different related

dissertations, research articles, scientific papers, journals, such other articles and research reports on ICB Mutual Funds.

Some basic techniques are used for data analysis such as mean, standard deviation, beta coefficient, coefficient of correlation and so on. For the analysis of results of specific objectives, different types of conceptual design are used. Sharpe Ratio, Treynor Ratio, Modigliani Measure, Sortino Ratio and Information Ratio are applied for evaluating the Risk-adjusted Performance of ICB Mutual Funds. Jensen Measure and Treynor and Mauzy Quadratic Equation are used for analyzing selectivity, market timing ability and diversification capacity of ICB Mutual Fund managers. For testing the impact of some major determinants on mutual fund growth, cross-section regression model and panel regression model are used.

Different tests are applied in this study to find the stationarity among different variables in the cross-sectional/panel regression analysis. Levin, Lin and Chu test, and Im, Pesaran and Shin test, and ADF-Fisher test are used to test unit root among the variables. Kao cointegration test is used to observe the long-run relationship among different variables and Granger-causality test is applied to find the short-run relationship among the variables in a regression line. To interpret the findings of this study, Akaike information criterion, Schwarz criterion, Hannan-Quinn criterion and Durbin-Watson statistic are used.

The findings explore that net assets value, earnings per share, dividend per share, price/earnings ratio and return on equity of ICB Mutual Funds are performing better year after year compared to the market performance in Bangladesh. The results again explore that the risk-adjusted performance ICB Mutual Funds are superior to market index. However, the selectivity and diversification capacity of fund managers are not good and the fund managers have lacking of market timing ability. The findings also explore that the asset turnover ratio and risk-adjusted return have significant positive impact and expense ratio has significant negative impact on the growth of ICB Mutual Funds.

# Chapter One

# Introduction

## 1.1 Introduction

A mutual fund is a connecting bridge or a financial intermediary that allows a group of investors to pool their money together with a predetermined investment objective. The title of this study is the performance evaluation of ICB Mutual Funds. To make full understanding of this study, some chapters are designed one after another. The first chapter introduces the study. The purpose of this chapter is to establish foundations for the following chapters and the study as a whole. This chapter is structured into ten sections.

Section 1.1 provides a general introduction to the chapter and section 1.2 provides research background of the study. Section 1.3 briefly explains the research problems, which will help this study. Section 1.4 and 1.5 describe the objectives and hypotheses of the study, respectively. The objectives are the central part of any research and methodology, which are essential for data and empirical results analysis.

Section 1.6 and 1.7 explain methodology and the justification of the study, respectively. Section 1.8 defines the terms used in this study. Section 1.9 enunciates significance and scope of the study and section 1.10 shows chapter structure of the whole study.

## 1.2 Research Background

A financial market plays an important role for the economic development of a country. A financial market is mainly classified into two categories: money market and capital market. Short-term investment is available in the money market and long-term investment in the capital market. There are many securities in both markets. Investors can earn something by investing in bank deposits, government different securities, corporate debentures and bonds or in stock of companies. Debentures and bonds provide low returns with low risk. Investment in stock provides high returns but volatile in different periods. It is very big investments for small investors. However, they feel to invest their small funds. In this case, mutual funds can be a better shelter for the marginal investors because this type of funds is a large portfolio with different securities of financial market.

The idea of mutual fund is originated in Belgium as investments in national industries associated with high risks. In 1860s, this movement starts in England. In 1868, the Foreign and Colonial Government Trust (FCGT) is established to spread risks for investors over a large number of securities. In USA, the idea takes root in the beginning of the 20$^{th}$ century. In Canada, during 1920, many close ended investment companies are organized. The first mutual fund in Canada to issue its share to public is the Canadian Investment Fund (1932). Large number of mutual funds emerges and expands their wings

in the many countries in Europe, the Far East countries and Latin America. Countries in Pacific area like Hong Kong, Thailand, Singapore and Korea have also entered this field in a long way.

It is apparent that besides the public mutual funds, the private mutual funds also play an important role in the capital market. For capital market stability, it is very necessary to increase the percentage of mutual funds. In the world, many marginal investors have no idea about capital market. Through mutual funds, it is possible to enter those marginal investors into the capital market for reducing its (capital market) fluctuations. The contribution of mutual funds summarizes as follows:

- to provide a large number of diversified portfolios by skilled and professional fund managers;
- to mobilize small and ideal funds to the capital market, which are very necessary for industrializations; and
- to increase the sustainable income of marginal investors.

### 1.3 Research Problems

Growth and development of a capital market is very necessary for creation of a favorable environment for economic growth of a country. A healthy capital market is needed to encourage savings, to mobilize that savings to productive investments and to distribute risks and gains based on financial commitments. Capital market can create profit for national prosperity. Currently, the capital market in Bangladesh is at a primary stage. A

private sector-led and export oriented economic growth cannot take place without sound financial intermediaries such as, banks, financial markets, mutual funds etc.

For the growth and development of capital market in Bangladesh, a special care should be taken so that all concerned stakeholders-the investors, the stock exchange members, the government and the people in general- can be benefited. In 1954, capital market in Bangladesh is enunciated and from 1954 to early 1980, this market was in a slack stage. During this period, few companies are listed in capital market and the investors are not interested in corporate stocks and bonds. The capital market ran an impressive growth particularly from late eighties to mid 2000 when ICB Mutual Funds are introduced in this market. In this period, market capitalization and index had shown a market rise, the Bangladesh Security and Exchange Commission (BSEC) was setup in 1993 to regulate the development of the capital market.

### 1.4 Objectives of the Study

The main purpose of the study is to evaluate the role, operations and performance of ICB Mutual Funds from 1995-96 to 2010-11. The specific objectives are:

(i) to analyze the growth and the policy development of ICB Mutual Funds;

(ii) to evaluate ICB Mutual Funds' risk-adjusted returns with respect to market return;

(iii) to analyze the selectivity, diversification and market timing ability of fund managers; and

(iv) to test the impact of some major determinants on mutual fund growth.

## 1.5 Hypotheses of the Study

The broader hypotheses of the study will be as follows:

$H_O$: There is no significant difference between ICB Mutual Funds risk-adjusted returns and market returns.

$H_O$: The ICB mutual fund managers have no significant undervalued share selection capacity in a portfolio.

$H_O$: The ICB mutual fund managers have no significant market timing ability.

$H_O$: The ICB Mutual Funds are not significantly diversified portfolios.

$H_O$: The determinants have no significant impact on ICB Mutual Fund growth.

$H_O$: There is no significant relationship between NAV and EPS of ICB Mutual Funds.

$H_O$: There is no significant relationship of P/E ratios between different ICB Mutual Funds.

## 1.6 Methodology of the Study

In choosing a research design, Zikmund (1997, p.37) discusses three types of business research: explanatory, descriptive and causal research. This research study is designed to analyze the growth and development of ICB Mutual Funds, to evaluate ICB Mutual Funds risk-adjusted returns with respect to market return, to analyze the selectivity, diversification and market timing ability of fund managers, and to test the impact of some major determinants on mutual fund growth. Thus, description is viewed as an appropriate research type. This is also designed to focus the cause and the effect relationships between some profitability and growth indicators of mutual funds. Thus, a combination

- Secondly, most researchers focus on the risk-adjusted performance of mutual funds, selectivity, market timing ability of mutual fund managers whereas there are very few researches on the impact of determents on mutual fund growth.

Based on the previous research findings and recognition of these gaps, a study of the risk-adjusted performance of ICB Mutual Funds, the performance of mutual fund managers and the impact of some major determinants on mutual fund growth are justified and a model of the impacts of some major determinants on the growth of ICB Mutual Funds should be developed. Therefore, this study will extend previous studies by focusing on examining the growth and development of ICB Mutual Funds, risk-adjusted performance of ICB Mutual Funds with its benchmark, selectivity, market timing ability and diversification capacities of fund managers and the impact of some major determinants on mutual fund growth using empirical evidence.

## 1.8 Definitions of Terms used in the Study

Specialized terms used in this study include mutual funds, downside risk, risk-adjusted return, managers, selectivity, market timing, diversification, determinants of mutual fund growth etc. These terms are adopted for ICB Mutual Funds context.

In this study, **mutual fund** means a fund established in the form of a trust to raise money through the sale of units to the public or a section of the public under one or more schemes for investing in securities, including money market instrument (Securities and Exchange Commission (Mutual Fund) Ordinance 2001). There are mainly two types of

mutual funds in Dhaka Stock Exchange (DSE): open ended and close ended, and this study considers only close ended mutual funds whose duration is more than 12 years.

**Downside risk** can be defined as the risk, which can be raised from underperforming funds. The underperforming funds are those funds whose excess return over risk free return is negative.

**Risk-adjusted return** means the average return of a security considering fluctuation of returns for a particular period. In this study, risk-adjusted returns of mutual funds are calculated by using Capital Asset Pricing Model (CAPM).

**Managers** are those persons or instititions who manage all resources in an organization to achieve the goals of that organization. In this study, managers mean the managers of ICB Mutual Funds.

**Selectivity** indicates the skillness of fund manager to select undervalued securities in the portfolio so that the higher return is possible to earn in the future.

**Market timing** ability indicates the capability of a fund manager to manage portfolio composition with market condition. Treynor and Mauzy (1996) mention a fund manager who would like to prefer market timing, structure the portfolio to have a relatively high beta during a market rise and relatively low beta during market decline.

**Diversification** can be defined as the reduction of specific risk or unsystematic risk of a portfolio. In this study, this term indicates the elimination of unsystematic risk of ICB Mutual Funds.

**Determinants** are the factors that determine something. In this study, determinants indicate those factors that determine the growth of mutual funds. Asset turnover ratio, expense ratio, family proportion of mutual funds, liquidity to net asset ratio and risk-adjusted return are the prominent determinants of mutual fund growth.

### 1.9 Significance and Scope of the Study

This study will bring together aspects of theory and practice. For theory, this study is an expansion of previous studies on attitudes of mutual funds and the performance of mutual funds by analyzing risk-adjusted returns, simultaneous impact of some major determinants on mutual fund growth. Data collected from annual reports of ICB Mutual Funds are used to test theories of mutual funds, to confirm and expand the scope of theoretical application.

In practice, this study is significant for investors as well as mutual fund managers. Results will show relationship between mutual fund managers and mutual fund attitudes in the capital market. This study will assist investors as well as mutual fund managers to improve performance and profitability of their investments by managing mutual funds as portfolios efficiently and effectively.

## 1.10 Chapter Scheme of the Study

This study is structured into six chapter schemes. The organized chapters are:

- The first chapter provides the background of the study, research problems, objective and hypotheses of the study. It also discusses justification of the study, definition of major terms used in this study, significance and scope of the study, and general analytical model of the study.

- The chapter two presents detailed reviews of literature and identifies the existing gaps.

- In the chapter three, research methodology of the study is carried out. This chapter defines and describes research methodology and research design, variables definitions and model development, data collection methods and data transformation, selection of samples for the study, sources of data and authenticity of data, and statistical tools used in this study. This chapter also explains some risk-adjusted measures such as Treynor ratio, Sharpe ratio, Modigliani measure, Sortino ratio and information ratio. Jensen measures, Treynor and Mauzy quadratic equations are used for selectivity, market timing ability and diversification capacity of mutual fund managers. Panel regression model is also discussed to analyze the impact of some major determinants on mutual fund growth in this chapter.

- The chapter four discusses about growth and development of mutual funds in Bangladesh. It explains the concept of mutual funds, objectives, functions, benefits, limitations and different types of mutual funds. It describes investment parameters, right, duties and obligations of different parties involved in mutual funds, refund procedures, borrowing policy of mutual funds and winding up procedures of mutual funds in Bangladesh. This chapter also describes the growth of gross income, total expenses and net income, the growth of net asset value (NAV), earnings per share (EPS) and Dividend per share (DPS) etc. for selected mutual funds within a selected period.

- The chapter five is for empirical analysis of ICB mutual fund performance. It analyzes the results of risk-adjusted performance of selected mutual funds, results of selectivity, market timing and diversification and the results of determinants on mutual fund growth.

- The concluding chapter provides major findings, limitations, and conclusion and policy implications of mutual funds.

# Chapter Two

# Literature Review

## 2.1 Introduction

This chapter focuses on both theoretical and empirical literatures to realize the necessary for rules and regulations, the form of regulations, approaches to risk and performance assessment for funds and estimating costs functions. Mutual fund is an investment of low risk and low costs. It encourages marginal investors to invest in the capital market with attractive earnings.

This chapter is divided into five sections. Section 2.1 provides general introduction of literature reviews. Section 2.2 describes the literature reviews on regulations and growth of mutual funds. Section 2.3 studies the literature on risk-adjusted performance of mutual funds. Section 2.4 is the literature reviews on selectivity, market timing ability and diversification capacity of fund managers. Section 2.5 reviews the literatures on the impact of some major determinants on mutual fund growth.

## 2.2 Regulations and Growth Regarding Mutual Funds

The regulations of mutual funds should be made clear from the view point of their basis, extent and mode. Posner (1969) studies exhaustively the regulating monopolies, though

dealing with the issue of regulating natural monopolies or more specially utilities, reforms questions the traditional basis and of regulating monopolies. He mentions that price need not be lower to maximize short term profits. He points out other managerial objectives which may lead to lower price. Besides, the problems of regulatory lags he emphasizes on the distortionary effects of rate of return regulation which lead to inferior services. He calls for a regulatory system based on a cost-benefit analysis that includes both direct and indirect costs of regulations.

Stigler (1971) feels that the demand for regulation is not often for public benefit but rather for the benefit of the industry in questions. The stated coercive power allows it to tax, control entry, effect made policies which affect complements or substitutes or even fix prices. Stigler points out that such regulations are actually welfare reducing as the benefits inefficient policies are possible only because in a democracy voting on each policy is costly and hence not done and also because not all voters who vote might have an interest in the issue.

The cost of market failures and the cost of regulation failures may vary time to time. Tullock (1975) finds the need for regulations and believes that the costs of government failures or regulatory failures are larger than the costs of market failures.

The asymmetric information and bounded rationality may be the cause for market failure and the base for regulations. Akerlof (1970) studies on information asymmetry and shows

imperfect information would lead to adverse selection and the ultimate collapse of the market through low quality sellers crowding out good quality sellers.

Schwartz and Wilde (1979) deal with the necessity for government intervention in markets with imperfect information. Governments intervene in markets when the percent of uniformed consumers in the market is sufficient to do so. If there exist sufficient number of informed consumers, the form has every incentive to behave competitively. They point out that the guiding variable is whether no-competitive behavior is occurred in the market. They suggest that proving information is a better method than price control.

Frank and Mayer (1989) point out that information asymmetries can lead to organizational failures which include fraud by employees, misutilization of funds, reckless investments and excessive churning of portfolio.

Yang and Yaung (2007) try to prove the existence of herding behavior and positive feedback trading of mutual funds in the Asian markets. For this, they use two fluctuation models based on positive feedback trading and herding behavior in the mutual funds. The empirical evidence suggests the existence of both positive feedback trading effect and herding behavior, although it has failed to particularly dig into the factors that lure international capitals.

As per Ali and Malik (2006), a capital market plays a vital role in the economic development of a country. Mutual funds are considered to be an important source of injecting liquidity into the capital markets. A well-established financial intermediation system facilitates the economic activity by mobilizing domestic as well as foreign savings.

The success of the industry will lie in several factors, one of which will be the role of regulators and their efforts to continuously evolve the code of corporate governance for the mutual fund industry. Cheema and Shah (2006) find that mutual funds are becoming vehicles of securities investments most favored by the general public worldwide. Whereas, this trend is more pronounced in the developed markets of the United States of America and Europe. Mutual funds are increasingly gaining the public attention in the developing economies as well. It is said that Bangladesh is not different from this global trend and even though mutual funds form a comparatively small segment of the securities markets, they have grown phenomenally over the last few years.

Regulations of mutual funds cover mandatory disclosure of relevant information, fixing management fees and expense limits, guidelines for valuing the portfolio and conducting shareholders transactions, control of false and misleading information, investment norms and corporate governance structure.

In 2002, Research conducted by Bauer, Koedijk, and Otten, using an international database containing German, UK and US ethical funds remark that the existing empirical

evidence on US data suggests that ethical screening leads to similar or slightly less performance relative to comparable unrestricted portfolios.

### 2.3 Risk-Adjusted Performance of Mutual Funds

The purpose of this section is to identify the works on risk-adjusted performance of mutual funds. In the traditional portfolio models, the investors are assumed to maximize the expected return of the portfolio or minimize the portfolio risk. Markowtz (1952) is the first researcher who proposes the mean-variance analysis of portfolio decisions. He discusses the concept of efficiently diversified portfolios, which maximizes expected returns for a given amount of risk measured by variance.

Friend, Brown, Herman, and Vickers (1962) offer the first empirical analysis of mutual fund performance. Treynor (1965), Sharpe (1966), and Jensen (1967) develop the standard indices to measure risk-adjusted mutual fund returns. Grinblatt and Titman (1989b) construct a positive period weighting measure of fund performance.

Sharpe (1966) suggests a measure for the evaluation of portfolio performance. Drawing on results obtained in the field of portfolio analysis, economist Treynor has suggested a new predictor of mutual fund performance, one that differs from virtually all those used previously by incorporating the volatility of a fund's return in a simple yet meaningful manner.

Jensen (1967) derives a risk-adjusted measure of portfolio performance (Jensen's alpha) that estimates how much a manager's forecasting ability contributes to fund's returns.

Chang and Lewellen (1985), using a test procedure derived from arbitrage pricing theory, find that mutual fund portfolios do not outperform a passive buy-and-hold portfolio strategy. Lehman and Modest (1987) try to ascertain whether conventional measures of abnormal mutual fund performance are sensitive to the benchmark chosen to measure normal performance. Data of monthly returns on 130 mutual funds over the fifteen-year period January 1968 through December 1982 are used and they employ the standard CAPM benchmarks and a variety of APT benchmarks to investigate this problem. They find little similarity between the absolute and relative mutual fund ranking obtained from these alternative benchmarks. Finally, they find statistically significant measured abnormal performance using all the benchmarks.

Chang (1996) also reports the performance of mutual funds exhibit a higher return than the stock market. The study regards whether the mutual fund induces have a better investment performance than the overall performance of the stock market via market return and Wilcoxon methods through three different stock markets in Taiwan to offer the investors some reference data. Furthermore, it tests whether the performance of mutual funds is greater than the market portfolio and non-foreign capital conceptual stock by Sharpe, Treynor and Jenson methods. This study finds out that the performance of mutual funds is better than the market portfolio. Finally, using the independent test method probes into whether rising or falling of the day (prior day) indices has a significant

relationship with overbuy and oversell volumes of the day. The empirical results show that the performance of mutual funds is greater than bear and great bear stock markets. On the contrary, the performance of mutual funds is inferior to the stock market in bull market. Also, on the prior day, one stock that has the largest buying volume from the mutual funds has a better return in any markets, bull, bear, and great bear markets, compared to the market portfolio. If the investors just follow the mutual funds and buy the same large stock the following day, investors can get a better than expected return in bull and great bear markets, except for the bear market.

As discussed by Santini and Aber (1998), the return in excess of the short-term rate are able to completely describe the funds' performance and new money flows are positive and highly significant covering the period from the first quarter of 1973 to the third quarter of 1985, including one hundred twenty-seven open-end equity mutual funds sample. Since the funds' performance is related to inflow behavior, Silva, Sapra and Thorley (2001) measure the performance of mutual funds compared to stock index and find out that the return of mutual funds is excess to the stock index via Sharpe argument about the link between the average return on stocks and funds to stock and fund return dispersion. They use the Center for Research in Security Prices (CRSP) database, which contains returns on all US stocks from National Association of Securities Dealers Automated Quotation (NASDAQ) Shares during1926 to 1973 and Amex Shares from 1926 to 1963.

Blake and Timmermann (1998) carry out a research in 1998 on performance evaluation of UK mutual funds and find that the average UK equity fund appears to underperform by around 1.8 percent per annum on a risk-adjusted basis. The authors say that there is also some evidence of persistence of performance, on average, a portfolio composed of the historically best performing quartile of mutual funds performs better in the subsequent period than a portfolio composed of the historically worst performing quartile of funds.

As indicated by Statman (2000), the excess standard deviation adjusted return (eSDAR) of a fund portfolio is the excess return of the portfolio over the return of the benchmark index, where the portfolio is leveraged to have the benchmark index's standard deviation. Roy et al. (2004) evaluate performance of Indian mutual funds in a bear market through relative performance index, risk-return analysis, Treynor's ratio, Sharpe ratio, Jensen measure, and measure. The study used 269 open ended schemes (out of total schemes of 433) for computing relative performance index. Then after excluding funds whose returns are less than risk-free returns, 58 schemes are finally used for further analysis. The results of performance measures suggest that most of mutual fund schemes in the sample of 58 are able to satisfy investor's expectations by giving excess returns over expected returns based on both premium for systematic risk and total risk.

Redman, Gullet and Manakyan (2000) examine the risk-adjusted returns using Sharpe index, Treynor index and Jensen alpha for five portfolios of international mutual funds for three time period: 1985 through 1994, 1985-1989 and 1990-1994. The results show

that for 1985 through 1994, the portfolios of international mutual funds outperform the US market and the portfolio of US mutual funds under Sharpe and Treynor indices. During 1985-1989, the international fund portfolio outperforms both the US market and domestic fund portfolio; the portfolio of Pacific Rim funds outperforms both benchmark portfolios.

Kuo and Chi (2000) collect the top 30 Taiwan companies invested by mutual funds and divide them into pre-crisis, on-crisis, and post-crisis groups. They use return and volatility of models to study if the mutual fund herding behavior induces as a better investment performance than the overall performance of Taiwan's stock market to offer the investors some reference data. The results show that the overall investment performance of mutual funds is better than the index performance, especially during the period of financial crisis. Thus, they suggest investors to pour their money into mutual funds for stock investment when facing high uncertainties.

Patro (2001) explicitly states that different sample periods also have different outcomes. He points out the net asset values (NAVs) or shares of the 45 US based international closed end funds, which underperform their local or the world market indices over the testing time 1991-1997. This differs from his empirical result that the funds match the performance of the world market index during 1991-1997. Therefore, how to provide a comprehensive empirical analysis of the mutual fund performance is the main mission of this study.

Mishra et al. (2002) measure mutual fund performance using lower partial moment. In this paper, measures of evaluating portfolio performance based on lower partial moment are developed. Risk from the lower partial moment is measured by taking into account only those states in which returns below a pre-specified "target rate" like risk-free rate.

Fernandes (2003) evaluates index fund implementation in India. In this paper, tracking error of index funds in India is measured .The consistency and level of tracking errors obtained by some well-run index fund suggests that it is possible to attain low levels of tracking error under Indian conditions. At the same time, there do seem to be periods where certain index funds appear to depart from the discipline of indexation.

Jagric, Podobnik,Strasek and Jagric (2007) study the mutual fund industry and apply various tests to evaluate the performance capacity of mutual funds. They calculate the performance measures of mutual funds by using Sharpe ratio and Treynor ratio and rank them according to the results. The ranking reveal that all analyzed funds outperform the market on a risk-adjusted basis.

Sipra (2008) evaluates the mutual funds performance in Pakistan from 1995 to 2004. In this study, 10 years monthly closing prices of 33 mutual funds are considered. He uses Sharpe, Treynor and Jensen ratio and finds low correlation between the mutual funds and market portfolio, which indicates low diversification of Pakistani mutual funds.

Nafees, Shah and Khan (2011), evaluate the performance of both open end and closed end mutual funds in Pakistan. The risk-adjusted performance of both types of mutual funds has been measured through traditional measures such Sharpe measure, Sortino measure, Treynor measure, Jensen differential measure and information measure. The results of all measure indicate that mutual fund industry is below as compared to market portfolio performance. Risk-adjusted performance results of mutual funds depict negative risk-adjusted returns to investors. The probable reason for negative risk-adjusted returns of mutual fund industry can be setback by global financial crisis to the market during sample period.

### 2.4 Selectivity, Market Timing Ability and Diversification

Numerous studies have tested the mutual fund manager's market-timing ability such as Treynor and Mazuy (1966), Henriksson and Merton (1981), Merton (1981), Kon (1983), Henriksson (1984), and Chang and Lewellen (1984) and the diversification benefits and risk-adjusted performance of funds: Lehman and Modest (1987), Grinblatt and Titman (1989a), and Logue and Rogalski (1989).

In 1990, the literature is extended by Cumby and Glen to include international mutual funds. The performance of 15 US based internationally diversified funds is compared to the Morgan Stanley Index for the US, the Morgan Stanley World Index, and to a benchmark combining the world index and Eurocurrency deposits. The period analysis is 1982-1988. Both the Jensen index and the methodology developed by Grinblatt and Titman (1989b) are employed to measure portfolio performance. Cumby and Glen

conclude that the funds do not outperform the international equity index; however, there is some evidence of the funds outperforming the US index.

In China, mutual funds have become a popular product because mutual funds provide many advantages, such as time-saving, convenience, etc. The new trend has resulted in increasing the appreciable funds. According to Asiaweek (2001), the emerging Asian countries like China, Indonesia, India, Malaysia, and the Philippines anticipate growing by double digits annually and are predicted to reach US $12 trillion by the year 2030. Thus, the performance of mutual funds is a seeking target for portfolio managers. Relatively, performance is an important ingredient to challenge individual investors preferring to invest into mutual funds.

Roy et al., (2003) conduct an empirical study on conditional performance of Indian mutual funds. This paper uses a technique called conditional performance evaluation on a sample of eighty-nine Indian mutual fund schemes .This paper measures the performance of various mutual funds with both unconditional and conditional form of CAPM, Treynor-Mazuy model and Henriksson-Merton model. The effect of incorporating lagged information variables into the evaluation of mutual fund managers' performance is examined in the Indian context. The results suggest that the use of conditioning lagged information variables improves the performance of mutual fund schemes, causing alphas to shift towards right and reducing the number of negative timing coefficients.

Zakri (2005) matches a sample of socially responsible stock mutual funds matched to randomly select conventional funds of similar net assets to investigate differences in characteristics of assets held, degree of portfolio diversification and variable effects of diversification on investment performance. The study finds that socially responsible funds do not differ significantly from conventional funds in terms of any of these attributes. Moreover, the effect of diversification on investment performance is not different between the two groups. Both groups underperform the Domini 400 Social Index and S&P 500 during the study period.

### 2.5 Impact of Some Major Determinants on Mutual Fund Growth

Ippolito (1989) examines the relation between mutual fund investment performance and other variables such as asset size, expenses, turnover, and load status. Domestic mutual fund risk-adjusted returns, net of fees and expenses, are comparable to returns of index funds. However, portfolio turnover is unrelated to fund performance.

Droms and Walker (1994) use a cross-sectional/time series regression methodology. Four funds are examined over 20 years (1971-1990), and 30 funds are analyzed for a six-year period (1985-1990). The funds are compared to the S&P 500 Index, the Morgan Stanley Europe, Australia, and Far East Index (EAFE) which proxy non-US stock markets, and the World Index. Applying the Jensen, Sharpe, and Treynor indices of performance, they find that international funds have generally underperformed the US market and the international market. Additionally, their results indicate that portfolio turnover, expense ratios, asset size, load status and fund size are unrelated to fund performance.

Chalmers, Edelen and Kadlec (1999) analyze annual trading costs for a sample of equity mutual funds. The sample of 132 funds is used for the period 1984-1991. To analyze the objectives, Panel analysis and regression analysis models are used. Here raw returns, CAPM adjusted returns and Carhart adjusted returns measures are also used. The annual costs of fund managers' trading are estimated and they find that these costs to have a substantial negative association with return performance. The results also interpret that poor return causes higher trading cost because investors have funds poor returns, which generate additional trading costs.

Warmers (2000) carries out a research on mutual funds performance in America and finds that funds hold stocks that outperform by market 1.3 percent per year, but their net results underperform by one percent. Out of this 1.6 percent is due to expense and transaction costs.

Malkiel and Radisich (2001) find that index funds have regularly produced rates of return exceeding those of active funds by 100 to 200 basis points per annum in the United States over the 1990s and find that there are two reasons for the excess performance by passive funds: management fee and trading costs.

Otten and Bams (2004) carry a research on European mutual funds. Results suggest that Europeans mutual funds especially small capitalization funds are able to add value. If the

management fee is added back, some exhibits significant out performance. The authors also point out that European mutual fund industry is still lagging behind the US industry both in total assets size and market capitalization.

Huij and Verbeek (2007) want to evaluate the usefulness of shrinkage estimation in analyzing mutual fund performance and its persistence. For this reason, they explore information contained in the cross-sectional data of mutual fund returns, analyze three alternative shrinkage estimators, and investigate their properties in a simulated sample of mutual funds in comparison with standard OLS estimators. The results indicate that shrink estimates are substantially more accurate than OLS in realistic setting. Consequently, persistence studies using shrunk estimates appear to be significantly more reliable.

Nazir and Nawaz (2010) investigate the role of various factors in determining the mutual funds growth in Pakistan. The panel data for the period of 2005-2009 has been used for 13 family equity mutual funds and fixed effect and random effect models have been applied for estimation of determinants of mutual funds growth in Pakistan. They have reported that assets turnover, family proportion, and expense ratio are positively leading the growth of mutual funds, in contrast with management fee and risk-adjusted returns, which are negatively associated with mutual funds growth.

From the above literature review, following research gaps are observed:

- The time horizon considered in the previous studies is improved using updated information which help to analyze return and managers' selectivity and market timing ability of different mutual funds with present economic situation.

- Some researchers use Modigliani and Modigliani measure (1997), the Sortino ratio (1991) and Information ratio (IR), which are very important for evaluating performance of any security or mutual funds. In the present study, these measures are used carefully to analyze the risk-adjusted performance of selected ICB Mutual Funds.

- Chalmers, Edelen and Kadlec (1999), Droms and Walker (1994) and Nazir and Nawaz (2010) use cross-sectional/ time series regression or panel regression to evaluate the performance of mutual funds. The same model may be employed to evaluate the impact of some major determinants on the growth of selected ICB mutual funds.

- Droms and Walker (1994) state that portfolio turnover and expense ratio are unrelated to the fund performance, Chalmers, Edelen and Kadlec (1999) state that trading costs have substantial negative association with return performance of mutual funds while Nazir and Nawaz (2010) state that asset turnover and expense ratio are positively related to the growth of mutual funds. Their conflicts motivate a lot to choose the present study.

# Chapter Three

# Methodology of the Study

## 3.1 Introduction

Methodology is the systematic and logical study of the principles guiding scientific investigation. "It is the system of principles, practices and procedures applied to any specific branch of knowledge."[2] The objectives of this chapter are: (i) to justify research methodology of the study, (ii) to make clear the research methodology used in the study, (iii) to explain research deign, variable specification and model development, (iv) to demonstrate the statistical techniques used in the study for data analysis, and (v) to explain different models used in this study with their assumptions.

Section 3.1 introduces the chapter including objectives and structure of the chapter. Section 3.2 discusses purpose and types of investigation. Section 3.3 provides measures of variables and units of analysis. Section 3.4 describes sampling design of the study. Section 3.5 states sources of data and data collection method, which is very important for model buildings and result analysis. Section 3.6 discusses data editing, Section 3.7 explains reliability and validity of data. Section 3.8 mentions the techniques used in this

[2] Robert Ilson, ed., *Readers Digest Great Illustrated Dictionary* ( London: The reader's Digest Association Limited, 1985), p.1071

study. Section 3.9 briefly explains the lists of variables and model development and the final section discusses the tests for stationarity and cointegration of data.

## 3.2 Purpose and Types of Investigation

The present study is initiated with a view to evaluate the performance evaluation of ICB Mutual Funds. For this purpose, it is designed to analyze the growth and development of ICB Mutual Funds, to evaluate ICB Mutual Funds' risk-adjusted returns with respect to market return, to analyze the selectivity, diversification and market timing ability of fund managers, and to test the impact of some major determinants on mutual fund growth. Thus, description is viewed as an appropriate research type. This is also designed to focus the cause and the effect relationships between some profitability and growth indicators of mutual funds. A cause and effect relationship between dependent and explanatory variables is also developed by applying regression analysis. Different hypotheses are developed to justify the truth in this study. Thus, a combination of descriptive, hypothesis testing and causal research are selected for this study.

## 3.3 Measures of Variables and Units of Analysis

Based on the objectives of the present study, different variables are chosen to establish relationship among gross income, total expenses and net income, to make relationship among net assets value, earnings per share and dividend per share of ICB Mutual Funds. Some statistical measures such as median as central tendency, rank correlation are used to make the ranking among selected mutual funds. Some interval scales such as mean as

central tendency, standard deviation as dispersion are also used. Actual figures of variables are taken into consideration in this study. The author manipulates the data for convenience of the study by using different statistical techniques.

Thus, a mix of measures including nominal, ordinal, interval and ratio scales is used to facilitate the growth analysis of ICB Mutual Funds, to evaluate the risk-adjusted performance, and to analyze selectivity, diversification and market timing ability of mutual fund managers. These measures also facilitate to test the impact of some major determinants on mutual fund growth.

Data for this study are collected from secondary sources. Each mutual fund is isolated from assets turnover ratio, expense ratio, risk-adjusted returns, dividend payout ratio, net assets value and so on are derived from financial statements of different mutual fund annual report, but the management of each mutual fund cannot be isolated from one another. Therefore, the selected 8 prominent ICB Mutual Funds are considered as units of analysis.

### 3.4 Sampling Design

There are about 41 mutual funds in Bangladesh, which are trading in Dhaka Stock Exchange (DSE) and among these; about 17 mutual funds are managed by Investment Corporation of Bangladesh (ICB). All mutual funds under the management of ICB are the population of the study. Purposively, first 8 ICB Mutual Funds are considered as samples for this study. These Mutual Funds are chosen as samples because of their data

availability and large time horizon compared to other mutual funds in the population. The data of the selected Mutual Funds are chosen for the period from 1996 to 2011, because the data of the selected Mutual Funds before this span are not available.

### 3.5 Sources of Data and Data Collection

The study uses trend data from 1996 to 2011. The data are collected by the author himself from secondary sources and variables related to the study are carefully labeled. This study uses income statement and balance sheet data for the sample ICB Mutual Funds. Data are collected from various issues of annual report of ICB Mutual Funds, annual report of ICB, annual report of Bangladesh Securities and Exchange Commission (BSEC), Quarterly Review of BSEC, Monthly Review of Dhaka Stock Exchange (DSE), Bangladesh Economic Review, Statistical Year Book of Bangladesh, Websites of Dhaka Stock Exchange (DSE), Investment Corporation of Bangladesh (ICB) and Bangladesh Securities and Exchange Commission (BSEC).

### 3.6 Data Editing

After collecting raw data from secondary sources, it is processed to detect errors and omissions and edited as many times as possible. Data sets are completed with a careful scrutiny. It is assured that data selected for the current study are accurate and consistent with other facts gathered. Data are well arranged for completing the study. To test the stationarity of data, Levin, Lin and Chu test, Im Pesaran and Shin test and ADF-Fisher

test are attempted. To establish long-run and short-run relationship among the variables, Kao cointegration test and Granger-causality test, respectively are run.

### 3.7 Reliability and Validity of Data

With a view to justify the reliability and validity of the data and credibility and trustworthiness of the data within collected documents and books, a care is taken to use the original works, to distinguish between a fact and an opinion and to evaluate and compare between old and new materials. Constructive opinions of different authors are adjusted with the present study and adverse opinions among different authors, which seem to be equally reliable, are resolved here by weighing and counting the evidence for each point of view and then analyzing the researchers' value judgments.

### 3.8 Techniques of Data Analysis

There are various statistical tools, which are used to find risk and return of mutual funds, market return, and risk free rate of return, standard deviation, Coefficient of variation, Covariance, coefficient of correlation and determination and beta coefficient. The basic concepts of portfolio risk and return and analytical methods of the same are discussed below which will help to analyze the ICB mutual fund performance.

**Return of Mutual Funds:** The rates of returns of different mutual funds are computed on the basis of annual opening and closing market prices and annual dividend of those mutual funds. The return from mutual fund $P$ at time $t$ is as follows:

$$R_{Pt} = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}} \times 100 \text{ .....(3.1)}$$

Where, $R_{Pt}$ is rate of return of a portfolio $P$ at time $t$, $D_t$ is dividend per share in the period $t$, $P_t$ is price per share in the period t and $P_{t-1}$ is price per share in the period $t-1$

.

**Market rate of return:** The market rates of returns are computed on the basis of annual general index of Dhaka Stock Exchange (DSE). Such as:

$$R_{Mt} = \frac{Index_t - Index_{t-1}}{Index_{t-1}} \times 100 \text{ .....(3.2)}$$

Where, $R_{Mt}$ is market return in t time, $Index_t$ is general index of DSE at time $t$ and $Index_{t-1}$ is general index of DSE at time $t-1$.

**Risk Free Rate of Return:** The risk free return is the return at which an investor can invest his/her funds with zero risk over a given period of time. In this research work, interest rate on 364-day Bangladeshi Treasury Bill is taken as risk free return.

**Standard Deviation:** The standard deviation is the absolute measure of risk. It measures the variability or tightness of a set of outcomes for a particular period of time. The standard deviation for mutual funds can be computed as follows:

$$\sigma_P = \sqrt{\frac{\sum_{i=1}^{n} y^2}{n-1}} \text{ .....(3.3)}$$

Where, $\sigma_P$ is the standard deviation of a portfolio or a mutual fund $P$, $y = \left(R_P - \overline{R_P}\right)$, $R_P$ is return on a portfolio or a mutual fund, $\overline{R_P}$ is average rate of return of a portfolio and $n$ is the number of period. Standard deviation of market return is:

$$\sigma_M = \sqrt{\frac{\sum_{i=1}^{n} X^2}{n-1}} \quad \text{..... (3.4)}$$

Where, $\sigma_M$ is standard deviation of a market portfolio, $x = \left(R_M - \overline{R_M}\right)$, $R_M$ is the return of market index, $\overline{R_M}$ is the average market return.

**Downside Risk:** Sometimes, investors show their attitudes toward risks through downside risk. Simons (1998) shows that to calculate a measure of downside risk, it would be considered only losses but not gains. For calculating downside risk the following steps are followed:

1) Compute the number of years when excess returns over risk free returns are underperformed.
2) Sum up of the underperformed excess returns.
3) Divide the sum by the total number of years in the research period.

Sharpe (1997) analyzes monthly standard deviations of excess returns and average monthly underperformance in a sample of 1,286 diversified equity funds in the three-year period between 1994 and 1996. He finds a close relationship between these two measures, with a correlation coefficient of 0.932. Such a close correlation is not surprising, since monthly stock returns generally follow a symmetrical bell-shaped

distribution. Therefore, stocks with larger downside deviations will also have larger standard deviations.

**Beta Coefficient:** Risk can be classified in two categories: systematic risk and unsystematic risk. Systematic risk cannot be diversified. It reflects the tendency of return of a given security with respect to the market return. The formula of calculating beta coefficient is:

$$\beta_P = \frac{n\sum_{i=1}^{n} xy - \left(\sum_{i=1}^{n} x \times \sum_{i=1}^{n} y\right)}{n\sum_{i=1}^{n} x^2 - \left(\sum_{i=1}^{n} x\right)^2} \quad \text{.....(3.5)}$$

Where, $\beta_P$ is beta coefficient of a portfolio, $x = \left(R_M - \overline{R_M}\right)$, $y = \left(R_P - \overline{R_P}\right)$, $R_P$ is return on a portfolio or a mutual fund, $R_M$ is return of market index.

**Coefficient of Correlation and Determination:** Correlation shows the directional relationship between two variables. The coefficient of determination indicates the goodness of fit. It is nothing but square of correlation coefficient. The formula of coefficient of correlation and determination is as under:

$$\rho_{PM} = \frac{n\sum_{i=1}^{n} xy - \left(\sum_{i=1}^{n} x \times \sum_{i=1}^{n} y\right)}{\sqrt{\left\{n\sum_{i=1}^{n} y^2 - \left(\sum_{i=1}^{n} y\right)^2\right\} \times \left\{n\sum_{i=1}^{n} x^2 - \left(\sum_{i=1}^{n} x\right)^2\right\}}} \quad \text{.....(3.6)}$$

Where, $\rho_{PM}$ is the coefficient of correlation between portfolio return and market return, x=$\left(R_M - \overline{R_M}\right)$, y=$\left(R_P - \overline{R_P}\right)$, $R_P$ is return on a portfolio or a mutual fund, $R_M$ is return of

market index, $\overline{R_M}$ is average market return, $\overline{R_P}$ is average rate of return of a portfolio and $n$ is the number of period.

### 3.9 List of Variables and Model Development

This section describes variable definitions and its classification and develops a model, which shows the functional relationship between dependent and independent variables. Before developing a model for the study, all the concerned variables should be clearly defined and labeled. A variable is any attribute or property in which organisms (objects, events, and people) vary.[3] In developing a cause and effect model, two types of variables, dependent and independent are considered. An independent variable is the presumed cause, whereas a dependent variable is the presumed effect.[4] A more detail of dependent and independent variables is considered, which are used in this study.

#### Dependent Variable

This study examines risk-adjusted returns of ICB Mutual Funds, selectivity, market timing ability and diversification capacity of fund managers, and the impact of some major determinants on mutual fund growth. Different risk-adjusted ratios and growth rate of mutual funds are considered as dependent variables for this study.

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[3] Pedharzur, E.J. and Schmelkin, L.P. (1991), *"Measurement, Design, and Analysis: An Integrated Approach"*, Lawrence Erlbaum Associates, Publishers.

[4] *Ibid.*

**Independent Variable**

In this study, ICB mutual fund rates of returns, market returns and risk free rates of returns are the independent variables for different risk-adjusted ratios used in this study. Excess market returns over risk free return are considered as independent variables for Jensen measure and Treynor and Mauzy quadratic equation. Different determinants of mutual fund growth are considered as independent variables and these variables are briefly explained below:

**Asset Turnover Ratio (ATR):** Total sales revenue of mutual fund is considered as asset turnover. Asset turnover ratio is calculated by using the following formula:

$$ATR_i = \frac{TSR_{it}}{NA_{it}}$$

Where, $ATR_{it}$ is the asset turnover ratio of mutual fund $i$ in period $t$, $TSR_{it}$ is the total sales revenue of mutual fund $i$ in period $t$, and $NA_{it}$ is the net assets of mutual fund $i$ in period $t$. All else equal, the higher the turnover ratio, the higher the growth in the fund. The null hypothesis is that the variable, $ATR$ responds positively to the growth of mutual fund.

**Expense Ratio (ER):** In this study, expense indicates total expenses of mutual fund including management fee for a particular period. This ratio is computed as follows:

$$ER_{it} = \frac{TE_{it}}{NA_{it}}$$

Where, $ER_{it}$ is the expense ratio of mutual fund $i$ in period $t$, $TE_{it}$ is the total expense of mutual fund $i$ in period $t$, and $NA_{it}$ is the net assets of mutual fund $i$ in period $t$. The total expense includes all of the costs that the management company charges to the fund including the management fee, trading costs, and any other expenses. The greater the total expenses ratio, the lower the growth of mutual fund. Investors should prefer a lower cost fund as compared to a higher cost fund. The null hypothesis is that the variable, *ER* is negatively related with the growth of selected Mutual Funds.

**Family Proportion of Mutual Fund (FPF):** Family Proportion of Mutual Fund is the proportion of the mutual fund family assets made up of fund $i$. It is computed as follows:

$$FPF_{it} = \frac{NA_{it}}{TNA_t}$$

Where, $FPF_{it}$ is the family proportion of mutual fund $i$ in period $t$, $NA_{it}$ is the net assets of mutual fund $i$ in period $t$ and $TNA_{it}$ is the total net assets of all selected mutual fund in period $t$. It is hypothesized that the larger the proportion of the family assets in the fund, the higher the expected growth of selected Mutual Funds.

**Liquidity to Net Assets Ratio (LNAR):** Net cash flow of a mutual fund is considered as liquidity position of that mutual fund. This ratio is computed as follows:

$$LNAR_{it} = \frac{NCF_{it}}{NA_{it}}$$

Where, $LNAR_{it}$ is the liquidity to net assets ratio of mutual fund $i$ in period $t$, $NCF_{it}$ is the net cash flows of mutual fund $i$ in period $t$, and $NA_{it}$ is the net assets of mutual fund

$i$ in period $t$. The higher the liquidity positions to net assets ratio, the lower the investment in securities. The null hypothesis is that the determinant, *LNAR* has negative impact on the growth of mutual funds.

**Risk-Adjusted Rate of Return (RAR):** The risk-adjusted rates of returns of a mutual fund estimated by using the Capital Asset Pricing Model. That is:

$$RAR_{it} = R_f + \beta_i (R_M - R_f)$$

Where, $RAR_{it}$ is the risk-adjusted rate of return of mutual fund $i$ in period $t$, $R_f$ is the risk free rate of return $\beta_i$ is the systematic risk of mutual fund $i$ and $R_M$ is the market return. The null hypothesis is that the variable, *RAR* responds positively to the growth of mutual funds.

**Model Development**

The Treynor ratio and its assumption, the Sharpe ratio, Modiglini measure, Sortino ratio and the information ratio are explained to measure risk-adjusted performance of mutual funds. For observing selectivity, market timing ability and diversification capacities of mutual fund managers, the Jensen measure, the Treynor and Mauzy quadratic equation are run to explain the market timing ability and diversification capacity of mutual fund managers. Panel regression model is run to test the impact of some major determinants on mutual fund growth. In this case, the fixed effect model, random effect model and Generalized Least Square (GLS) using Seemingly Unrelated Regression (SUR) framework are run. To test the stationarity of data, unit root test and panel cointegration

test have been considered. Granger-Causality test is explained in this section to find short-run relationship between the variables.

### 3.9.1 Methods of Risk-Adjusted Performance Evaluation

Methods of risk-adjusted performance evaluation with mean-variance criteria are used to evaluate risk-adjusted performance of ICB Mutual Funds. This evaluation technique is based on Capital Asset Pricing Model (CAPM). Jack Treynor (1965), William Sharpe (1966), Michael Jensen (1968), Modigliani and Modigliani (1997), Sortino Ratio (1991) and Information Ratio (IR) (Goodwin, 1998) recognized immediately the implications of the CAPM for analyzing the performance of mutual funds and these five classic models are used to evaluate the risk-adjusted performance of the mutual funds.

**Treynor Portfolio Performance Measure**

Treynor (1965) develops the first composite measure of portfolio performance that includes risk. He postulates two components of risk: (1) risk produced by general market fluctuations and (2) risk resulting from unique fluctuations in the portfolio securities. To identify risk due to market fluctuations, Treynor (1965) introduces the characteristic line, which defines the relationship between the rates of return for a portfolio over time and the rates of return for an appropriate market portfolio. Treynor (1965) notes that the slope of characteristic line measures the relative volatility of the portfolio's returns with respect to the market return. This slope is the portfolio's beta coefficient; a higher slope (beta)

characterizes a portfolio that is more sensitive to market returns and that greater market risk.

Treynor (1965) is interested in a measure of performance that would apply to all investors regardless of their risk preferences, building on development in capital market theory; Treynor (1965) introduces a risk free asset that could be combined with different portfolios to form a straight portfolio possibility line. Treynor (1965) shows that rational, risk-averse investors always prefer portfolio possibility lines with larger slopes, because such high slope lines place investors on higher indifference curves. The slope of this portfolio possibility line (designated *T*) is:

$$T_P = \frac{\overline{R}_P - R_f}{\beta_P} \quad \text{.....(3.7a)}$$

Where, $\overline{R}_P$ is the average rate of return for a portfolio during a specified time period, $R_f$ is the average rate of return on a risk free investment during the same time period and $\beta_P$ is the slope of the fund's characteristic line during that time period (this indicates the portfolio's relative volatility).

As noted, a larger $T$ value indicates a larger slope and a better portfolio for all investors (regardless of their risk preferences). Because the numerator of this ratio $\left(\overline{R}_P - R_f\right)$ is the risk premium and the denominator is a measure of risk, the total expression indicates the portfolio's risk premium per unit of systematic risk; all risk-averse investors will prefer to maximize this value. Note that the risk variable beta measures systematic risk and tells us

nothing about the diversification of the portfolio. It implicitly assumes a completely diversified portfolio, which means that systematic risk is the relevant risk measure.

Comparing a portfolio's $T$ value to a similar measure for the market portfolio indicates whether the portfolio would plot above the security market line (SML). The calculation of the $T$ value for the aggregate market is as follows:

$$T_M = \frac{\overline{R}_M - R_f}{\beta_M} \quad \text{.....(3.7b)}$$

In this expression, $\beta_M$ equals 1.0 (the market beta) and indicates the slope of the SML. Therefore, a portfolio with a higher $T$ value than the market portfolio plots above the SML, indicating superior risk-adjusted performance.

**Sharpe Portfolio Performance Measure**

Sharpe (1966) conceives of a composite measure to evaluate the performance of mutual funds. The measure follows closely his earlier work on the capital asset pricing model (CAPM), dealing specially with the capital market line (CML). The Sharpe measure of portfolio performance (designated $S$) is stated as follows:

$$S_P = \frac{\overline{R}_P - R_f}{\sigma_P} \quad \text{.....(3.8a)}$$

Where, $\overline{R}_P$ is the average rate of return for a portfolio during a specified time period, $R_f$ is the average rate of return on a risk free investment during the same time period, $\sigma_P$ is the standard deviation of the rate of return for the portfolio during the time period.

This composite measure of portfolio performance is similar to the Treynor measure; however, it seeks to measure the total risk of the portfolio by including the standard deviation of returns rather than considering only the systematic risk summarized by beta. Since the numerator is the portfolio's risk premium, this measure indicates the risk premium return earned per unit of total risk in terms of capital market theory.

Comparing a portfolio's $S$ value to a similar measure for the market portfolio, it indicates whether the portfolio would plot above the CML. The formula of the $S$ value for the aggregate market is as follows:

$$S_M = \frac{\overline{R}_M - R_f}{\sigma_M} \text{.....(3.8b)}$$

In this expression, $\sigma_M$ indicates the slope of the CML. Therefore, a portfolio with a higher $S$ value than the market portfolio plots above the CML, indicating superior risk-adjusted performance.

**The Sortino Ratio (SOR)**

The Sortino ratio (*SOR*), (Sortino, 1991) is a ratio that measures risk weighted returns using the downside risk or volatili1y of returns below a certain minimum acceptable return. This ratio is given below:

$$SOR_P = \frac{\overline{R}_P - R_f}{\sigma_{UR}} \text{.....(3.9)}$$

While the numerator is similar to the Sharpe ratio, the denominator is the standard deviation of underperformed return ($\sigma_{UR}$). The less the under-performing fund, the lower

the downside risk, the higher the value of $SOR_P$, and the better the performance of that fund.

**Modigliani Measure**

Sharpe ratio may be difficult for the average investors to understand. The alternative of Sharpe ratio, Modigliani and Modigliani (1997) propose a somewhat different measure of risk-adjusted performance. Their measure expresses a fund's performance relative to the market in percentage terms and they believe that the average investors would find the measure easier to understand. The Modigliani measure can be expressed as follows:

$$MM_P = \frac{\overline{R_P - R_f}}{\sigma_{ER}} \times \sigma_{EM} \text{ .....(3.10)}$$

Where, $MM_P$ is Modigliani measure, $\overline{R_P - R_f}$ is the average excess return, $\sigma_{ER}$ is the standard deviation of portfolio excess return and $\sigma_{EM}$ is the standard deviation of market excess return. Modigliani and Modigliani (1997) propose to use the standard deviation of a broad-based market index, such as the S&P 500, as the benchmark for risk comparison, but for the privilege of analyzing ICB mutual fund's performance, DSE general index is used as the benchmarks. The fund with the highest Modigliani measure, like the fund with the highest Sharpe ratio, would have the highest return for any level of risk. Since their measure is expressed in percentage points, Modigliani and Modigliani (1997) believe that it is more easily understood by average investors.

**Information Ratio (IR)**

Closely related to the statistics, a widely used performance measure, the information ratio developed by Goodwin (1998), is also known as an appraisal ratio. This statistics measures a portfolio's average return in excess of average market return divided by the standard deviation of this excess return. Formally, the information ratio (IR) is calculated as:

$$IR_P = \frac{\overline{R}_P - \overline{R}_M}{\sigma_{ER}} \text{.....(3.11)}$$

Where, $IR_P$ is the information ratio for portfolio $P$, $\overline{R}_P$ is the average return for the portfolio during the specified time period and $\overline{R}_M$ is the average return for the market index or the benchmark during the specified time period, $\sigma_{ER}$ is the standard deviation of excess return during the period.

The mean excess return in the numerator represents the investor's ability to use his/her talent and information to generate a portfolio return that differs from that of the benchmark against which his/her performance is being measured. Conversely, the denominator measures the amount of residual risk that the investor incurs in pursuit of those excess returns. Sometimes, the coefficient is called the tracking error of the investor's portfolio and it is a cost of active management.

Goodwin (1998) notes that the Sharpe ratio is a special case of the information ratio, where the risk free asset is the benchmark portfolio, despite the fact that this

interpretation violates the spirit of a statistic that should have a value of zero for any passively managed portfolio.

### 3.9.2 Methods of Selectivity, Market Timing Ability and Diversification

In this section, three extensions of the basic performance measures are considered to evaluate selectivity, market timing ability and diversification capacity of mutual fund managers. They are:

**Selectivity Performance Measure**

Selectivity indicates the skillness of fund manager to select undervalued securities in the portfolio so that the higher return is possible to earn in the future. Through Jensen alpha, selectivity is measured. Jensen measure (Jensen, 1968) is based on the capital asset pricing model (CAPM). All versions of the CAPM calculate the expected one-period return on any security or portfolio by the following expression:

$$E(R_P) = R_f + \beta_P \left[ E(R_M) - R_f \right] \text{.....(3.12a)}$$

Where, $E(R_P)$ is the expected return on security or portfolio $P$, $R_f$ is the one period risk free return, $\beta_P$ is the systematic risk for security or portfolio $P$ and $E(R_M)$ is the expected return on the market portfolio of risky assets.

The expected return and risk free return vary for different period. Consequently, it is concerned with the time series of expected rates of return for security or portfolio $P$.

Moreover, assuming that the asset-pricing model is empirically valid, we can express above equation in terms of realized rates of returns follows:

$$R_{Pt} = R_f + \beta_P (R_{Mt} - R_f) + \varepsilon_{Pt} \text{.....(3.12b)}$$

This equation states that the realized rate of return on a security or portfolio during a given time period should be linear function of the risk free rate of return during the period, plus risk premium that depends on the systematic risk of the security or portfolio during the period plus a random error term $(\varepsilon_{Pt})$. Subtracting the risk free return from both sides, we have

$$R_{Pt} - R_f = \beta_P (R_{Mt} - R_f) + \varepsilon_{Pt} \text{.....(3.12c)}$$

This shows that the risk premium earned on the portfolio $P$ is equal to $\beta_P$ times a market premium plus a random error term. In this form, an intercept for regression is not expected if all assets and portfolios are in equilibrium.

Alternatively, superior portfolio managers who forecast market returns or consistently select undervalued securities earn higher risk premiums that those implied by this model. Specifically, superior portfolio managers have consistently positive random error terms because the actual returns for their portfolios consistently exceed the expected returns implied by this model. To detect and measure this superior performance, we must allow for an intercept (a nonzero constant) that measures any positive or negative difference from the model. Consistent positive differences cause a positive intercept, whereas consistent negative differences (inferior performance) cause a negative intercept. With intercept or nonzero constant, the earlier equation is mentioned as follows:

$$R_{Pt} - R_f = \alpha_P + \beta_P (R_{Mt} - R_f) + \varepsilon_{Pt} \text{ .....(3.12d)}$$

In this equation, $\alpha_P$ value indicates whether the portfolio manager is superior or inferior in market timing and/or stock selection. A superior manager has a significant positive $\alpha_P$ (alpha) value because of the consistent positive residuals and vice versa.

Therefore, the $\alpha_P$ represents how much of the rate of return on the portfolio is attributable to the manager's ability to derive above-average returns adjusted for risk. Superior risk-adjusted returns indicate that the manager is good at either predicting market turns, or selecting undervalued issues for the portfolio, or both.

**Diversification Performance Measure**

The selectivity component can also be broken down into two parts. If a portfolio manager attempts to select undervalued stocks and in the process give some diversification, it is possible to measure the added return necessary to justify this diversification decision.

Through coefficient of determination $(R^2)$, diversification can be measured. The value of coefficient of determination is found by regressing the portfolio excess return $(R_P - R_f)$ against the market excess returns $(R_M - R_f)$. The higher the value of the $R^2$, the more the diversification of a portfolio and vice versa.

**Market Timing ability Measure**

Market timing ability indicates the capability of a fund manager to manage portfolio composition with market condition. Treynor and Mauzy (1996) mention a fund manager who would like to prefer market timing, structures the portfolio to have a relatively high beta during a market rise and relatively low beta during market decline. They develop a model, which measures the ability of the fund manager to time the market. The model is as follows:

$$R_P - R_f = \alpha_P + \beta_P(R_M - R_f) + \gamma_P(R_M - R_f)^2 + \varepsilon_{Pt} \text{.....(3.14)}$$

Where, $R_P$ is the return from the portfolio, $R_f$ is the risk free rate of return, alpha $(\alpha)$, beta $(\beta)$ and gamma $(\gamma)$ are the coefficients that are estimated by the quadratic regression analysis. This model is similar to the Jensen's model but it includes a quadratic term to it. The coefficient $\gamma_P$ is the one, which determines the market timing ability but only the sign matters and not the magnitude. If $\gamma_P$ is positive, then the slope of the regression increases with the increase in $(R_M - R_f)$. This change in slope indicates a portfolio managers' market timing ability.

### 3.9.3 Panel Regression Model

To test the impact of some major determinants on mutual fund growth, multiple regression model for each mutual funds and panel regression model are used. It considers fixed effects and random effects model under panel data approach for analysis. It also uses cross-section SUR generalized least squares (GLS) on this specification. The growth

of mutual funds is assumed to depend on a variety of determinants. Empirical studies are employed an endless list of variables. The determinants, which mostly affect the growth of mutual funds, are considered for this study. To analyze the growth rate of ICB Mutual Funds, the following formula is used:

$$G_i = \frac{ASSET_t - ASSET_{(t-1)}}{ASSET_{(t-1)}} \times 100 \text{.....(3.15)}$$

Where $G_i$ is the growth rate of mutual fund $i$, $ASSET_i$ is the net assets of mutual fund $i$ in period $t$ and $ASSET_{t-1}$ is the net assets of mutual fund $i$ in period $t-1$.

Nazir and Nawaz (2010) investigate the role of different factors determining the growth of mutual funds in Pakistan. Simply modifying the regression model provided by Nazir and Nawaz (2010), the following model is used to analyze the impact of some major determinants on the growth of Investment Corporation of Bangladesh (ICB) Mutual Funds. The model in this study uses five relevant variables reflecting growth of ICB Mutual Funds.

Panel regression model that controls for Risk-Adjusted Returns (RAR), Asset Turnover Ratio (ATR), Liquidity Position to Net Assets Ratio (LNAR) within a Family Proportion of Funds (FPF), Expenses Ratio (ER) including the management fee, are used. The relevant regression model is:

$$G_i = \alpha_i + \beta_{1i} ATR_i + \beta_{2i} ER_i + \beta_{3i} FPF_i + \beta_{4i} LNAR_i + \beta_{5i} RAR_i + \varepsilon_i \text{.....(3.16a)}$$

Where:

$Gi$ = Growth of the mutual fund $i$ during the study period of 1996-2011.

*RARi* = Risk-adjusted rate of returns of mutual fund *i*.

*ATRi* = Assets turnover ratio of the fund *i*.

*FPFi* = Family proportion of mutual fund *i* relative to the family of that fund.

*ERi* = Total expense ratio including the management fee of mutual fund *i*.

*LNARi*= Liquidity position to net assets ratio of mutual fund *i*.

The assumptions of this model are:

(a) the error term $(\varepsilon)$ is normally distributed,

(b) the mean value of the error term is zero,

(c) the variance of the error term is constant but unknown,

(d) the value of the error term are independent one another and,

(e) the relationship between mutual fund growth (dependent variable) and the determinants (independent variables) is linear.

The results are tried to analyze with the help of fixed effects model and random effects model. Further, for the test of stationarity, some panel unit root tests and panel cointegration tests are used. These models and their relevant hypotheses are explained below:

**The Fixed Effect Model**

To find how the fixed effects model works, we can consider the following example:

$$G_{it} = \alpha_i + \beta_1 ATR_{it} + \beta_2 ER_{it} + \beta_3 FPF_{it} + \beta_4 LNAR_{it} + \beta_5 RAR_{it} + \varepsilon_{it} \text{ .....(3.16b)}$$

Where $G_{it}$ is the dependent variable, $\alpha_i$ is the intercept term, $\beta_i$ is a k×1 vector of parameters to be estimated on independent variables i= Mutual Funds 1, 2,....., 8; t=1, 2, ....., T and $\varepsilon_{it}$ is the error-term. This model could be estimated using dummy variables, which would be termed the least square dummy variable (LSDV) approach.

$$G_{it} = \beta x_{it} + \mu_1 D1_i + \mu_2 D2_i + \mu_3 D3_i + \ldots\ldots\ldots\ldots + \mu_N DN_i + v_{it} \quad \ldots\ldots\ldots\ldots\ldots(3.16c)$$

Where, $x_{it}$ are independent variables of mutual fund growth. D1i is a dummy variable that takes the value 1 for all observations on the first entity (that is first ICB mutual fund) in the sample and zero otherwise, D2i is the dummy variable that takes the value 1 for all the observations on the second entity (that is second ICB mutual fund) and zero otherwise, and so on. It is noticeable that the intercept term, α, is removed from the equation (5.10c) to avoid the 'dummy variable trap'. When the fixed effects model is postulated in this way, it is relatively easy to see how to test for whether the panel approaches are necessary at all. When restriction is incorporated that all of the intercept dummy variables have the same parameter (i.e. $H_0: \mu_1 = \mu_2 = \ldots\ldots = \mu_N$). If this null hypothesis is not rejected, the data can simply be pooled together and OLS employed. If this null hypothesis is rejected, then it is not valid to impose the restriction that the intercepts are the same over the cross-sectional units and a panel approach must employed.

**The Random Effect Model**

An alternative to the fixed effects model is the random effects model. Under the random effects model, the intercepts for each cross-sectional unit are assumed to arise from a

common intercept α (which is the same for all cross-sectional units and over time), plus a random variable $\omega_i$ that varies cross-sectionally but is constant over time. $\omega_i$ measures the random deviation of each entity's intercept term from the global intercept term α. The random effects panel model can be written as follows:

$$G_{it} = \alpha + \beta_{1i} ATR_{it} + \beta_{2i} ER_{it} + \beta_{3i} FPF_{it} + \beta_{4i} LNAR_{it} + \beta_{5i} RAR_{it} + \varepsilon_{it} \quad .....(3.16d)$$

$$\varepsilon_{it} = \omega_i + v_{it} \quad .....(3.16e)$$

Where $G_{it}$ is the dependent variable, $\alpha$ is the intercept term, $\beta_i$ is a k×1 vector of parameters to be estimated on independent variables i= Mutual Funds 1, 2,....., 8; t=1, 2, ....., T and $\varepsilon_{it}$ is the error-term.

This assumption is more stringent than the corresponding one in the fixed effects case, because with random effects model, we require both $\omega_i$ and $v_{it}$ to be independent of all of the independent variables.

A test for whether this assumption is valid for the random effects model estimator is based on a slightly more complex version of the Hausman test (Hausman, 1978). The Hausman specification test compares the fixed versus random effects under the null hypothesis that the individual effects are uncorrelated with the other regressors in the model (Hausman, 1978). Given a model and data in which fixed effect estimation would be appropriate, a Hausman test statistic tests whether random effects estimation would be almost good. In a fixed effects kind of case, the Hausman test is a test of $H_0$: that random effects would be consistent and efficient, versus $H_1$: that random effects would be

inconsistent. Therefore, if the Hausman test statistic is large, one must use fixed effects model. If the statistic is small, one may get away with random effects model.

### Seemingly Unrelated Regression (SUR) Framework

As the selected Mutual Funds under consideration share common features, many common factors might affect all the mutual funds. In these circumstances, it needs to consider the models of Seemingly Unrelated Regression (SUR). Under SUR framework, the fifth model used in the study can be written as follows:

$$G_{it} = \alpha + \beta_{1i} ATR_{it} + \beta_{2i} ER_{it} + \beta_{3i} FPF_{it} + \beta_{4i} LNAR_{it} + \beta_{5i} RAR_{it} + \varepsilon_{it} \text{.....(3.16f)}$$

Where, $G_{it}$ is the dependent variable, $\alpha$ is the intercept term, $\beta_i$ is a k×1 vector of parameters to be estimated on independent variables i= Mutual Funds 1, 2,....., 8; t=1, 2, ....., T and $\varepsilon_{it}$ is the error-term. Under the SUR framework, this basic panel data equation will produce common multiple equation structure. The disturbances (errors) in the equations may include factors that are common to all the mutual funds.

## 3.10 Tests for Stationarity and Cointegration

When a model is run, stationarity and cointegration tests are very necessary for data analysis. If the data are not stationary and cointegrated, the results might be biased. Different types of stationarity and cointegration tests are discussed below:

## Stationarity Test

In this study, two stationarity test processes for panel data are considered: (1) panel unit root process and (2) panel cointegration test. They are explained below:

## Panel Unit Root Test

Stationarity of data of selected factors of mutual fund growth is checked through panel unit root test. Panel unit root test is not similar to unit root test. There are two types of panel unit root processes (Morshed, 2010):

- When the persistence parameters are common across cross-section, then this type of processes is called a common unit root process.
- When the persistent parameters freely move across cross section, then this type of unit root process is called an individual unit root process.

## Levin Lin and Chu

Levin Lin and Chu (2002) observe the stochastic process $\{y_{it}\}$ for a panel individuals (ICB Mutual Funds in this study), i=1,....., N and each individual contains t=1, ....., T time series observation. They wish to determine whether $\{y_{it}\}$ is integrated for each individual in the panel. Assume that $\{y_{it}\}$ is generated by one of the following three models:

**Model 1:** $\Delta y_{it} = \delta y_{it-1} + \xi_{it}$ .....(3.17a)

**Model 2:** $\Delta y_{it} = \alpha_{0i} + \delta y_{it-1} + \xi_{it}$ .....(3.17b)

**Model 3:** $\Delta y_{it} = \alpha_{0i} + \alpha_{1i}t + \delta y_{it-1} + \xi_{it}$, where $-2 < \delta \leq 0$

For i=1,...., N.....(3.17c)

The error process $\xi_{it}$ is distributed independently across individual and follows a stationary invertible ARMA process for each individual.

$$\xi_{it} = \sum_{j=1}^{\infty} \theta_{ij}\xi_{it-j} + \varepsilon_{it} \text{ .....(3.17d)}$$

In model 1, the panel unit root test procedure evaluates the null hypothesis $H_0$: $\delta=0$ against the alternative $H_1$: $\delta<0$.

The series $\{y_{it}\}$ has an individual-specific mean in model 2, but does not contain a time trend. In this case, the panel test procedure evaluates the null hypothesis that $H_0$: $\delta=0$ and $\alpha_{0i}=0$ for all i, against $H_1$: $\delta<0$ and $\alpha_{0i} \epsilon R$. Finally, under model 3, the series $\{y_{it}\}$ has an individual-specific mean and time trend. In this case, the panel test procedure evaluates the null hypothesis that $H_0$: $\delta=0$ and $\alpha_{1i}=0$ for all i, against $H_1$: $\delta<0$ and $\alpha_{1i} \epsilon R$.

As in the case of a single time series, if a deterministic element (e.g., an intercept or time trend) is present but not included in the regression procedure, the unit root test will be inconsistent. On the other hand, if a deterministic element is included in the regression procedure but is not present in the observed data, the statistical power of the unit root test will be reduced (Johansen's, 1992).

**Im, Pesaran and Shin Test**

Im, Pesaran and Shin (2003) start by specifying separate Augmented Dickey-Fuller (ADF) regression for each cross-section with individual effect and no time trend.

Let $\{y_{it}\}$ are generated according to the following finite-order AR(Pi+1) processes:

$$y_{it} = \mu_i \phi_i(1) + \sum_{j=1}^{p_i+1} \phi_{ij} y_{i,t-j} + \varepsilon_{it}, \quad \text{i=1, 2, ....., N,} \quad \text{t=1, 2, .....T.....(3.18a)}$$

Where $\phi_i(1) = 1 - \sum_{j=0}^{p_i+1} \phi_{ij}$ , which can be written as the ADF (Pi) regressions:

$$\Delta y_{i,t} = \alpha_i + \beta_i y_{i,t-1} + \sum_{j=1}^{p_i} \rho_{ij} \Delta y_{i,t-1} + \varepsilon_{it}, \quad \text{i=1, 2, ....., N, t=1, 2, .....T.....(3.18b)}$$

Where $\alpha_i = \mu_i \phi_i(1), \beta_i = -\phi_i(1) and \rho_{ij} = -\sum_{n=j+1}^{P_i+1} \phi_{in}$

The null hypothesis can be written as

$H_0$: $\beta_i = 0$ for all i

While the alternative hypothesis is

$H_1$: $\beta_i < 0$ for all i

For testing $\beta_i = 0$, the t-bar is formed as a simple average of individual t-statistics

$$\bar{t}_{NT} = \frac{1}{N} \sum_{t=1}^{N} t_{tT}(P_t, \rho_t) \text{.....(3.18c)}$$

The *t*-bar is then stand razed and IPS shows that when $N$ and $T \to \infty$, then the standardized *t*-bar statistic converges to the standard normal distribution.

**ADF -FisherTest**

Augmented Dickey-Fuller (1984) provides a unit root test for cross-sectional observations under autoregressive process. Suppose the P[th] order autoregressive process,

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + ..... + \alpha_{P-2} y_{t-P+1} + \alpha_P y_{t-P} + \varepsilon_t \text{ .....(3.19a)}$$

Adding and subtracting $\alpha_P y_{t-P+1}$, we get

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + ..... + \alpha_{P-2} y_{t-P+2} + (\alpha_{P-1} + \alpha_P) y_{t-P+1} - \alpha_P \Delta y_{t-P+1} + \varepsilon_t \text{ ...(3.19b)}$$

Again, adding and subtracting $(\alpha_{P-1} + \alpha_P) y_{t-P+1}$, we get

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + ..... - (\alpha_{P-1} + \alpha_P) \Delta y_{t-P+1} - \alpha_P \Delta y_{t-P+1} + \varepsilon_t \text{ .....(3.19c)}$$

Continuing this process, we finally get

$$\Delta y_t = \alpha_0 + \gamma y_{t-1} + \sum_{i=2}^{P} \beta_i \Delta y_{t-i+1} + \varepsilon_t \text{ .....(3.19d)}$$

Where, $\gamma = -\left(1 - \sum_{i=1}^{P} \alpha_i\right)$ and $\beta_i = \sum_{j=i}^{P} \alpha_j$ , for i=1, 2, .....P-1

The null hypothesis and alternative hypothesis of Augmented Dickey-Fuller t-test are:

$H_0$: $\gamma = 0$

$H_1$: $\gamma < 0$.

**Panel Cointegration: Kao Cointegration Test**

Kao (1999) presents two tests for the null hypothesis of no cointegration in panel data: the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) type tests. Refereeing to the sequential limit theory, Kao shows that the asymptotic distribution of these statistics will converge to a standard normal distribution, that is N(0,1).

Kao results are offered for the asymptotic of spurious regression within a panel data setting. The specification of the panel model allows for differing intercepts across cross-sections and common slopes. Further, the long-run variance covariance matrix is assumed to be same for all cross-section observations.

Kao shows that in the panel data case, the results for LSDV estimation are somewhat more encouraging. In fact, adding the cross section dimension, an appropriate normalization of the estimated parameter converges in distribution to a normal, mean zero, random variable and even though the model is misspecified, the LSDV estimator is consistent; however, the t-statistic keeps on diverging[5].

Under the null hypothesis of no cointegration, the residuals require the test need to be estimated. The residual based test is equivalent to test for a unit root in the LSDV estimated residuals. Using the panel model, the DF and the ADF test statistics, after appropriate normalizations will converge in distribution to random variables with normal distributions. Kao considers the following model:

$y_{it} = \alpha_i + \beta x_{it} + e_{it}$ Where, i=1, 2, ....., N and t=1, 2.....T .....(3.20a)

$y_{it} = y_{it-1} + u_{it}$ .....(3.20b)

$x_{it} = x_{it-1} + \varepsilon_{it}$ .....(3.20c)

Where, $\alpha_i$ are the fixed effects varying across the cross-section observation, β is the slope parameter common across $i$ and $u_{it}$ are the constant terms. Both $y_{it}$ and $x_{it}$ are

[5] L. Barbieri (2006). "Panel Cointegration Tests: A Review." Serie Rossa: Economia-Quaderno N.44. p. 5.

random walks, and under the null hypothesis of no cointegration, the residual series $e_{it}$ should be non-stationary.

Both tests proposed by Kao can be calculated from the estimated residuals of (3.20a) as:

$$\hat{e}_{it} = \rho\hat{e}_{it-1} + \sum_{j=1}^{p} \theta\Delta\hat{e}_{it-1} + v_{itp} \text{ .....(3.20b)}$$

Where the lags are added in the specification to take care of possible autocorrelation and the number lags, $P$ is the chosen such that the residuals $v_{itp}$ are uncorrelated with passed errors.[6]

In order to test the null hypothesis of no cointegration, the null hypothesis can be mentioned as $H_0 : \rho = 1$ against the alternative hypothesis, $H_1 : \rho < 1$. The OLS estimate of $\rho$ is given by:

$$\hat{\rho} = \frac{\sum_{i=1}^{N}\sum_{t=1}^{T} \hat{e}_{it} e_{it-1}}{\sum_{i=1}^{N}\sum_{t=1}^{T} e_{it-1}} \text{ .....(3.20c)}$$

**Granger-Causality Test**

Granger (1969) starts from the premise that the future cannot cause the present or the past. Arnold (1979) explains that at one extreme, people believe that "everything causes

[6] In the case of DF test, all $\theta_j = 0$

everything," and at the other extreme, people deny the existence of causation whatsoever. Granger[7] devises some tests for causality, which proceed as follows:

Consider two time series $y_t$ and $x_t$. Is it $y$ that causes the $x$ ($y \rightarrow x$) or is it the $x$ causes $y$ ($x \rightarrow y$), where the arrow points to the direction of causality. The Granger causality test assumes that the information relevant to the perdition of the respective variables, $y$ and $x$. is contained solely in the time series data on these variables. The test involves estimating the following pair of regressions:

$$y_t = \sum_{i=1}^{n} \alpha_i x_{t-i} + \sum_{i=1}^{n} \beta_i y_{t-i} + u_{1t} \text{.....(3.21a)}$$

$$x_t = \sum_{i=1}^{n} \lambda_i x_{t-i} + \sum_{i=1}^{n} \delta_i y_{t-i} + u_{2t} \text{.....(3.21b)}$$

Where it is assumed that the disturbances, $u_{1t}$ and $u_{2t}$, are uncorrelated. In passing, note that since we have two variables, we are dealing with bilateral causality. The null hypothesis is $H_0$: $\sum \alpha_i = 0$, that is, lagged x terms do not belong to the regression against the alternative hypothesis, $H_1$: $\sum \alpha_i > 0$.

[7] C.W.J. Granger (1969), "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods" *Econometrica*, Vol. 37, pp. 24-36.

# Chapter Four

# Growth and Development of ICB Mutual Funds

## 4.1 Introduction

This is a contextual chapter. The purpose of this chapter is to define the concept of mutual funds, to discuss objectives and functions of mutual funds, to mention benefits and limitations of mutual funds, to explain different types of mutual funds, to discuss policy development regarding mutual funds and their growth in Bangladesh. This chapter is structured into eleven sections.

Section 4.1 provides a general introduction to the chapter and section 4.2 provides the concept of mutual funds. Section 4.3 briefly explains the historical background of mutual funds, which will help this study. Section 4.4 and 4.5 describe the objectives and different functions of mutual funds, respectively that are necessary for general investors as well as fund managers to take proper decisions.

Section 4.6 and 4.7 state benefits and limitations of mutual funds, respectively that are helpful for investors to distinguish mutual funds from other securities in the capital markets. Section 4.8 enunciates different types of mutual funds in the world from their commencement. Section 4.9 mentions overview of mutual funds in Bangladesh and

section 4.10 and 4.11 discuss policy regarding mutual funds and their growth, respectively in Bangladesh.

## 4.2 Concepts of Mutual Funds

A mutual fund is an investment tool that allows small investors access to a well-diversified portfolios of equities, bonds and other securities. Each shareholder participates in the gain or loss of the fund. The fund net asset value (NAV) is determined each day. Diversification reduces the risk because not all stocks may move in the same directions in the same proportion at the same time. Investors of mutual funds are known as unit holders. The concept of mutual funds can be defined as follows:

**CONCEPT OF MUTUAL FUND**

⇩

Many investors with common financial objectives pour their money

⇩

Investors, on a proportionate basis, get mutual fund units for the sum contributed to the pool

⇩

The money collected from investors is invested into shares, debentures and other securities by the fund manager

⇩

The fund manager realizes gains or losses, and collects dividends or interest income

⇩

Any dividend, interest, capital gains or losses from such investments are passed to the investors in proportion of the number of units held by them.

When an investor subscribes for the units of mutual funds, he/she becomes part owner of the asset of the fund in the same proportion as his/her contribution with the corpus (the total amount of fund). Mutual fund investor is also known as a mutual fund shareholder or a unit holder. Any change in the value of the investments made into capital market investment (such as shares, debentures, etc.) is reflected in the net asset value (NAV) of the scheme.

## 4.3 History of Mutual Funds

Mutual funds really capture the public attention in the 1980s and '90s when mutual fund investments hit record and investors saw incredible returns. However, the idea of pooling assets for investment purposes is around for a long time. Here we look at the evolution of this investment vehicle, from its beginnings in the Netherlands in the 18th century to its present status as a growing, international industry with fund holdings accounting for trillions of dollars in the United States alone.

### Eighteenth Century

The history of the mutual funds is traced to the thriving late 18th century in Amsterdam. In July of 1774, an Amsterdam broker by the name of Abraham Van Ketwich offered on the market a diversified pooled security specifically designed for citizens of modest means. The security was known as a *negotiatie*, an instrument very similar to the present day closed end fund. This first negotiatie, *Eendragt Maakt Magt*, invested in bonds issued

by foreign governments and banks and in plantation loans in the West Indies.[8] The issue was successful and Van Ketwich introduced his second negotiatie, *Concordia Res Parvae Crescunt* in 1779, with more freedom in investment policy. The prospectus stated that the negotiatie would invest in "solid securities and those that based on decline in their price would merit speculation and could be purchased below their intrinsic values."[9]

**Nineteenth Century**

When the pooled investment structure crossed over to the English markets in the 19th century, it evolved into the investment trust, essentially a closed end fund. The first investment trust, *Foreign and Colonial Government Trust*, was founded in 1868 in London. The trust invested in foreign government bonds. The most famous of these investment trusts was Robert Fleming's *First Scottish American Investment Trust* invested in US railroad bonds.[10] By the 1890s the investment trust had migrated to the American markets. *The Boston Personal Property Trust*, formed in 1893, was the first closed end fund in the United States.[11]

**Twentieth Century**

The 1920's saw the creation of the first open-end mutual fund, Massachusetts Investors' Trust in Boston, Massachusetts (1924). The fund went public in 1928, a year which also saw Scudder, Stevens and Clark launched the first no-load fund and the creation of the

[8] Rouwenhorst, K. Geert, *The Origins of Mutual Funds* (December 12, 2004) Yale ICF Working Paper No. 04-48. pp. 5-6
[9] *Ibid,* p.7
[10] *Ibid,* pp. 16-17
[11] James E. McWhinney, *A Brief History Of The Mutual Fund,* Investopedia

*Wellington Fund*, the first mutual fund to include a balanced portfolio of stocks and bonds. By 1929 there were 19 open end mutual funds competing with nearly 700 closed end funds. The stock market crash of 1929 wiped out many highly-leveraged closed end funds; the small open end funds managed to survive. The ensuing round of 1930's financial legislation laid the groundwork for the contemporary mutual fund industry. The era saw the creation of the Securities and Exchange Commission (SEC), the passage of the Securities Act of 1933 and the Securities Exchange Act of 1934. The Investment Company Act of 1940 followed.[12] The act set the legal framework for four types of registered investment companies in the United States:

- Open end investment companies (mutual funds);
- Closed end investment companies ( closed end funds);
- Exchange-traded funds (ETFs);
- Unit Investment Trusts (UITs).

The ensuing major 1973-1974 bear market in stocks and high inflation during the decade resulted in investor redemptions and shrinking assets for mutual funds. The challenging 1970-1980 decade was marked by a number of innovations. Bruce R. Bent established the first money market fund in the US, *The Reserve Fund*, in 1971, which allowed savers and investors access to the high, often double digit money market yields during an age of regulated bank interest rates (5.25% maximum.) The money market fund was very

[12] *Ibid*

successful. In 1982, mutual fund assets consisted of 76% of assets in money market funds, 8% in bond funds, and 16% in stock funds.[13]

The decade saw that John Bogle created a unique metalized mutual fund firm, Vanguard, in 1975. Bogle launched the first retail index fund, *First Index Investment Trust*, based on the S&P 500 Index, in 1976. A number of this era's tax initiatives laid the foundations for growth in the US mutual fund industry. The Traditional IRA was created in 1974 (much liberalized after 1984); in 1976 the law not allowing mutual funds to pass through tax exempt income to investors was amended, thus spawning municipal bond funds[14]; and the 401-k corporate retirement plan came into existence in 1981. Mutual funds were to become the primary funding vehicle for both IRA's and 401-k plans.

In 1993, Nathan Most, an executive with the AMEX stock exchange, building on earlier efforts (1989 Index Participation Shares, halted by litigation, and 1990 Toronto Index Participation Shares) developed the exchange-traded fund with *Standard & Poor's Depositary Receipts* ("spiders"), based on the S&P 500 Index .[15]

The extended bull markets in stocks and bonds over the last two decades of the twentieth century resulted in explosive growth for the mutual fund industry. At the end of 1999,

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[13] John Bogle (2001), Economics 101: *For Mutual Fund Investors... For Mutual Fund Managers*, John Bogle on Investing, McGraw-Hill,

[14] John Bogle (1999), "*Giving the Bond Fund Investor a Fair Shake*", Upon Induction Into The Hall of Fame of the Fixed Income Analysts Society, Inc., New York.

[15] Gary L. Gastineau (2002), "*The Exchange-Traded Funds Manual*". John Wiley and Sons. pp. 32.

there were 7,791 mutual funds in the United States, holding over 6.8 trillion dollars of assets.

**Twenty First Century**

The first decade of the twenty-first century saw historic bear markets at the beginning and ending of the decade. The year 2003 also provided investors with scandal in the mutual fund industry. In 2003, the mutual fund industry was involved in a scandal involving unequal treatment of fund shareholders. Some fund management companies allowed favored investors to engage in late trading, which is illegal, or market timing, which is a practice prohibited by fund policy. The scandal was initially discovered by New York State Attorney General and resulted in significantly increased regulation of the industry.

At the end of 2011, there were over 14,000 mutual funds in the United States with combined assets of $13 trillion, according to the Investment Company Institute (ICI), a trade association of investment companies in the United States. The ICI reports that worldwide mutual fund assets are $23.8 trillion on the same date.

## 4.4 Aims and Objectives of Mutual Funds

Every mutual fund has an investment objective or a goal that it wants to realize. Each fund manager has an investment style, which is the approach he or she follows in making investments to achieve the fund's goal. Most fund aims and objectives fit into one of

several broad categories, such as growth in value, current income, or a combination of growth and income.

The main aims of the mutual funds are:

1. to provide exposure to stock market instruments to the common man who does not have the time or the skills required to invest in them;
2. to maximize the wealth of the investors who have trusted them and invested in them; and
3. to attain a profit out of investing in stocks using the investments done by investors.

Thousands of mutual funds are available that can satisfy the objectives of different types of investors. They are:

**(a) Diversification:** The fundamental objective of mutual funds is to diversify risk. Investors are often advised that they should not "put all their eggs in one basket." Investors who have too high of a percentage of their assets in one or two stocks can be severely affected if one of the companies goes belly-up. Most financial experts say investors should have at least 15 stocks in their portfolios. It takes a lot of time and effort to keep up with that many companies. Conversely, mutual funds hold a number of stocks, which give investors instant diversification and protect them from a sharp decline in any one holding.

**(b) Growth:** Some mutual fund investors are looking for rapid growth in the value of their funds. Stocks have historically offered the best long-term returns of any asset class, though it can be an up-and-down ride. Stock funds that are labeled "growth" typically invest in companies with bright prospects, while "value" funds target stocks that seem inexpensive compared with the company's earnings.

**(c) Income:** Other fund investors care more about receiving income from their investments. Numerous stock funds are invested in companies with high dividend payouts. Bond funds also can provide steady income, as funds that are invested in real estate investment trusts. All these income-focused funds pass the yields along to their investors, usually on a monthly or quarterly basis.

**(d) International Exposure:** Some large international firms offer their shares on US markets, but others do not. For example, individual investors can have a hard time getting access to shares in the fast-growing Chinese market. But international-focused mutual funds have an easier time investing in these shares. Because half of the world's corporate value is outside the US, it is important to have some exposure to overseas stocks, and mutual funds are the easiest way to get this.

**(e) Low Fees**: Stock picking can be expensive thanks to broker commissions, as many "no-load" mutual funds are available that do not charge investors anything. Many other funds charge investors less than 1 percent a year for operational fees. Investors looking for especially inexpensive funds might consider index funds, which charge fees as low as

0.1 percent per year. These funds usually hold every stock or bond in a given asset class, which offers tremendous diversification at a low cost.

### 4.5 Functions of Mutual Funds

Even though many mutual funds can include many different forms of investments, it must be easy to understand the entire concept, and how a particular fund functions in the trading industry. Essentially, a mutual fund is a pool of money obtained at a variety of traders. In the event the money is bundled into a mutual fund, a money manager or broker then invests the cash in a variety of various investments, like stocks, bonds, commodities, plus much more. Functions of mutual funds are:

**(a) Professional Management:** Experience and training count for a lot in the world of investments. It is a world where not knowing the right pricing convention can cost a couple thousand dollars in a few seconds. The key to mutual fund performance and one of its main functions for marginal investors is the fact that it is a hands-off investment. Money managers and a dedicated research team professionally manage the fund.

**(b) Diversification:** The characteristic of professional management is diversification, which serves a risk mitigation function for mutual funds. The more diversified the portfolio, the more of mitigating the risk of losing the original investment value.

**(c) Affordability:** Affordability is a key consideration for most mutual fund investors. The majority of those who invest in mutual funds do not have huge estates to invest and

only small amounts to contribute on a monthly basis. Being able to pay into an investment on a monthly basis provides the mutual funds greater access to a larger investment community.

**(d) Liquidity:** In addition to affordability, mutual fund shares can be easily redeemed (provided redemption fees or back-end funds are not excessive). Increased liquidity contributes to lowering the overall level of risk of investing in anything that is not as liquid as cash.

### 4.6 Benefits of Mutual Funds

Mutual fund is the intermediary in the capital market. It pools small savings from small investors and invests in different securities in capital market with a form of portfolio. The advantages of mutual funds are:

**(a) Portfolio Diversification:** One rule of investing, for both large and small investors, is asset diversification. Diversification involves the mixing of investments within a portfolio and is used to manage risk. For example, by choosing to buy stocks in the retail sector and offsetting them with stocks in the industrial sector, it can be reduced the impact of the performance of any one security on the entire portfolio. To achieve a truly diversified portfolio, it may be bought stocks with different capitalizations from different industries and bonds with varying maturities from different issuers. For the individual investor, this can be quite costly.

**(b) Professional Investment:** When anyone buys a mutual fund, He also chooses a professional money manager. This manager will use the money that any investor invests to buy and sell stocks that he or she has carefully researched. Therefore, rather than having to thoroughly research every investment before deciding to buy or sell, it needs to see a mutual fund's money manager to handle it for investors.

**(c) Liquidity:** Another advantage of mutual funds is the ability to get in and out for circumstances. In general, it is able to sell mutual funds in a short period without there being much difference between the sale price and the most current market value. However, it is important to watch out for any fees associated with selling, including back-end load fees.

**(d) Flexibility and Convenience:** Generally, most of the investors in mutual funds are marginal investors. They do not have the exact sums of money to buy round lots of securities. Ten thousand, fifty thousand, one, or two lacs taka is usually not enough to buy a round lot of a stock, especially after deducting commissions. Investors can purchase mutual funds in smaller denominations, ranging from Tk.10 to Tk.1,000 minimum. Smaller denominations of mutual funds provide mutual fund investors the ability to make periodic investments through monthly purchase plans while taking advantage of dollar-cost averaging. So, rather than having to wait for enough money to buy higher-cost investments, it is possible to get in right away with mutual funds.

**(e) Reduction in Transaction Cost:** Mutual funds are able to take advantage of their buying and selling size and thereby reduce transaction costs for investors. When an investor buys a mutual fund, he is able to diversify without the numerous commission charges.

**(f) Transparency:** One of the distinguishing features of mutual funds is a high level of operational transparency relative to other financial institutions, such as banks, insurance companies and pension funds that cater to the needs of households. Unlike banks and insurance companies, mutual funds do not assume credit and insurance risks and thus do not need to make subjective provisions against non-performing loans or to create actuarial reserves against future insurance claims. Mutual funds invest in marketable instruments and are able to follow a "mark-to-market" valuation for their assets.

### 4.7 Limitations of Mutual Funds

**(a) Fluctuation of Returns**: Mutual funds are like many other investments without a guaranteed return. There is always the possibility that the value of a mutual fund will depreciate. Unlike fixed-income products, such as bonds and Treasury bills, mutual funds experience price fluctuations.

(b) **No Control over Cost in the hands of an Investor:** Mutual fund is managed by professional manager who deals the portfolio. That manager purchases different securities from capital markets and sells securities from that portfolio if he/she thinks. Here the investors have no power to say about the wrong of the manager and there is no

value of the fund's portfolio less liabilities, but how is it possible to know if one fund is better than another? Furthermore, advertisements, rankings and ratings issued by fund companies only describe past performance. It is noted that mutual fund descriptions/advertisements always include the tagline "past results are not indicative of future returns". Be sure not to pick funds only because they have performed well in the past - yesterday's big winners may be today's big losers.

## 4.8 Classification of Mutual Funds

Mutual fund is a portfolio of different securities of capital markets. There may emerge different types of mutual funds in the capital market as well as money market based on structure, objectives, functions of mutual funds etc. Mutual fund can be classified as follows:

**Based on Structure**

**i) Open End Funds:** Investor can buy and sell the units from the fund, at any point of time.

**ii) Close End Funds**: These funds raise money from investors only once. Therefore, after the offer period, fresh investments cannot be made into the fund. If the fund is listed on a stock exchange, the units of fund can be traded like stocks.

**Based on Investment Objectives**

With fluctuating share prices, such funds show volatile performance. Short-term fluctuation in the market smoothens out in the long-term thereby offering higher returns at relatively lower volatility. At the same time, such funds can yield great capital appreciation as historically equities have outperformed all asset classes in the long term. Hence, investment in equity funds should be considered for a period at least 3-5 years. It can be further classified as:

**i) Index Funds**: In this case, a key stock market index is tracked. Their portfolio mirrors the benchmark index in terms of both composition and individual stock weightings.

**ii) Equity Diversified Funds:** 100% of the capital is invested in equities spreading across different sectors and stocks.

**iii) Dividend Yield Funds:** It is similar to the equity diversified funds except that they invest in companies offering high dividend yields.

**iv) Thematic Funds:** For thematic mutual funds, 100% of the assets is invested in sectors, which are related through some theme, e.g., an infrastructure fund invests in power, construction, cements sectors etc.

**v) Sector Funds:** When 100% of the capital is invested in a specific sector, then it is called sector funds. For example, a banking sector fund will invest in banking stocks.

**vi) Equity Linked Saving Scheme (ELSS):** These types of mutual funds provide tax benefit to the investors.

**Balanced Fund**

This type of investment portfolio includes both debt and equity. As a result, on the risk-return ladder, they fall between equity and debt funds. Balanced funds are the ideal mutual funds vehicle for investors who prefer spreading their risk across various instruments. Following are balanced funds classes:

**i) Debt-Oriented Funds:** When investment is made below 65% in equities, then it is called debt-oriented mutual funds.

**ii) Equity-Oriented Funds:** When at least 65% of total capital is invested in equities, remaining in debt, it is called equity-oriented mutual funds.

**Debt Fund**

The manager of this type of mutual fund invests only in debt instruments, and there is a good option for investors to averse the idea of taking risk associated with equities. Therefore, they invest exclusively in fixed-income instruments like bonds, debentures, Government Saving Certificate, and money market instruments such as certificates of deposits (CDs), commercial papers (CPs) and call money. The different types of debt mutual funds are:

**i) Liquid Coupon Rate Funds:** These funds invest 100% in money market instruments. A large portion is being invested in call money market.

**ii) Gilt Funds ST:** These funds invest 100% of their portfolio in government securities and T-bills.

**iii) Floating Rate Funds**: managers of these types of mutual funds invest in short-term debt securities.

**iv) Arbitrage Fund:** They generate income through arbitrage opportunities due to miss pricing between cash market and derivatives market. Funds are allocated to equities, derivatives and money markets. Higher proportion (around 75%) is put in money markets, in the absence of arbitrage opportunities.

**v) Gilt Funds LT:** They invest 100% of their portfolio in long-term government securities.

**vi) Income Funds LT:** Typically, such funds invest a major portion of the portfolio in long-term debt papers.

**vii) Monthly Income Plans (MIPs):** Monthly Income Plans have an exposure of 70%-90% to debt and an exposure of 10%-30% to equities.

**viii) Fixed Monthly Plans (FMPs):** Fixed Monthly Plans invest in debt papers whose maturity is in line with that of the fund.

## 4.9 Mutual Funds in Bangladesh

The mutual fund industry in Bangladesh started in 1980 with the formation of first ICB mutual fund initiated by Investment Corporation of Bangladesh (ICB). After that, about 40 mutual funds are launched in Bangladeshi capital markers. The brief history of launching of mutual funds in Bangladeshi capital markets is mentioned below:

The mutual fund was first launched by the government autonomous organization, Investment Corporation of Bangladesh (ICB) in 1980. It launched eight closed end mutual funds in different periods: first ICB Mutual Fund in 1980; second ICB Mutual Fund in 1984; third ICB Mutual Fund in 1985; fourth ICB Mutual Fund in 1986; fifth ICB Mutual Fund in 1987; sixth ICB Mutual Fund in 1988 seventh ICB Mutual Fund in 1995 and eighth ICB Mutual Fund in 1996. In 1996 total paid up capital of these Mutual Funds is Tk. 1750 lacs.

ICB Securities Trading Company provides trading facility, depository participant facility of CDBL, brokerage service, managing own portfolio and work as selling agent of DSE. Meanwhile, another government agency, Bangladesh Shilpa Rin Sangstha (BSRS), merged in to Bangladesh Development Bank, launched its solitary mutual fund in 1997, which is running under its own status. The first ever-private asset management company AIMS of Bangladesh comes into play in 1999. They issue their first fund, AIMS First

Guaranteed Mutual Fund, a closed end balanced fund in March 2000. Where guarantee means, the capital of the fund that is underwritten at redemption by IDLC and AIMS during the initial five years of life.

In 2003, Asset Management Company Limited (AMCL) launched ICB AMCL 1st mutual fund with paid up capital of Tk.100 million. Later, in 2005 the unit holders resolve to reduce the guarantee to 50% underwritten only by AIMS. This translates that 50% of the paid-up capital loss will be borne by AIMS at the time of redemption. The portfolio of this mutual fund will be a growth-value blend basket of large-cap as well as small-cap stocks and a mix of fixed income securities. Besides AIMS, currently few other private fund managers are also doing this business, namely, RACE, LR Global, BRAC-EPL etc. all together.

Gradually, ICB 1st to 3rd NRB, ICB 1st and 2nd AMCL mutual fund, ICB employee mutual fund, ICB Islamic mutual fund etc. are launched in Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE) one after another. Later on, three subsidiaries are created, they are: ICB Capital Management Limited, ICB Asset Management Company Ltd. and ICB Securities Trading Company Ltd. ICB Capital Management Limited is mainly concerned with underwriting of share, issue management, placement of share, investment counseling, managing investment account; ICB Asset Management Limited is involved with investment management. At present more than 40 closed end funds are traded in the Dhaka Stock Exchange (DSE) with few waiting in the queue for starting their operation (Table 4.1).

(As on 10.05.2012)

**Table 4.1: Mutual Funds in Bangladesh**

| Company Name | Trading Code | Paid-Up Capital (mn Tk.) | Face Value (Tk.) | Listing Year | Market Capital (mn Tk.) |
|---|---|---|---|---|---|
| 1ST ICB MUTUAL FUND | 1STICB | 8.0 | 10 | 1980 | 696.83 |
| 2ND ICB MUTUAL FUND | 2NDICB | 5.0 | 10 | 1984 | 130.00 |
| 3RD ICB MUTUAL FUND | 3RDICB | 10.0 | 10 | 1985 | 157.00 |
| 4TH ICB MUTUAL FUND | 4THICB | 10.0 | 10 | 1986 | 157.70 |
| 5TH ICB MUTUAL FUND | 5THICB | 15.0 | 10 | 1987 | 187.80 |
| 6TH ICB MUTUAL FUND | 6THICB | 50.0 | 10 | 1988 | 236.00 |
| 7TH ICB MUTUAL FUND | 7THICB | 30.0 | 10 | 1995 | 285.00 |
| 8TH ICB MUTUAL FUND | 8THICB | 50.0 | 10 | 1996 | 272.50 |
| 1ST BSRS MTUAL FUND | 1STBSRS | 50.0 | 10 | 1997 | 474.00 |
| AIMS 1ST MUTUAL FUND | AIMS1STMF | 415.0 | 10 | 2000 | 1454.90 |
| ICB AMCL 1st MUTUAL FUND | ICBAMCL1 | 100.0 | 10 | 2003 | 420.00 |
| ICB AMCL ISLAMIC MUTUAL FUND | ICB1SLAMIC | 100.0 | 10 | 2005 | 200.00 |
| GRAMEEN MUTUAL FUND ONE | GRAMEEN1 | 255.0 | 10 | 2005 | 1185.75 |
| ICB AMCL 1ST NRB MUTUAL FUND | ICB1STNRB | 100.0 | 10 | 2007 | 280.00 |
| ICB 2ND NRB MUTUAL FUND | ICB2NDNRB | 1000.0 | 10 | 2008 | 1450.00 |
| GRAMEEN ONE SCHEME TWO | GRAMEENS2 | 1375.0 | 10 | 2008 | 2076.25 |

*Continued to the next page*

| | | | | | |
|---|---|---|---|---|---|
| PRIME FINANCE FIRST MUTUAL FUND | 1STPRIMFMF | 200.0 | 10 | 2009 | 240.00 |
| EBL FIRST MUTUAL FUND | EBL1STMF | 1000.0 | 10 | 2009 | 940.00 |
| ICB AMCL SECOND MUTUAL FUND | ICBAMCL2 | 500.0 | 10 | 2009 | 405.00 |
| ICB EMPLOYEES PROVIDENT MF1: 1ST | ICBEPMF1S1 | 750.0 | 10 | 2009 | 585.00 |
| EBL NRB MURUAL FUND | EBLNRBMF | 1500.0 | 10 | 2009 | 1245.00 |
| TRUST BANK 1ST MUTUAL FUND | TRUSTB1MF | 2000.0 | 10 | 2010 | 1680.00 |
| PRIME BANK IST ICB AMCL MUTUAL FUND | PRIME1ICBA | 1000.0 | 10 | 2010 | 680.00 |
| DBH 1ST MUTUAL FUND | DBH1STMF | 1200.0 | 10 | 2010 | 780.00 |
| IFIC BANK 1ST MUTUAL FUND | IFIC1ST MF | 1200.0 | 10 | 2010 | 912.00 |
| PHOENIX FINANCE 1ST MUTUAL FUND | PF1STMF | 600.0 | 10 | 2010 | 372.00 |
| ICB AMCL THIRD NRB MUTUAL FUND | ICB3RDNRB | 1000.0 | 10 | 2010 | 650.00 |
| FIRST JANATA BANK MUTUAL FUND | 1JANATA MF | 2000.0 | 10 | 2010 | 1440.00 |
| GREEN DELTA MUTUAL FUND | GREENDEL MF | 1500.0 | 10 | 2010 | 810.00 |
| POPULAR LIFE FIRST MUTUAL FUND | POPULAR1 MF | 2000.0 | 10 | 2010 | 1260.00 |
| IFIL ISLAMIC MUTUAL FUND-1 | IFILISLMFI | 1000.0 | 10 | 2010 | 540.00 |
| PHP 1ST MUTUAL FUND | PHPMF1 | 2000.0 | 10 | 2010 | 1140.00 |

*Continued to the next page*

| | | | | | |
|---|---|---|---|---|---|
| AIBL 1ST ISLAMIC MUTUAL FUND | AIBL1STIMF | 1000.0 | 10 | 2011 | 730.00 |
| MBL 1ST MUTUAL FUND | MBLISTMF | 1000.0 | 10 | 2011 | 740.00 |
| SOUTHEAST BANK IST MUTUAL FUND | SEBL1STMF | 907.0 | 10 | 2011 | 888.99 |
| "RELIANCE ONE" THE 1ST SCHEME | RELIANCE1 | 550.0 | 10 | 2011 | 462.00 |
| LR GLOBAL BANGLADESH MUTUAL FUND ONE | LRGLOBMF1 | 3000.0 | 10 | 2011 | 2940.00 |
| AB BANK 1ST MUTUAL FUND | ABB1STMF | 1500.0 | 10 | 2012 | 1545.00 |
| NLI 1ST MUTUAL FUND | NLIISTMF | 458.0 | 10 | 2012 | 430.13 |
| FIRST BANGLADESH FIXED INCOME FUND | FBFIF | 5000.0 | 10 | 2012 | 4600.00 |

Now a days, commercial banks and non-bank financial institutions are getting involved in mutual fund issue firmly. There are 15 funds of different banks, financial institutions and insurance companies out of 36 funds traded in DSE.

The objectives for this trend is to get synergic benefit from cost savings from different process of managing funds, to use their funds (the portion of sponsor) in marketable securities to get the benefits of and to diversify its portfolio of investment. The proceeds of these mutual funds are invested in both equity (stock market) and Fixed Income Scheme (FIS). At least 70 percent of the realized income risk-adjusted performance of mutual fund is distributed as dividend in taka amount at the end of each accounting year.

As per BSEC rules, the dividend must be distributed within 45 days from the date of declaration.

### 4.10 Policy Regarding Mutual Funds

The mutual fund shall be constituted in the form of a Trust made in accordance with the provisions of Trust Act, 1882 (Act II of 1882) and under the provisions of the Security and Exchange Commission (Mutual Fund) Ordinance, 2001. The instrument of trust shall be duly registered under the provisions of Registration Act, 1908 (Act XVI of 1908). According to this Ordinance, the main features of mutual funds in Bangladesh are:

Tenure (not more than 10 years for closed end mutual fund) and size of the mutual fund as designed and structured by the Asset Management Company and duly approved by the Trustee, which shall be predetermined at the time of offer in case of closed end mutual funds. Individuals as well as the institutional investors are eligible for investment in this fund. The Asset Management Company shall pay all registration and other fees as payable to the Commission or any other agencies under the Ordinance and to the legal advisor(s) for establishing the mutual fund and its various schemes and for registration of the Deed from the fund.

The fund shall invest subject to the Ordinance and only in those securities, deposits and investment approved by the Securities and Exchange Commission and/or the Bangladesh Bank and/or the Insurance Regulatory Authority (IRA) of Bangladesh or any other competent authority authorized in this behalf.

The mutual fund shall follow a general net formula approved by the Commission and prescribed in the Ordinance for computing the Net Asset Value (NAV) per unit of the Schemes on weekly basis or as directed by the Commission and adequate disclosure shall be made as per the provision of the Ordinance. The fund shall not borrow to finance its investments, as long as it is not permissible under the Ordinance.

**Rights, Duties and Obligation of the Parties of Mutual Funds**

There are different parties involved in mutual funds. The sponsors, the trustee, the Asset Management Company and the custodian are notable among them. These parties have different rights, duties and obligations in mutual fund operations, which are described as follows:

**The Sponsors**

The Sponsor shall have caused to constitute the mutual funds by virtue of the Trust Deed. He/she appoints the Trustee of the mutual funds by virtue of the Trust Deed, who shall hold the property of the fund in trust for the benefit of the unit holders of the schemes and appoints the Custodian, who shall provide custodian service to the fund in accordance with the Ordinance.

**The Trustee**

As the guardian of the mutual funds, the Trustee shall hold all capital assets of the mutual funds in trust for the benefit of the unit holders, in accordance with the Ordinance and the instrument of Trust. The unit holders shall preserve only the beneficial interest in the Trust properties on pro rata basis of their ownership in the specific scheme of the fund.

**The Asset Management Company**

The Asset Management Company shall be responsible for designing, structuring, registering, promoting, issue & public floatation, investment operation and management of the schemes of the mutual funds in accordance with the provisions of the Trust Deed and the Ordinance. The Company shall take initiative to facilitate electronic settlement of certificates of the fund with the CDBL, as and where applicable.

**The Custodian**

The Custodian shall keep liaison with the CDBL, and collect and preserve information required for ascertaining the movement of securities of the fund, and keep the securities of the fund in safe and separate custody and shall provide highest security for the assets of the fund.

The Custodian, among others, shall preserve the following documents and information as applicable as regards to the fund:

(a) Details of acquisition and disposal of securities under custody;

(b) Details of receipt and disbursement of funds;

(c) Details about the right of the clients on the securities held on behalf of the clients;

(d) Details of registration of the securities, if any; under custody;

(e) Ledger of accounts of the clients;

(f) Details about the order received from and given to the clients.

**General Obligation of Mutual Funds**

There are different obligations of mutual funds when it enters and is operated in the markets. The general obligations of mutual funds are discuss below:

**Expenses of the Fund**

The initial issue expenses in respect of the schemes shall not exceed 5% of the targeted amount of the fund raised under any scheme or any other ceiling as determined by the Commission. The total expenses charged to any scheme of mutual fund, except the amortization of initial issue expenses and transaction cost in the form of stock brokerage against buy and sale of securities, forming a part of acquisition or disposal cost of such securities, but including transaction fees payable to the Custodian against acquisition or disposal of securities, CDBL charges, listing fees payable to the stock exchange(s), management fees payable to the Asset Manager and Trustee fees, annual registration fees payable to the Commission, audit fees, cost for publication of reports and periodicals, bank charges, and all other expenses related to the operation of the scheme.

**Refunds**

The Asset Management Company shall be liable to refund to the applicants the entire amount of money collected through IPO, if any, for any scheme of the fund, if public subscription including sponsor's contribution plus private placements fail to collect a minimum amount which have been mentioned in the Act 46 and 48 of the Security and Exchange Commission (Mutual Fund) Ordinance, 2001.

In the event of failure to refund any refundable amount within the period stipulated in the Ordinance, the Asset Management Company shall be liable to pay the applicants the entire amount with interest @ 18% per annum or as determined by the Commission within the next month from the expiry of the aforesaid period as per Ordinance, and any such interest payable for late payment stated above, shall be paid from the own account of the Asset Management Company.

**Maintenance of Proper Books of Accounts and Records**

Subject to the provision of the Ordinance, mutual fund shall keep and maintain proper books of records and documents. The fund shall also follow the accounting policies and standards so as to provide appropriate details of the scheme-wise disposition of the assets of the fund at the relevant accounting date, and the performance during the period together with information regarding distribution or accumulation of income accruing to the unit holders in a fair and true manner and in conformance with disclosure norms.

**Limitation of Expenses**

All expenses shall be clearly identified and appropriated to the respective schemes. The Asset Management Company shall charge the schemes of the mutual funds with formation, investment management and advisory fees, which are fully disclosed in the prospectus of the scheme or provided for in the Ordinance. Asset Management Company may amortize the initial issue costs of the various schemes of the fund over a period as provided for in the Ordinance.

**Borrowing Policy**

As per current provisions of the Ordinance, mutual fund is neither permitted to borrow for finance any investment nor allowed to advance/guarantee any term loan for any purpose. However, if the Securities and Exchange Commission withdraws or relaxes these restrictions during the lifetime of the fund, if necessary, with the consent of the Trustee, it may well opt for borrowing from any legal sources as well as advance/guarantee term loan at a competitive rate.

**Distribution of Dividend**

The fund shall declare and pay dividend to the unit holders annually from the distributable profit, if any. Unit holders whose names will appear in the register on the record date to be declared each year will be eligible to receive the dividend. The Asset Management Company shall pay off the declared dividend and submit a statement thereof to the Commission and the Trustee in the manner and within the period stipulated by the

Ordinance or as directed by the SEC. Mutual fund shall create a dividend equalization reserve by suitable appropriation from the net income of the schemes.

**Winding Up of Mutual Funds**

(a) The open end schemes of the mutual fund shall be wound up if the number of outstanding units of the scheme at any point in time falls below 25% of the total issued units, after repurchases.

(b) The closed end schemes of the mutual funds may be wound up:

(i) On the expiry of any pre-determined tenure.

(ii) On the happening of any event, this scheme, in the opinion of the Trustee, requires the scheme to be wound up, subject to approval from the Commission,

(iii) If holders of 75% units of the scheme pass a resolution that the scheme be wound up,

(iv) If the Commission so directs in the interest of the unit-holders.

**Effect of Winding Up**

On and from the date of the notice of winding up of any scheme of the fund, the Trustee or the Asset Management Company as the case may be,

(a) Shall cease to carry on any business activities of the scheme.

(b) Cease to create and cancel units in the scheme.

(c) Cease to issue and redeem units in the scheme.

## 4.11 Growth of ICB Mutual Funds

Before 2000, the mutual fund listing in the capital market of Bangladesh was very negligible and after 2000, listing of mutual funds is increasing and their performance compared to other securities is better. The table 3 in appendix B shows the growth of mutual funds in DSE of Bangladesh. Only the 8 ICB Mutual Funds was operated actively up to 1997 and that after, 1st Bangladesh Shilpa Rin Sangstha mutual fund and AIMS 1st mutual fund was introduced in the capital market in 1997 and 2000, respectively. After IMS 1st mutual fund, the different mutual funds are listed in this capital market and from 1980-2012, the listing growth of mutual funds is very high which signals the market stability in the future.

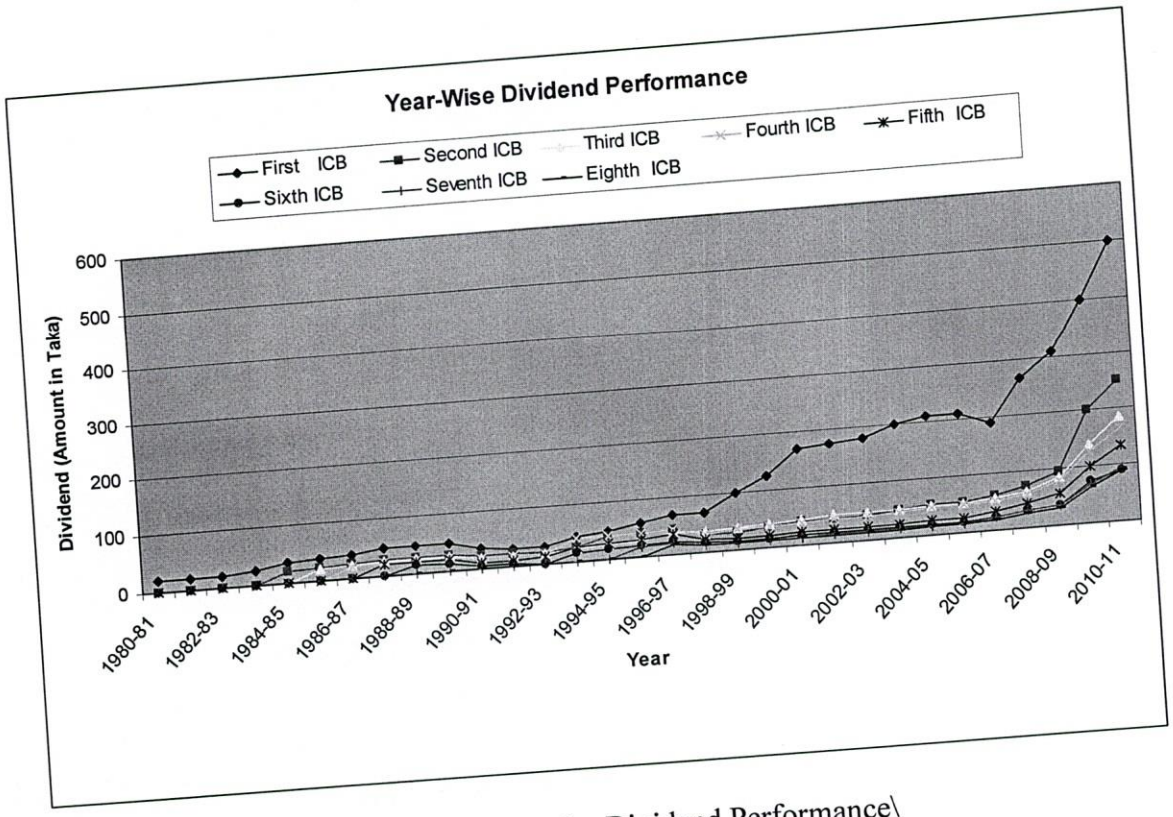


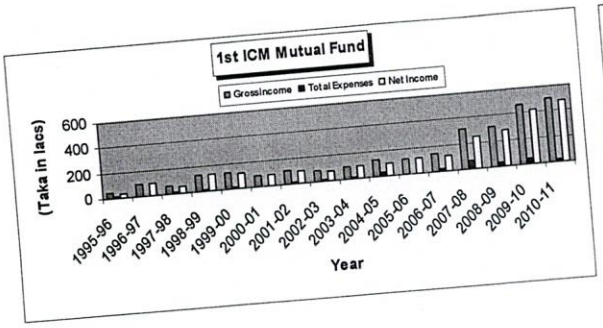

Figure 4.1: Year-wise Dividend Performance\

## Gross Income, Total Expenses and Net Income

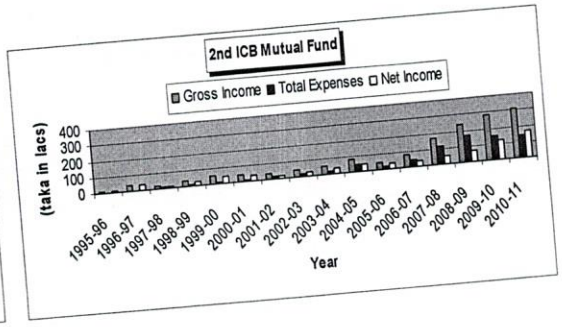
The growth of ICB Mutual Funds can be analyzed from the point of view of gross income, total expenses and net income. Since mutual fund is the combination of different securities, the income may arise from different source such as dividend income, capital gain, interest income and others. Total expenses may occur in different ways such as management fee, staff expenses, audit fee, bank charges etc. Some researchers analyze that in countries where securities markets are well established, mutual funds underperform the market, especially when fees are taken into account. The standard advice for investors is to invest in low expense index funds (Malkiel, 1995). The relationship between mutual fund expenses and performance is also reasonably well established. Funds that heavily underperform have very high expense ratios, while funds that are successful do not increase revenues by raising their fees but benefit from the increased size of their funds (Elton Et al. 1996, Carhart 1997).

Yet now Bangladeshi capital market is not well established. As a result, mutual fund has greater importance the development of capital market because this type of fund charges lower management fee and other expense and plays important role to make capital market more stable. From the table 4 in appendix B, we can say that 1st ICB Mutual Fund net income performance is very good and it is about equal to gross income of that fund. Other selected funds also show better performance but sometimes, total expenses exceed net income such as total expenses exceeds net income of 2nd ICB Mutual Fund in figure 4.2(b) for the period from 2006-07 to 2007-08, 3rd ICB Mutual Fund in figure 4.2(c) for the period 2007-08 and 2008, 4th ICB Mutual Fund in figure 4.2(d) for the period from

2007-08 to 2009-10, 5th ICB Mutual Fund in figure 4.2(e) for the period from 2004-05 to 2009-10, 6th ICB Mutual Fund in figure 4.2(f) for the period 2007-08, 7th ICB Mutual Fund in figure 4.2(g) for the period form 2004-05 to 2009-10 and 8th ICB Mutual Fund in figure 4.2(h) for the period from 2006-07 to 2009-10. Finally, it can be said that all selected Mutual Fund earning performance is not unsatisfied and 1st ICB Mutual Fund earning performance is excellent.




(a)

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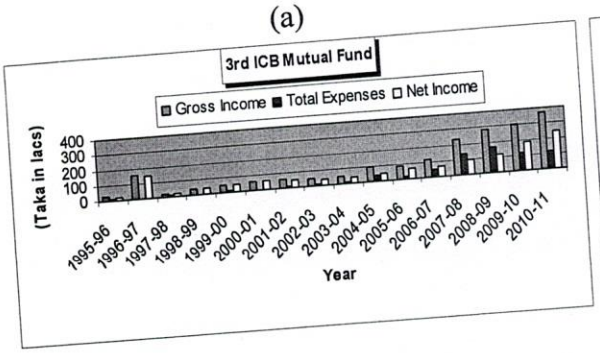
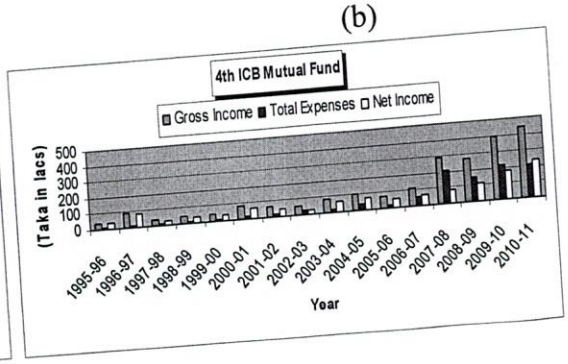
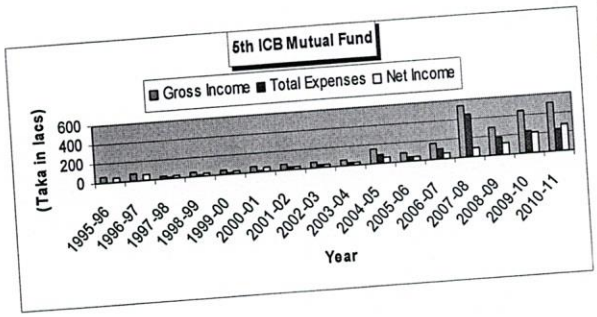


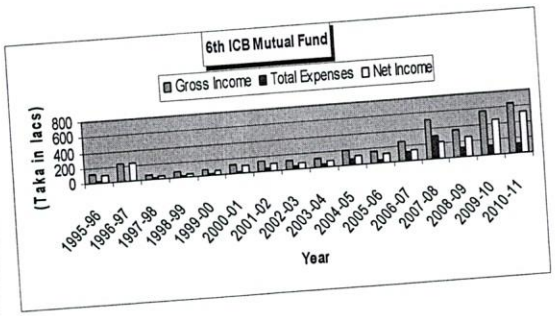

(c)



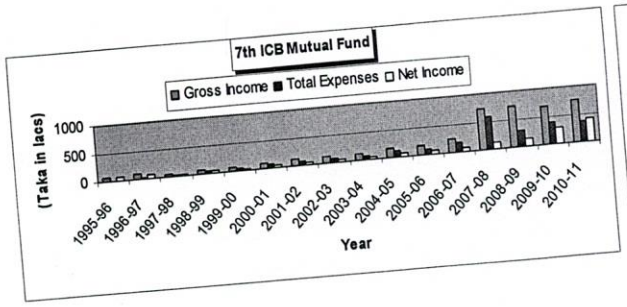

(d)



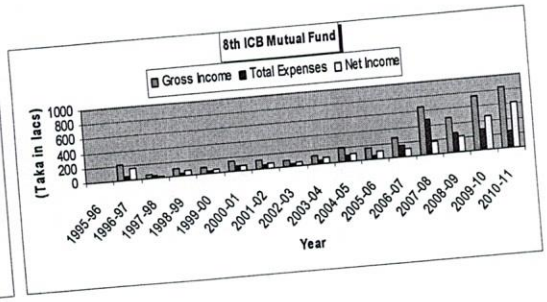

(e)




(f)




(g)

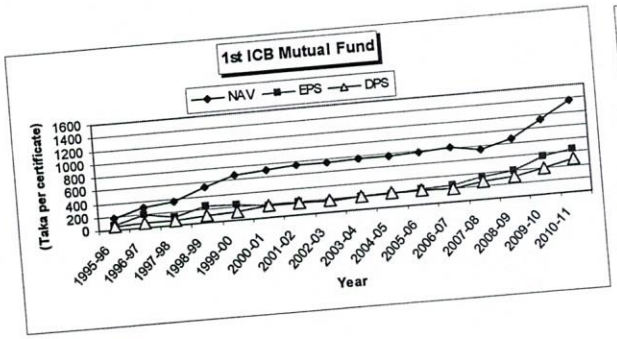



(h)

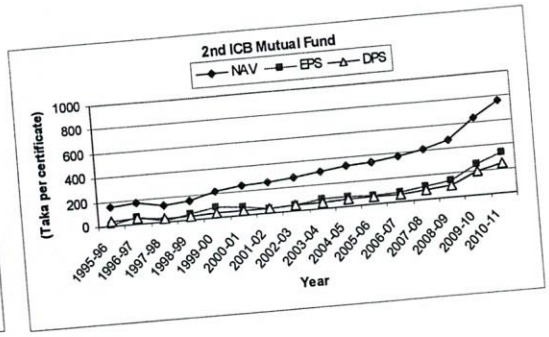
Figure 4.2: Relationship between Gross Income, Total Expenses and Net Income

## NAV, EPS and DPS

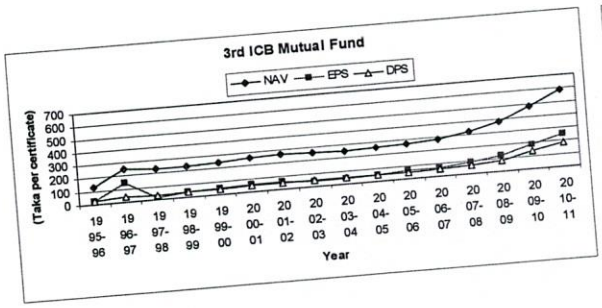
Net Asset value (NAV), Earnings per Share (EPS) and Dividend per Share (DPS) are the most important instrument for evaluating performance of any company. To show the relationship among NAV, EPS and DPS of selected Mutual Funds, we draw some graphs from table 5 in appendix B, and from these graphs, it can be observed that the relationship among NAV, EPS and DPS of all selected Mutual Funds are about same direction (Figure 4.3 (a), (b), (c), (d), (e), (f), (g) and (h)). Sometimes DPS crosses over EPS and it is possible because the management of that fund declares excess dividend from its previous undistributed earnings. Since these ratios are positive and are about in increasing trend, no doubt, it can be said that the performance of selected funds is better compared to the average performance of other companies listed the capital markets in Bangladesh.



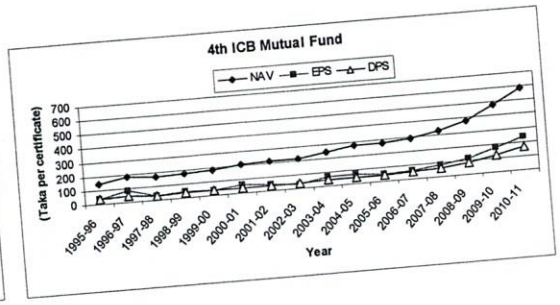

(a)



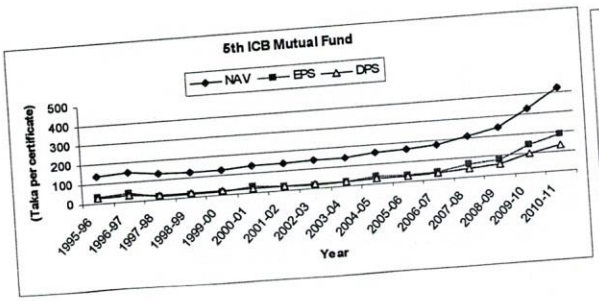

(b)



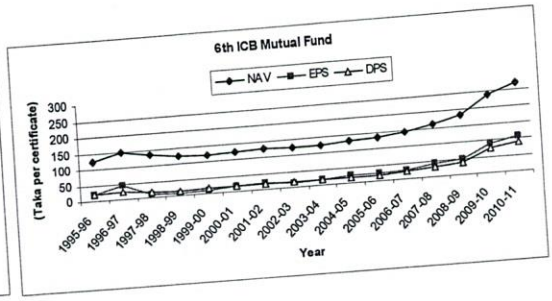

(c)




(d)




(e)

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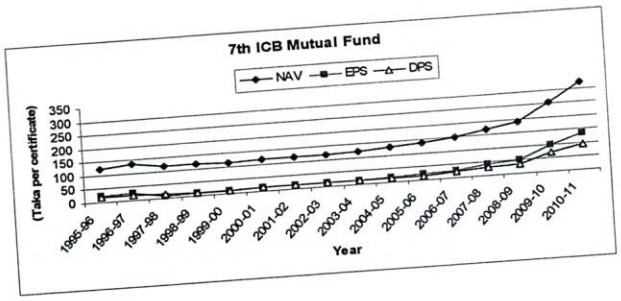
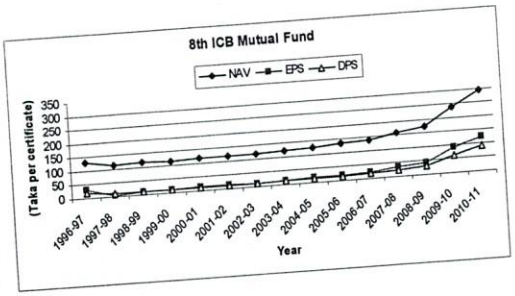



(g)




(h)

Figure 4.3: Relationship among NAV, EPS and DPS

Now, Spearman Rank Correlation between Net Asset Value (NAV) and Earnings per Share (EPS) of different selected Mutual Funds is used and is hypothesized that there is no relationship between NAV and EPS of different funds. That is:

$H_0$= There is no relationship between NAV and EPS of selected Mutual Funds.

$H_1$= There is relationship between NAV and EPS of selected Mutual Funds.

**Table 4.2: Rank Correlation between NAV and EPS**

| Mutual Funds | 1st ICB | 2nd ICB | 3rd ICB | 4th ICB | 5th ICB | 6th ICB | 7th ICB | 8th ICB |
|---|---|---|---|---|---|---|---|---|
| Rank Correl-ation | 0.62** (2.85) | 0.79*** (4.65) | 0.78*** (4.49) | 0.79*** (4.65) | 0.93*** (9.12) | 0.86*** (6.08) | 0.95*** (10.97) | 0.96*** (12.36) |

This table reports the results of Spearman Rank Correlation between *NAV* and *EPS*. Figures in parentheses indicate *t*-value. ** and *** indicate significant at 5% and 1% , respectively.

From the table 4.2, it can be said that all selected funds are positively correlated and null hypothesis are rejected that there is no relationship between NAV and EPS of selected Mutual Funds. Among these funds, the NAV and EPS of 5th, 6th, 7th and 8th ICB Mutual Funds are highly positively correlated.

**Price/ Earnings (P/E) and Return on Equity (ROE)**

Price/Earnings (P/E) ratio is the valuation ratio of a company's share market price compared to its earnings per share. If P/E ratio is low yet earnings per share is increasing

year by year, then it can be said that the share is undervalued and if P/E ratio is high yet the earnings per share is decreasing year by year, then the share of a company is overvalued. In the figure 4.4 and 4.5, we see that 1st ICB Mutual Fund's P/E ratio is high when earning per share is increasing and this follows up to financial 2007-08 for all selected Mutual Funds and after that P/E ratios are not high when earnings per share of all selected Mutual Funds are increasing. With this analysis it can easily be said that the selected Mutual Funds are undervalued.

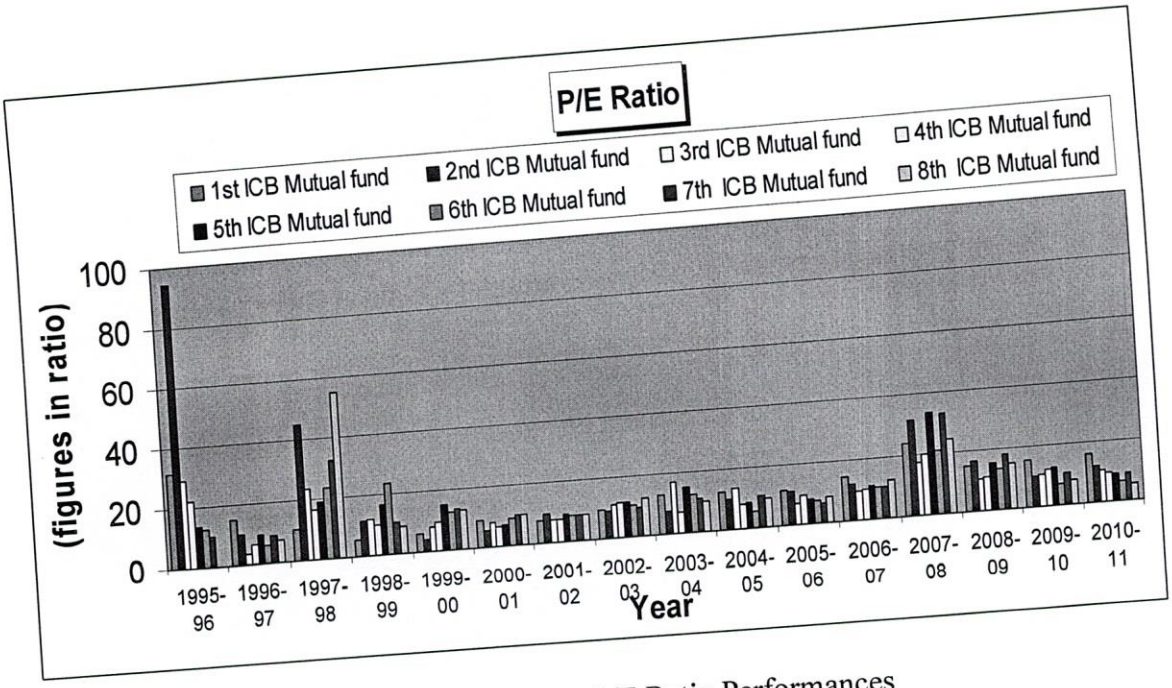
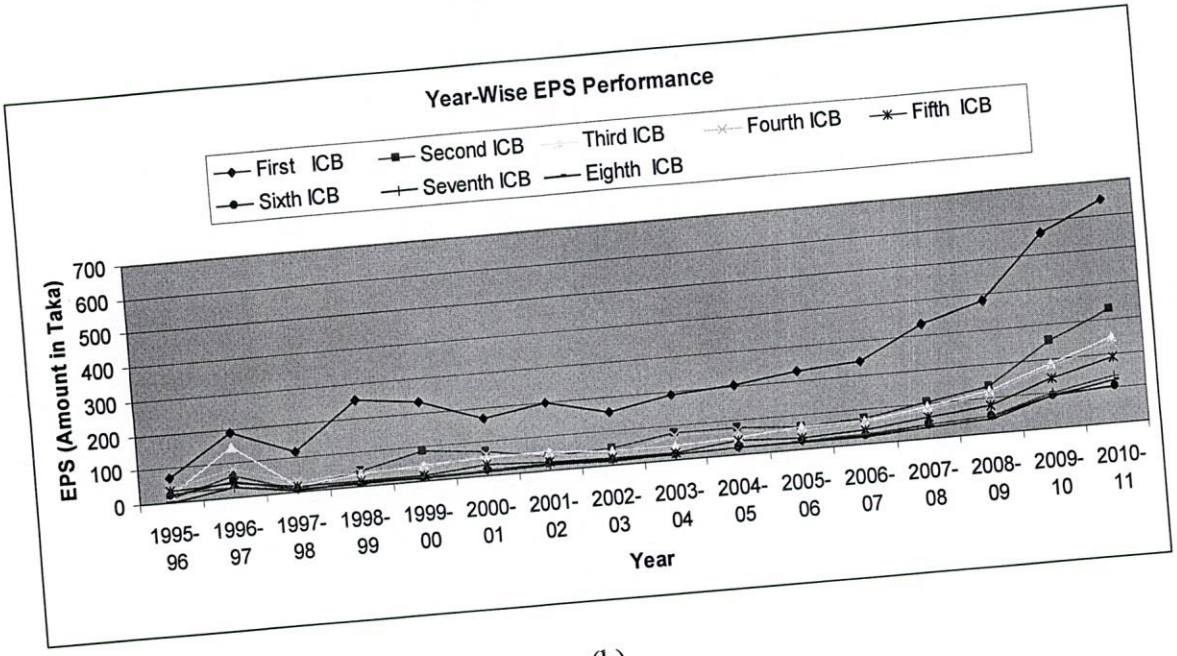



Figure 4.4: Year-wise P/E Ratio Performances




(b)

Figure 4.5: Year-wise EPS Performance

Among the same industry, rank correlation of P/E ratio between selected different Mutual Funds can be developed and direction of P/E ratios among them can be analyzed. The relevant hypotheses are:

$H_0$= There is no relationship of P/E ratio between selected different Mutual Funds.

$H_1$= There is relationship of P/E ratio between selected different Mutual Funds.

From the table 4.3, it can be explained that some Mutual Funds' P/E ratios are highly positively correlated and some are negatively correlated and some Mutual Funds' P/E ratios have no relation. Rank correlations of P/E ratio between $2^{nd}$ and $4^{th}$; $3^{rd}$ and $5^{th}$; $5^{th}$ and $6^{th}$; $5^{th}$ and $7^{th}$; $6^{th}$ and $7^{th}$, and $7^{th}$ and $8^{th}$ Mutual Funds explain that they are highly positively related and statistically significance at 1%, 5% and 10% significant levels.

**Table 4.3: Rank Correlation Matrix of P/E Ratio between ICB Mutual Funds**

| Mutual Funds | 1st ICB | 2nd ICB | 3rd ICB | 4th ICB | 5th ICB | 6th ICB | 7th ICB | 8th ICB |
|---|---|---|---|---|---|---|---|---|
| 1st ICB | 1.00 | | | | | | | |
| 2nd ICB | 0.59** (2.73) | 1.00 | | | | | | |
| 3rd ICB | 0.31 (1.22) | 0.51** (2.22) | 1.00 | | | | | |
| 4th ICB | 0.44* (1.83) | 0.73*** (4.00) | 0.62** (2.96) | 1.00 | | | | |
| 5th ICB | 0.15 (0.57) | 0.41 (1.68) | 0.63*** (3.04) | 0.60** (2.80) | 1.00 | | | |
| 6th ICB | -0.13 (-0.49) | 0.39 (1.58) | 0.51** (2.22) | 0.52 (2.28)** | 0.83*** (5.57) | 1.00 | | |
| 7th | 0.06 (0.22) | 0.23 (0.88) | 0.58** (2.66) | 0.38 (1.54) | 0.81*** (5.17) | 0.68*** (3.47) | 1.00 | |
| 8th ICB | -0.29 (-1.13) | 0.00 (0.00) | 0.21 (0.80) | 0.21 (0.80) | 0.50** (2.16) | 0.57** (2.60) | 0.72*** (3.88) | 1.00 |

This table reports the results of Spearman Rank Correlation of P/E ratio between different mutual funds. Figures in parentheses indicate *t*-value. *, ** and *** indicate significant at 10%, 5% and 1%, respectively.

The correlations of P/E ratio between 1st and 6th; 1st and 8th Mutual Funds indicate negative relationship and there is no relation of P/E ratio between 2nd and 8th Mutual Funds and they are not statistically significant.

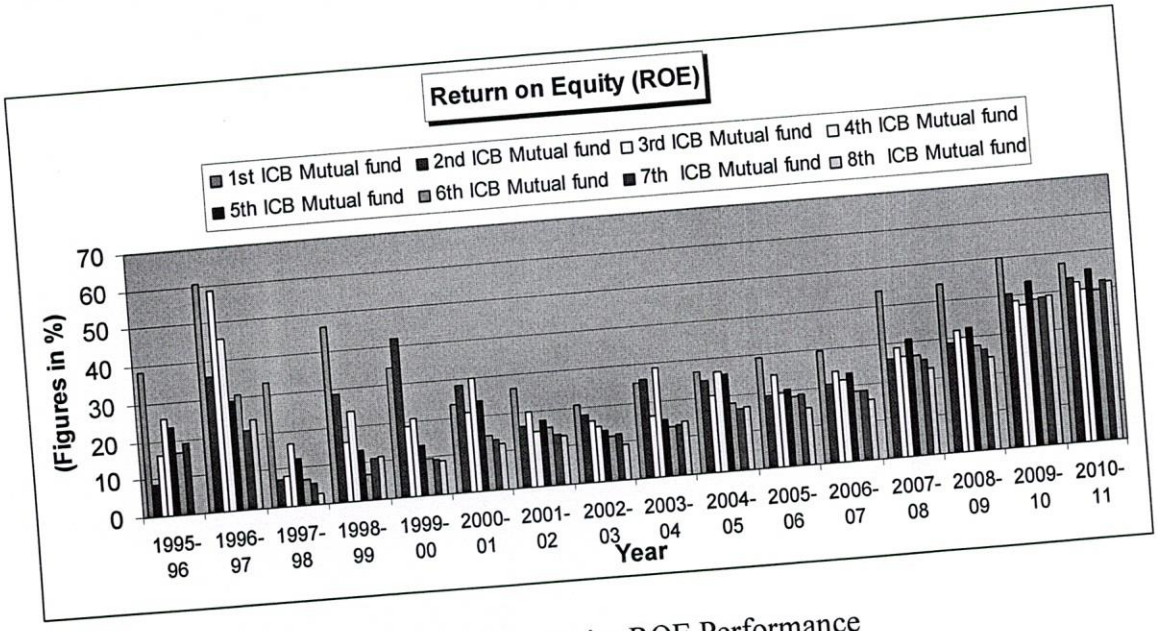



Figure 4.6: Year-wise ROE Performance

Return on equity (ROE) measures the rate of return on the ownership interest (shareholders' equity) of the common stock owners. It measures a firm's efficiency at generating profits from every unit of shareholders' equity (also known as net assets or assets minus liabilities).

From table 4.4, it is explored that the rank correlation of ROE between different Mutual Funds is strongly positive. That is if the ROE of one mutual fund increases (decreases), the ROE of another mutual fund also increases (decreases). Therefore, it concludes that all mutual funds show same behavior in case of ROE.

**Table 4.4: Rank Correlation Matrix of ROE between Mutual Funds**

| Mutual Funds | 1st ICB | 2nd ICB | 3rd ICB | 4th ICB | 5th ICB | 6th ICB | 7th ICB | 8th ICB |
|---|---|---|---|---|---|---|---|---|
| 1st ICB | 1.00 | | | | | | | |
| 2nd ICB | 0.66*** (3.17) | 1.00 | | | | | | |
| 3rd ICB | 0.54** (2.13) | 0.48** (1.97) | 1.00 | | | | | |
| 4th ICB | 0.58** (2.57) | 0.56** (2.44) | 0.69*** (3.44) | 1.00 | | | | |
| 5th ICB | 0.43 (1.72) | 0.45* (1.82) | 0.90*** (7.44) | 0.78*** (4.49) | 1.00 | | | |
| 6th ICB | 0.49** (2.03) | 0.18 (0.66) | 0.95*** (10.99) | 0.67*** (3.25) | 0.94*** (9.93) | 1.00 | | |
| 7th ICB | 0.55** (2.37) | 0.37 (1.44) | 0.89*** (7.04) | 0.67*** (3.25) | 0.94*** (9.93) | 0.96*** (12.36) | 1.00 | |
| 8th ICB | 0.53** (2.25) | 0.44* (1.77) | 0.88*** (6.68) | 0.75*** (4.09) | 0.95*** (10.99) | 0.95*** (10.99) | 0.98*** (17.76) | 1.00 |

This table reports the results of Spearman Rank Correlation of P/E ratio between different mutual funds. Figures in parentheses indicate *t*-value. *, ** and *** indicate significant at 10%, 5% and 1%, respectively.

# Chapter Five

# Empirical Analysis of ICB Mutual Fund Performance

## 5.1 Introduction

This chapter discusses the empirical results of present study. The purpose of this chapter is to show the empirical results and analyze the results to find the truth of this study. It is structured in five broad sections. Section 5.1 introduces this chapter. Section 5.2 provides the results of risk-adjusted performance of mutual funds and for this analysis, the results of Treynor ratio, Sharpe ratio, Modigliani measure, Sortino ratio and information ratio are discussed.

Section 5.3 discusses about the results of selectivity, market timing ability and diversification capacity of mutual funds managers. Section 5.3.1 provides the results of selectivity of fund managers, section 5.3.2 discusses the results of market timing ability of fund managers and section 5.3.3 explores the results of diversification capacity of fund managers.

Section 5.4 states the results of the impact of some major determinants on mutual fund growth. Section 5.4.1 and 5.4.2 mention the results of panel unit root tests and cointegration tests. Section 5.4.3 shows and explains the results of Granger-causality test and section 5.4.4 provides and briefly explains the results of fixed effect and random

effect panel models and discusses the results of seemingly unrelated regression (SUR) framework.

**Table 5.1: Ranks of Selected Mutual Funds According to Treynor Ratio**

| Mutual Funds | $\overline{R_P} - R_f$ | $\beta_P$ | *TR* | *Rank* |
|---|---|---|---|---|
| First ICB | 24.32 | 0.7827 | 30.59 | 5 |
| Second IC | 28.03 | 0.7390 | 40.46 | 2 |
| Third ICB | 21.59 | 0.7979 | 27.90 | 6 |
| Fourth ICB | 21.25 | 0.8547 | 23.70 | 8 |
| Fifth ICB | 30.64 | 1.0908 | 26.15 | 7 |
| Sixth ICB | 19.73 | 0.4010 | 48.20 | 1 |
| Seventh ICB | 37.81 | 0.9784 | 38.62 | 3 |
| Eighth ICB | 31.81 | 0.7279 | 37.62 | 4 |
| Market Index Return | | 12.04 | | |

This table reports the results of Treynor ratio. Here $\overline{R_P} - R_f$ is portfolio excess return over risk free return, $\beta_P$ is the portfolio beta, and *TR* is the Treynor ratio.

## 5.2 Risk-Adjusted Performance

To analyze the risk-adjusted performance, at first Treynor ratio *(TR)* is considered. The table 5.1 provides ranks of ICB Mutual Funds risk-adjusted performance according to this ratio.

The range of the Treynor ratio is 23.70 to 48.20. The Treynor ratio for DSE general index is 12.04. Therefore, the risk-adjusted performance of ICB Mutual Funds is better than the market index. Treynor ratio is calculated based on systematic risk of the fund. From the table 5.1, it is found that sixth ICB Mutual Fund acquires 1$^{st}$ rank according to this ratio, which indicates that the fund has low systematic risk and better performance. The fourth and fifth ICB Mutual Funds acquire 8$^{th}$ and 7$^{th}$ ranks, respectively based on this ratio, which indicate that the systematic risk of both funds is higher compared to other funds. Similarly, other mutual funds are analyzed.

The Treynor ratio has a great limitation. It considers only systematic risk but not total risk. For this limitation, Sharpe ratio *(SR)* is considered, which counts total risk. The table 5.2 provides the ranks of ICB Mutual Funds risk-adjusted performance based on Sharpe ratio.

The range of the Sharpe ratio is 0.3093 to 0.5931. The Sharpe ratio for DSE general index is 0.3416. Therefore, it is clear that the risk-adjusted performance of ICB Mutual Funds is better than the market index except sixth ICB Mutual Fund. This ratio is calculated based on total risk of the fund. From the table 5.2, it is observed that sixth ICB Mutual Fund acquires 8$^{th}$ rank according to this ratio and it is the underperforming fund compared to market index return. According to Treynor ratio, it is the best performing fund. Therefore, it is said that the unsystematic risk of this fund is very high. According to Sharpe ratio, the 5$^{th}$ ICB Mutual Fund is the best performing fund but according to Treynor ratio, its rank is 7$^{th}$.

**Table 5.2: Ranks of Selected Mutual Funds According to Sharpe Ratio**

| Mutual Funds | $\overline{R_P} - R_f$ | $\sigma_P$ | *SR* | *Rank* |
|---|---|---|---|---|
| First ICB | 24.32 | 49.59 | 0.4826 | 2 |
| Second IC | 28.03 | 80.76 | 0.3702 | 6 |
| Third ICB | 21.59 | 48.31 | 0.4608 | 3 |
| Fourth ICB | 21.25 | 53.99 | 0.3753 | 5 |
| Fifth ICB | 30.64 | 48.09 | 0.5931 | 1 |
| Sixth ICB | 19.73 | 62.49 | 0.3093 | 8 |
| Seventh ICB | 37.81 | 106.80 | 0.3540 | 7 |
| Eighth ICB | 31.81 | 70.17 | 0.3902 | 4 |
| Market Index Return | | | 0.3416 | |

This table reports the results of Sharpe ratio. Here $\overline{R_P} - R_f$ is portfolio excess return over risk free return, $\sigma_P$ is the portfolio total risk, and *SR* is the Sharpe ratio.

Therefore, we can say that the 5th ICB Mutual Fund has higher systematic risk. Similarly, we can analyze all other selected Mutual Funds. The rank correlation between Sharpe ratio and Treynor ratio is significantly negative (Table 5.6).

The Treynor or Sharpe ratio does not provide the result in percentage. To analyze the selected Mutual Funds considering results in percentage, Modigliani measure *(MM)* is used, which considers standard deviation of both fund excess return over risk free return

and market excess return over risk free return. The table 5.3 provides the ranks of ICB Mutual Funds risk-adjusted performance based on Modigliani measure.

The range of the Modigliani measure is 9.86 to 16.61. The Modigliani measure for DSE general index is 7.99. Therefore, it is clear that the risk-adjusted performance of ICB Mutual Funds is better than the market index. The higher the value of Modigliani measure, the better the performance of the fund.

**Table 5.3: Ranks of Selected Mutual Funds According to Modigliani Measure**

| Mutual Funds | $\overline{R_P - R_f}$ | $\sigma_{ER}$ | $\sigma_{EM}$ | *MM* | *Rank* |
|---|---|---|---|---|---|
| First ICB | 23.88 | 48.71 | 33.89 | 16.61 | 1 |
| Second ICB | 29.90 | 80.77 | 33.89 | 12.55 | 6 |
| Third ICB | 22.28 | 48.32 | 33.89 | 15.63 | 3 |
| Fourth ICB | 20.26 | 54.13 | 33.89 | 12.68 | 5 |
| Fifth ICB | 28.50 | 97.98 | 33.89 | 9.86 | 8 |
| Sixth ICB | 19.12 | 60.39 | 33.89 | 10.73 | 7 |
| Seventh ICB | 43.28 | 104.53 | 33.89 | 14.03 | 4 |
| Eighth ICB | 32.13 | 67.90 | 33.89 | 16.04 | 2 |
| Market Index Return | | | 7.99 | | |

This table reports the results of Modigliani measure. Here $\overline{R_P - R_f}$ is average portfolio excess return over risk free return, $\sigma_{ER}$ is the standard deviation of portfolio excess return, $\sigma_{EM}$ is the standard deviation of market excess return, and MM is the Modigliani measure.

From the table 5.3, it is found that first ICB Mutual Fund acquires 1st rank according to this ratio, which indicates that the fund is the best risk-adjusted performing based on both fund excess return as well as market excess return. The fifth and sixth ICB Mutual Funds acquire 8th and 7th ranks, respectively based on this measure, which indicate low risk-adjusted performance compared to other funds. From table 5.6, it is explored that there are positive direction between Sharpe ratio and Modigliani measure and negative direction between Treynor ratio and Modigliani measure.

**Table 5.4: Ranks of Selected Mutual Funds According to Sortino Ratio**

| Mutual Funds | $\overline{R_P} - R_f$ | $\sigma_{UR}$ | *SOR* | *Rank* |
|---|---|---|---|---|
| First ICB | 24.32 | 5.84 | 4.16 | 2 |
| Second IC | 28.03 | 10.26 | 2.73 | 6 |
| Third ICB | 21.59 | 6.89 | 3.13 | 5 |
| Fourth ICB | 21.25 | 7.82 | 2.71 | 7 |
| Fifth ICB | 30.64 | 7.69 | 3.98 | 4 |
| Sixth ICB | 19.73 | 7.64 | 2.58 | 8 |
| Seventh ICB | 37.81 | 7.92 | 4.77 | 1 |
| Eighth ICB | 31.81 | 7.77 | 4.09 | 3 |

This table reports the results of Sortino ratio. Here $\overline{R_P} - R_f$ is portfolio excess return over risk free return, $\sigma_{UR}$ is the portfolio downside risk, and *SOR* is the Sortino ratio.

Since market movement is not certain, there may have volatility of fund return below a certain minimum acceptable return. In this situation, Sortino ratio *(SOR)* is applied under

consideration of downside risk. The table 5.4 provides the ranks of ICB Mutual Funds risk-adjusted performance based on Sortino ratio.

The range of Sortino ratio is 2.58 to 4.77. The standard deviation of underperformed return of first ICB Mutual Fund is low, which indicates the lowest negative return for the selected period. However, its average return is lower compared to seventh ICB Mutual Fund. As a result, it acquires 2nd rank. The second ICB Mutual Fund has the maximum underperformed return compared to other mutual funds. The selected Mutual Funds show about equal volatility of underperformed returns.

**Table 5.5: Ranks of Selected Mutual Funds According to Information Ratio**

| Mutual Funds | $\overline{R_P} - \overline{R_M}$ | $\sigma_{ER}$ | *IR* | *Rank* |
|---|---|---|---|---|
| First ICB | 11.89 | 48.71 | 0.24 | 2 |
| Second IC | 17.86 | 80.77 | 0.22 | 4 |
| Third ICB | 10.22 | 48.32 | 0.21 | 5 |
| Fourth ICB | 8.22 | 54.13 | 0.15 | 7 |
| Fifth ICB | 16.48 | 97.98 | 0.17 | 6 |
| Sixth ICB | 7.29 | 60.39 | 0.12 | 8 |
| Seventh ICB | 25.77 | 104.53 | 0.25 | 1 |
| Eight ICB | 15.34 | 67.90 | 0.23 | 3 |

This table reports the results of information ratio. Here $\overline{R_P} - \overline{R_M}$ is portfolio excess return over market return, $\sigma_{ER}$ is the standard deviation of portfolio excess return, and *IR* is the information ratio.

The information ratio *(IR)* is another risk-adjusted performance measure. It measures the investor's ability to use his/her talent and market information to generate portfolio excess return over benchmark return for extra unit risk of excess return. The table 5.5 provides the ranks of ICB Mutual Funds risk-adjusted performance based on information ratio.

**Table 5.6: Spearman Rank Correlation Matrix**

| | *TR* | *SR* | *MM* | *SOR* | *IR* |
|---|---|---|---|---|---|
| *TR* | 1.00 | | | | |
| *SR* | -0.93*** | 1.00 | | | |
| | (-6.1969) | | | | |
| *MM* | -0.23 | 0.15 | 1.00 | | |
| | (-0.5789) | (0.3716) | | | |
| *SOR* | -0.21 | 0.28 | 0.52 | 1.00 | |
| | (-0.5261) | (0.6859) | (1.4904) | | |
| *IR* | 0.06 | -0.04 | 0.63** | 0.95*** | 1.00 |
| | (0.1472) | (-0.1472) | (1.9871) | (7.5320) | |

This table reports the results of Spearman rank correlation. Here *TR* is Treynor ratio; *SR* is Sharpe ratio; *MM* is Modigliani measure; *SOR* is Sortino ratio and *IR* is information ratio.

N.B.: Figures in parenthesis indicate *t*-value. **, and *** stand for statistically significant at 5%, and 1% levels, respectively.

The range of the information ratio is 0.12 to 0.25.The higher the value of information ratio, the better the performance of the fund. This ratio results excess average return over benchmark return of the fund against per unit risk of excess return. From the table 5.5, it is found that seventh ICB Mutual Fund's standard deviation of excess return is very high

and excess average return is high. As a result, it acquires 1st rank. The first and eighth ICB Mutual Funds are also better performing funds.

## 5.3 Selectivity, Market Timing Ability and Diversification of Mutual Fund Managers

In this section, performance of fund managers is analyzed, that is selectivity, market timing and diversification capacity of fund managers are observed. This analysis is made under the following three subsections:

### 5.3.1 Selectivity of Fund Managers

Through Jensen alpha $(\alpha_P)$, fund manager's selectivity skillness is measured. That is, the alpha $(\alpha_P)$ interprets that the manager is good at either predicting market turns, or selecting undervalued securities for the portfolio, or both. In table 5.7, it is observed that $\alpha_P$ of all selected Mutual Funds are positive but it is not significant.

### 5.3.2 Market Timing Ability of Fund Managers

Treynor and Mauzy (1996) develop a model, which measures the ability of the fund manager to time the market. This model is non-linear model. Before explaining the results of market timing ability, the actual series can be analyzed with the fitted series.

**Table 5.7: Results of Selectivity Test: Jensen Measure**

| Mutual Funds | $\alpha_P$ | $\beta_P$ |
|---|---|---|
| First ICB | 14.485 | 0.785** |
| | {1.320} | {2.610} |
| Second ICB | 21.258 | 0.718 |
| | {1.010} | {1.240} |
| Third ICB | 12.709 | 0.794** |
| | {1.180} | {2.690} |
| Fourth ICB | 10.111 | 0.843** |
| | {0.820} | {2.480} |
| Fifth ICB | 15.858 | 1.052 |
| | {0.640} | {1.540} |
| Sixth ICB | 14.553 | 0.397 |
| | {0.910} | {0.900} |
| Seventh ICB | 26.148 | 0.969 |
| | {0.940} | {1.270} |
| Eighth ICB | 18.728 | 0.732 |
| | {1.020} | {1.500} |

This table reports the results of the following equation:

$$R_P - R_f = \alpha_P + \beta_P (R_M - R_f) + \varepsilon_{Pt}$$

$\alpha_P$ is the intercept term, $\beta_P$ is the coefficient of $(R_M - R_f)$,

Figures in parentheses indicate t-value. * and ** stand for significance at 10% and 5% level, respectively.

**Actual, Fitted, Residual Graphs**

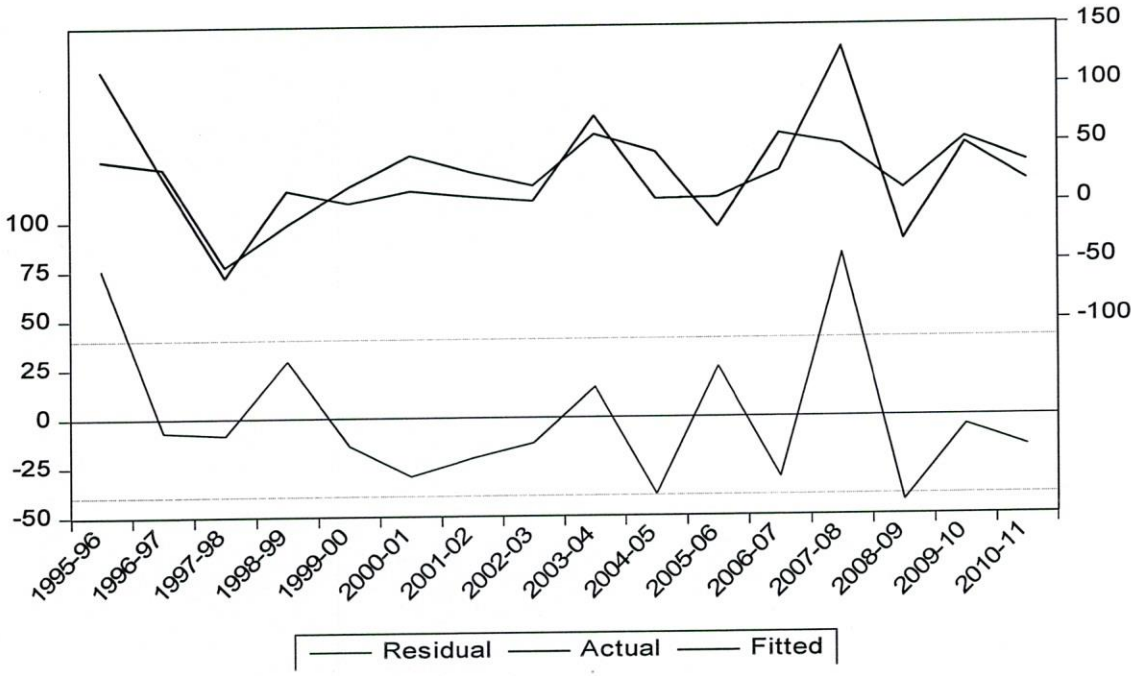



Figure 5.1: First ICB Mutual Fund

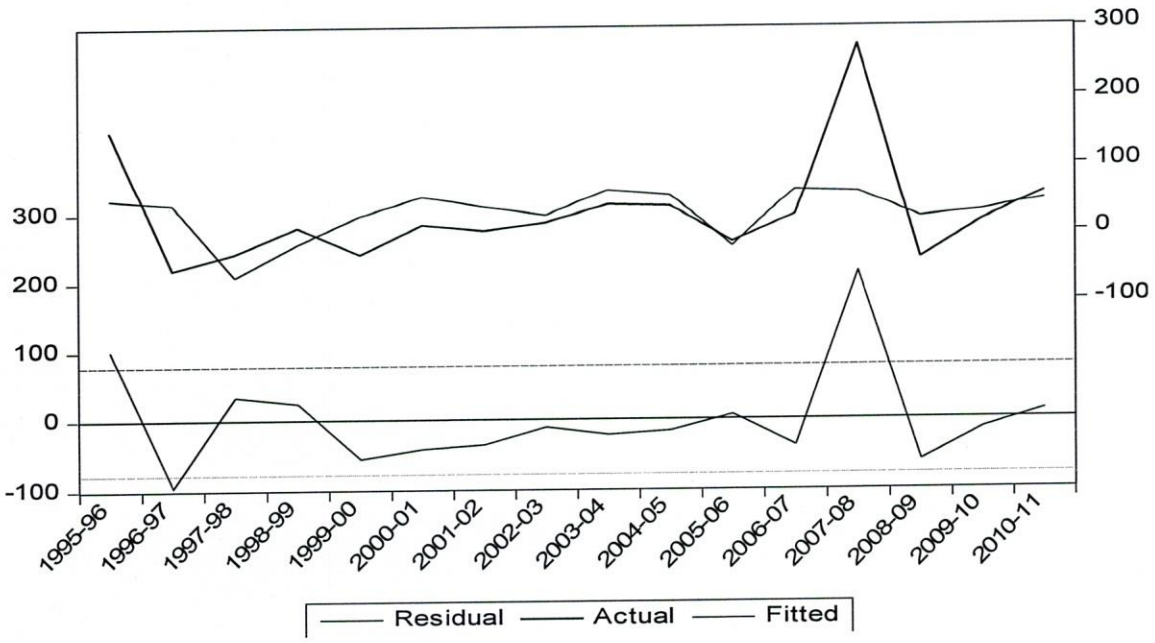



Figure 5.2: Second ICB Mutual Fund

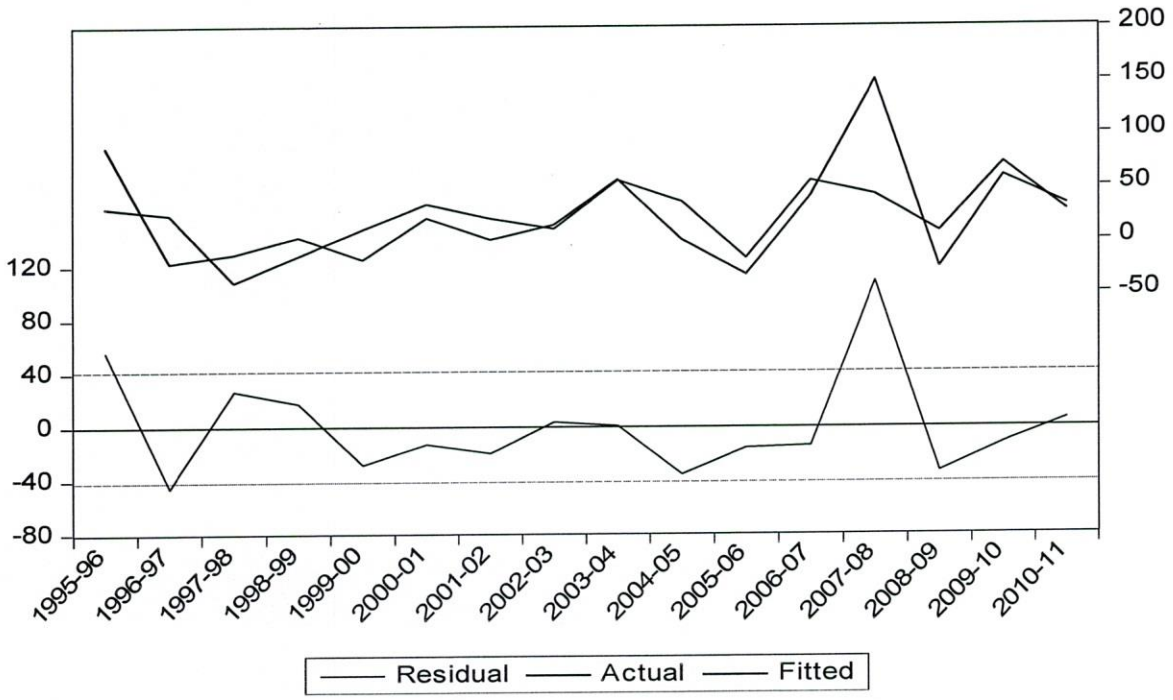



Figure 5.3: Third ICB Mutual Fund

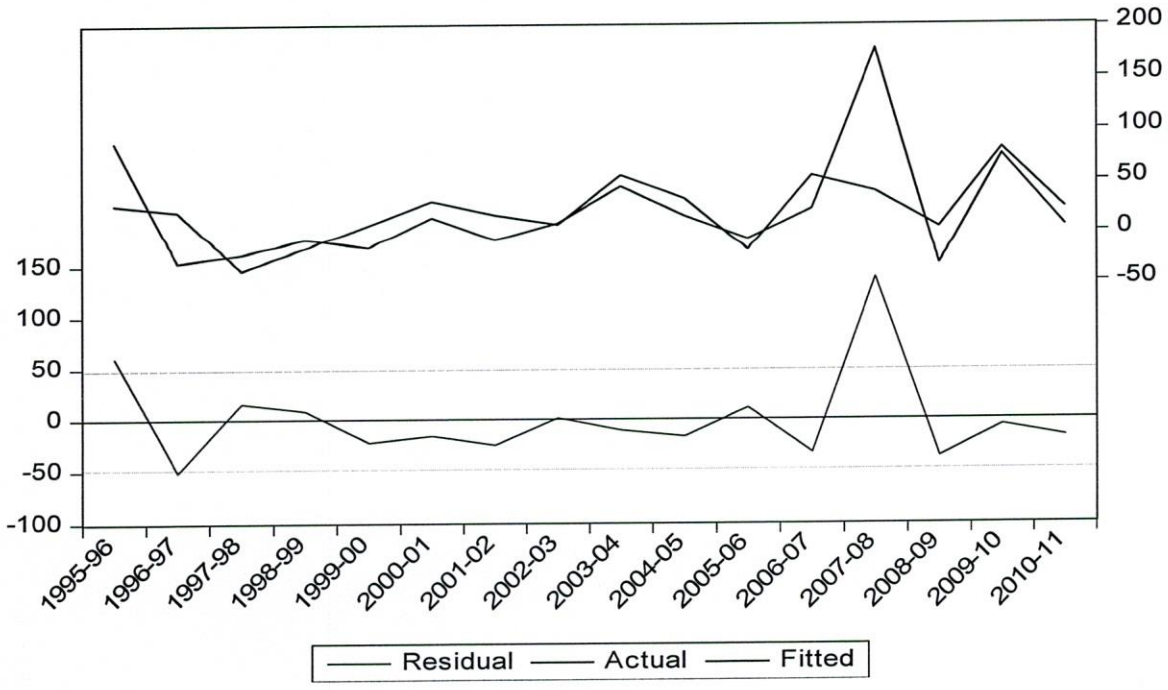



Figure 5.4: Fourth ICB Mutual Fund

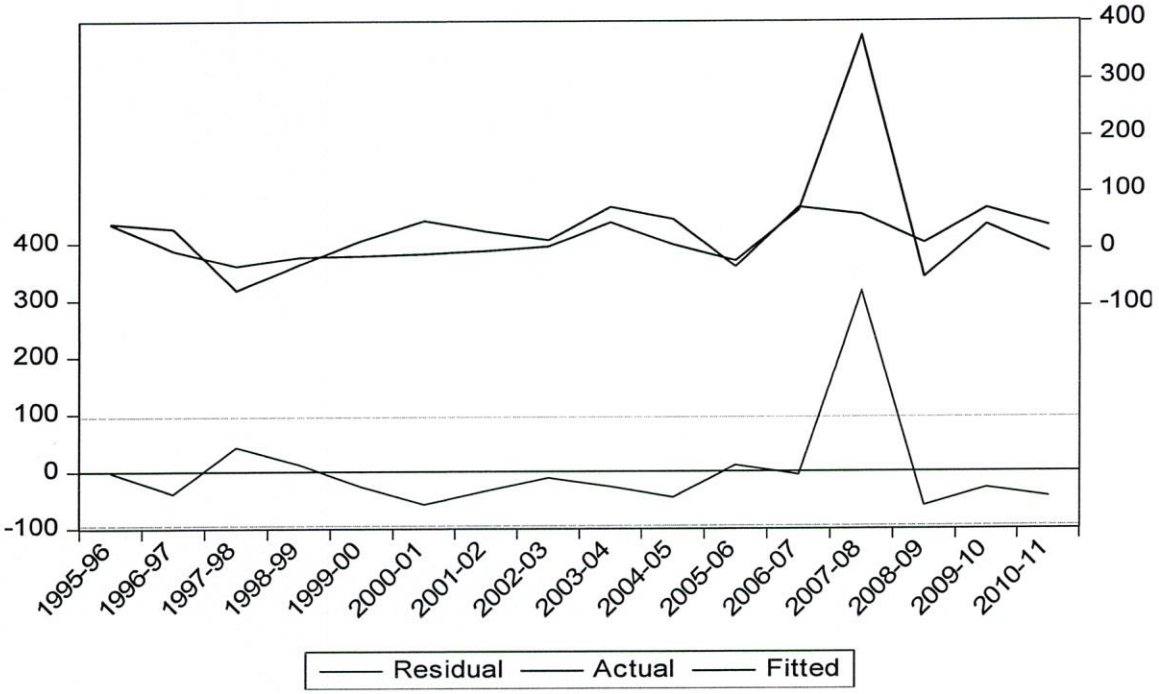



Figure 5.5: Fifth ICB Mutual Fund

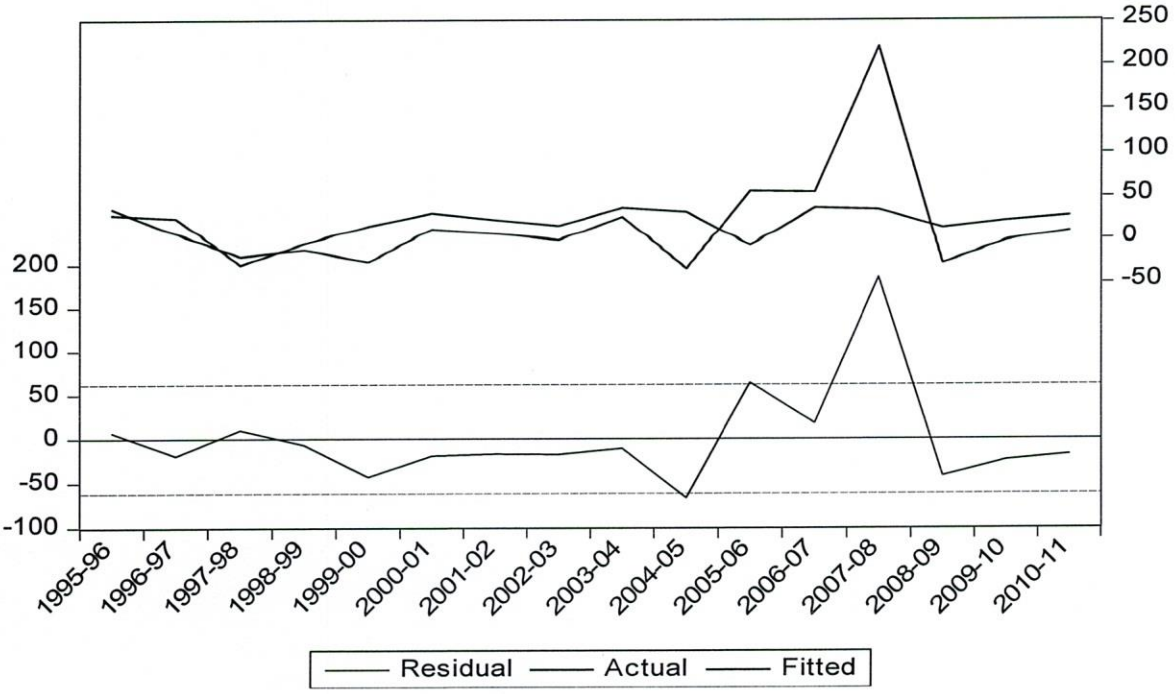



Figure 5.6: Sixth ICB Mutual Fund

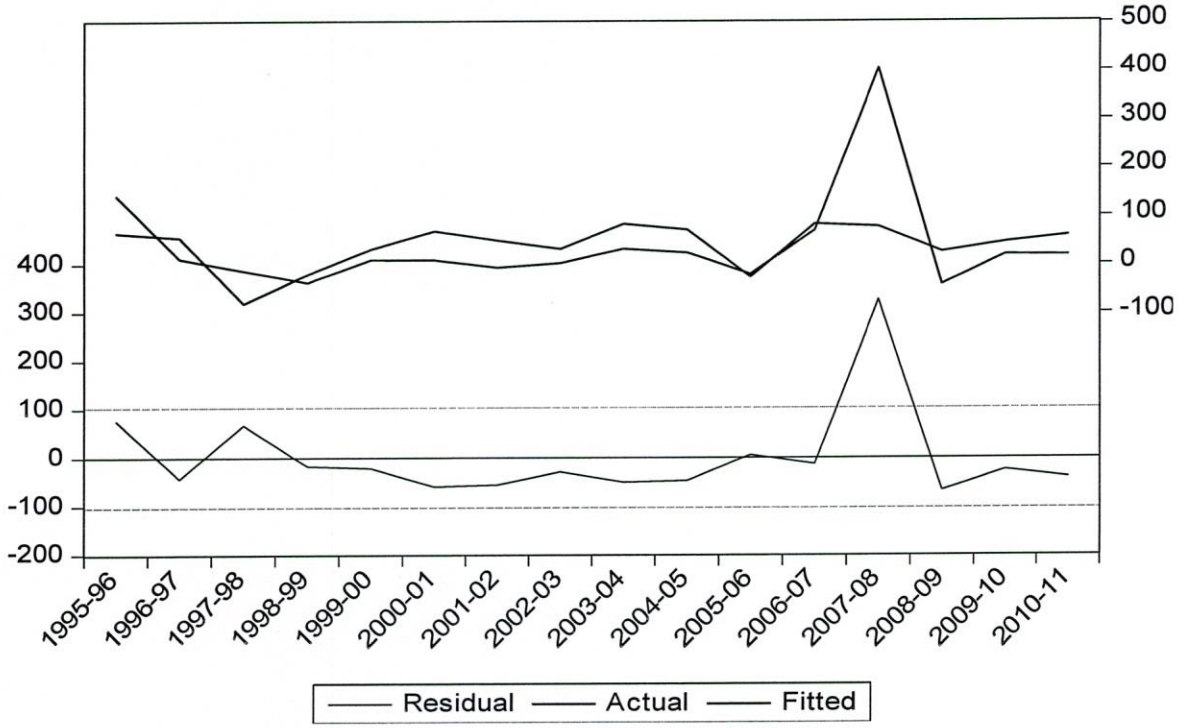



Figure 5.7: Seventh ICB Mutual Fund

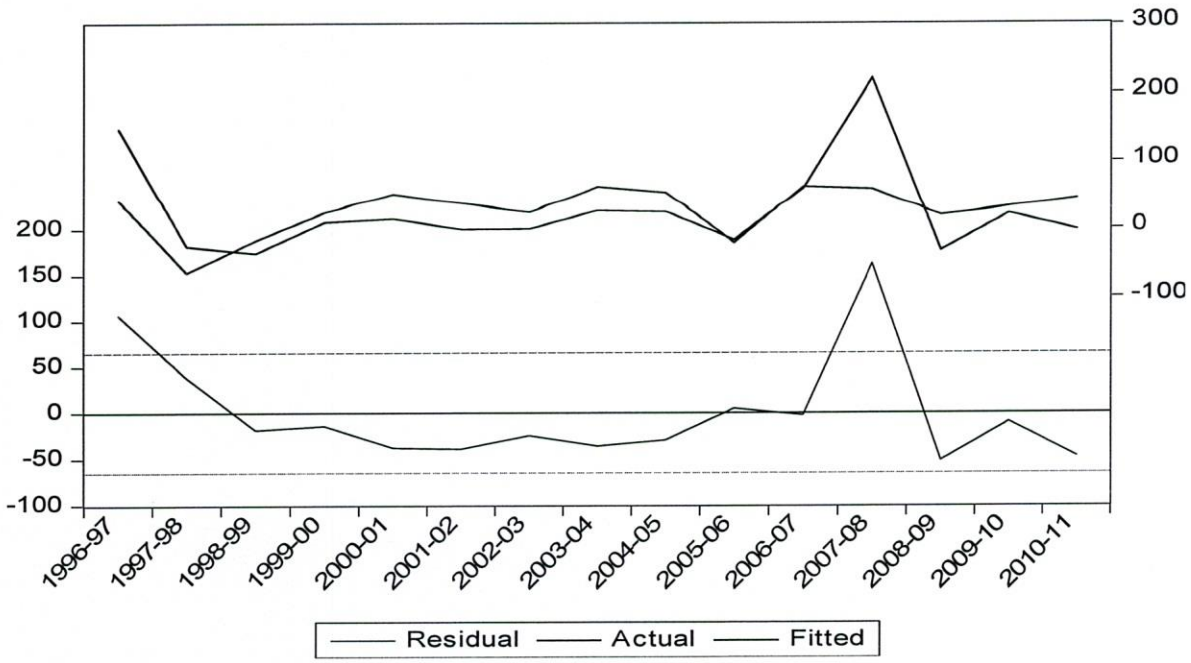



Figure 5.8: Eighth ICB Mutual Fund

Actual, fitted and residual graphs are given (Figure from 5.1 to 5.8). The residuals are plotted against the left vertical axis and both the actual and fitted series are plotted against the right vertical axis. The fit is good though the observations are small. The fitted values nearly cover up the actual values on all selected graphs. From the residuals, we see that there are some outliers and a small number of spikes in all graphs.

The results of gamma $(\gamma_P)$ in the table 5.8 for all selected Mutual Funds are negative, which indicate that the market timing ability of funds managers is not good.

### 5.3.3 Diversification Capacity of Fund Managers

Diversification means reduction of unsystematic risk of the portfolio by introducing different securities of opposite direction in the portfolio. The results of $R^2$ of different mutual funds are shown in table 5.8. The diversification capacity of first ICB Mutual Fund manager is better compared to all other selected Mutual Funds. However, the diversification capacity of all mutual fund managers is not good.

**Table 5.8: Results of Diversification and Market Timing Ability Test**

| Mutual Funds | $(R^2)$ | $(\alpha_P)$ | $(\beta_P)$ | $(\gamma_P)$ |
|---|---|---|---|---|
| First ICB | 0.42 | 21.2457* | 1.1465 | -0.0084 |
| | | (1.8269) | (2.9535) | (-1.4074) |
| | | {0.0908} | {0.0112} | {0.1828} |
| Second ICB | 0.19 | 32.5991 | 1.3248 | -0.0141 |
| | | (1.4358) | (1.7481) | (-1.2091) |
| | | {0.1747} | {0.1040} | {0.2482} |
| Third ICB | 0.36 | 15.9558 | 0.9675 | -0.0040 |
| | | (1.5847) | (2.4017) | (-0.6511) |
| | | {0.1857} | {0.0320} | {0.5263} |
| Fourth ICB | 0.31 | 11.9654 | 0.9427 | -0.0023 |
| | | (0.8526) | (2.0126) | (-0.3199) |
| | | {0.4093} | {0.0653} | {0.7541} |
| Fifth ICB | 0.18 | 24.3298 | 1.5056 | -0.0105 |
| | | (0.8775) | (1.6268) | (-0.7395) |
| | | {0.3962} | {0.1278} | {0.4727} |
| Sixth ICB | 0.10 | 20.2936 | 0.7043 | -0.0071 |
| | | (1.1328) | (1.1778) | (-0.7756) |
| | | {0.2777} | {0.2600} | {0.4518} |
| Seventh ICB | 0.18 | 40.2249 | 1.7222 | -0.0175 |
| | | (1.3352) | (1.7126) | (-1.1310) |
| | | {0.2047} | {0.1105} | {0.2785} |
| Eight ICB | 0.27 | 30.9823 | 1.3331 | -0.0138 |
| | | (1.5751) | (2.0930) | (-1.4054) |
| | | {0.1412} | {0.0583} | {0.1853} |

This table reports the results of the following equation:
$R_P - R_f = \alpha_P + \beta_P(R_M - R_f) + \gamma_P(R_M - R_f)^2 + \varepsilon_{Pt}$. Here, $\alpha_P$ is the intercept term, $\beta_P$ is the coefficient of $(R_M - R_f)$, $\gamma_P$ is the coefficient of $(R_M - R_f)^2$ and $R^2$ is the coefficient of determination.

Figures in (•) indicate *t*-Statistic and in {•} indicate *p*-value. *indicates rejection of null hypothesis at 10% level of significance.

## 5.4 Impact of Some Major Determinants on Mutual Fund Growth

This section analyzes the results of the impact of some major determinants on mutual fund growth. For this analysis, the following subsections are taken under consideration:

### 5.4.1 Panel Unit Root Tests

To observe the stationarity of selected data, two types of panel unit root tests are used. One is common unit root process in which Levin, Lin and Chu panel unit root test is used and other is individual unit root process in which Im, Pesaran and Shin panel unit root test and the ADF-Fisher Chi-square test are used.

The results of the stationarity test using Levin, Lin and Chu unit root test are presented in panel A of table 5.9. The table shows that all the variables except LNAR are stationary at level. Thus, they except LNAR are integrated at order zero I(0). The variable, LNAR is stationary at first difference, and therefore it is integrated at order one I(1).

The results of Im, Pesaran and Shin unit root test are shown in panel B of Table 5.9. The table explores that all the variables except LNAR are stationary at level. Thus, they except LNAR are integrated at order zero I(0). The variable, LNAR is stationary at first difference, and therefore it is integrated at order one I(1). That is, this confirms the results of Levin, Lin and Chu test.

**Table 5.9: Panel Unit Root Tests (Summery Results)**

**Panel A: Results of Levin Lin and Chu Unit Root Test**

| Variables | Levin Lin Chu Test (at levels) | Levin Lin Chu Test (at first differences) | Order of Integration |
|---|---|---|---|
| *ATR* | -5.7265 | -11.2080 | I(0) |
| | (0.0000) | (0.0000) | |
| *ER* | -6.3330 | -10.5397 | I(0) |
| | (0.0000) | (0.0000) | |
| *FPF* | -9.5793 | -14.9199 | I(0) |
| | (0.0000) | (0.0000) | |
| *LNAR* | 7.2904 | -6.4199 | I(1) |
| | (1.0000) | (0.0000) | |
| *RAR* | -9.8028 | -14.1290 | I(0) |
| | (0.0000) | (0.0000) | |

(1) Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

(2) Figures in parentheses indicate *P-value*

**Panel B: Results of Im, Pesaran and Shin Unit Root Test**

| Variables | Im, Pesaran and Shin test (at levels) | Im, Pesaran and Shin test (at first differences) | Order of Integration |
|---|---|---|---|
| *ATR* | -2.4005 | -7.5436 | I(0) |
| | (0.0082) | (0.0000) | |
| *ER* | -3.0703 | -6.5511 | I(0) |
| | (0.0011) | (0.0000) | |
| *FPF* | -7.7872 | -11.9243 | I(0) |
| | (0.0000) | (0.0000) | |
| *LNAR* | -9.3020 | -12.0113 | I(1) |
| | (1.0000) | (0.0000) | |
| *RAR* | -9.3020 | -12.0113 | I(0) |
| | (0.0000) | (0.0000) | |

(1) Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

(2) Figures in parentheses indicate *P-value*

The results of ADF-Fisher unit root test are presented in panel C of Table 5.9. The table also explores that all the variables except LNAR are stationary at level. Thus, they except LNAR are integrated at order zero I(0). The variable, LNAR is stationary at first difference, and therefore, it is integrated at order one I(1). That is, this also confirms the results of Levin, Lin and Chu test.

**Panel C: Results of ADF-Fisher Chi-square Unit Root Test**

| Variables | ADF-Fisher Chi-square test (at levels) | ADF-Fisher Chi-square test (at first differences) | Order of Integration |
|---|---|---|---|
| *ATR* | 30.3055 | 75.2736 | I(0) |
| | (0.0165) | (0.0000) | |
| *ER* | 34.6277 | 65.2796 | I(0) |
| | (0.0045) | (0.0000) | |
| *FPF* | 69.0649 | 105.8030 | I(0) |
| | (0.0000) | (0.0000) | |
| *LNAR* | 0.7324 | 53.3207 | I(1) |
| | (1.0000) | (0.0000) | |
| *RAR* | 91.4601 | 114.8880 | I(0) |
| | (0.0000) | (0.0000) | |

(1) Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

(2) Figures in parentheses indicate *p*-value

### 5.4.2 Panel Cointegration Test

Secondly, the cointegration of data can be checked. For this, Kao residual cointegration test is used. The results of Kao residual cointegration test are shown in table 5.10.

**Table 5.10: Panel Cointegration**

**Panel A: Results of Kao Residual Cointegration Test**

Series: ATR ER FPF LNAR RAR

Sample: 1996 2011

Included observations: 127

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 0

Newey-West automatic bandwidth selection and Bartlett kernel

| | Rho | *p*-value | *t*-Statistic | *p*-value |
|---|---|---|---|---|
| DF | -11.31686 | 0.0000 | -8.913899 | 0.0000 |
| DF* | 0.414803 | 0.3391 | -2.111206 | 0.0174 |
| Residual variance | | | 0.019624 | |
| HAC variance | | | 0.003239 | |

The results of Kao cointegration test explain that the determinants of mutual fund growth are significantly cointegrated among themselves. That is, there exists a long-run equilibrium relationship between the determinants used in the panel.

Panel B of table 5.10 represents the results of the Johansen cointegration tests (both the Trace test and the Maximum Eigenvalue test). The results explain that the variables in the

questions are cointegrated thereby. Therefore, it concludes that there is a long-run or equilibrium relationship between the mutual fund growth and its determinants.

**Panel B: Results of Johansen Fisher Panel Cointegration Test**

Series: *ATR ER FPF LNAR RAR*

Sample: 1996 2011 Included observations: 127

Trend assumption: No deterministic trend (restricted constant)

Lags interval (in first differences): 0

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Fisher Stat.* (From Trace test) | *p*-value | Fisher Stat.* (from Max-Eigen test) | *p*-value |
|---|---|---|---|---|
| None | 195.8 | 0.0000 | 152.2 | 0.0000 |
| At most 1 | 94.98 | 0.0000 | 64.10 | 0.0000 |
| At most 2 | 48.40 | 0.0000 | 50.07 | 0.0000 |

* Probabilities are computed using asymptotic Chi-square distribution.

### 5.4.3 Granger-Causality Test

The Granger-causality test assumes that the information relevant to the prediction of the respective variables such as *ATR* and *ER*; *LNAR* and *FPF; ATR* and *RAR* and so on, are contained solely in the time series data on these variables. The results in the table 5.11 interpret that most of the variables in the panel regression have causality relationship at two lagged which are statistically significant.

**Table 5.11: Results of Granger-Causality Tests (lags 2)**

| Null Hypothesis: | Obs | *F*-Statistic | *p*-value |
|---|---|---|---|
| *ER* does not Granger Cause *ATR* | 111 | 3.53351 | 0.0327** |
| *ATR* does not Granger Cause *ER* | | 0.42525 | 0.6547 |
| *FPF* does not Granger Cause *ATR* | 111 | 0.80082 | 0.4517 |
| *ATR* does not Granger Cause *FPF* | | 0.14199 | 0.8678 |
| *LNAR* does not Granger Cause *ATR* | 111 | 1.96738 | 0.1449 |
| *ATR* does not Granger Cause *LNAR* | | 29.3946 | 7.E-11*** |
| *RAR* does not Granger Cause *ATR* | 111 | 9.76163 | 0.0001*** |
| *ATR* does not Granger Cause *RAR* | | 21.1460 | 2.E-08*** |
| *FPF* does not Granger Cause *ER* | 111 | 0.86435 | 0.4243 |
| *ER* does not Granger Cause *FPF* | | 0.27995 | 0.7564 |
| *LNAR* does not Granger Cause *ER* | 111 | 4.41196 | 0.0144** |
| *ER* does not Granger Cause *LNAR* | | 27.0460 | 3.E-10*** |
| *RAR* does not Granger Cause *ER* | 111 | 10.0930 | 0.0001*** |
| *ER* does not Granger Cause *RAR* | | 31.3136 | 2.E-11*** |
| *LNAR* does not Granger Cause *FPF* | 111 | 0.48792 | 0.6153 |
| *FPF* does not Granger Cause *LNAR* | | 0.04207 | 0.9588 |
| *RAR* does not Granger Cause *FPF* | 111 | 0.32062 | 0.7264 |
| *FPF* does not Granger Cause *RAR* | | 0.39878 | 0.6721 |
| *RAR* does not Granger Cause *LNAR* | 111 | 4.52271 | 0.0130** |
| *LNAR* does not Granger Cause *RAR* | | 1.92910 | 0.1503 |

This table reports the results of Granger Causality Tests. Here *ATR* is assets turnover ratio; *ER* is expense ratio; *FPF* is family proportion of mutual funds; *LNAR* is liquidity to net assets ratio and *RAR* is risk-adjusted return of mutual funds.

** and *** stand for statistically significant at 5% and 1% levels, respectively.

### 5.4.4 Results of Fixed and Random Effects Models and SUR Framework

Before analyzing the results of fixed effects and random effects models, the results of time series regression for each mutual fund are analyzed. Results of time series regression for each mutual fund are shown in table 5.12.

**Table 5.12: Results of Time Series Regression for Selected Mutual Funds**

| Mutual Funds | *Constant* | *ATR* | *ER* | *FPF* | *LNAR* | *RAR* | $R^2$ |
|---|---|---|---|---|---|---|---|
| **First ICB** | -0.440*** (-4.716) | 2.040*** (8.907) | -3.216*** (-4.044) | 0.173 (1.051) | -0.764*** (-3.535) | 0.063 (0.756) | 0.904 |
| **Second ICB** | -0.300** (-2.817) | 1.241*** (7.152) | -1.241*** (-6.062) | 2.154 (0.999) | -0.059 (-0.656) | 0.007 (0.920) | 0.894 |
| **Third ICB** | -0.601** (-2.134) | 1.948*** (12.211) | -2.067*** (-8.777) | 3.418 (1.067) | -0.280** (-2.516) | -0.033 (-0.488) | 0.958 |
| **Fourth ICB** | -0.189 (-1.337) | 1.090*** (6.551) | -0.976*** (-5.594) | -0.282 (-0.175) | -0.041 (-0.593) | 0.031 (0.627) | 0.894 |
| **Fifth ICB** | -0.132** (-2.500) | 0.928*** (6.135) | -0.858*** (-5.645) | -0.456 (-0.671) | 0.007 (0.161) | 0.060* (2.191) | 0.949 |
| **Sixth ICB** | -0.151* (-2.146) | 0.979*** (6.325) | -0.949*** (-4.682) | 0.041 (0.161) | -0.124 (-1.225) | 0.153* (1.862) | 0.914 |
| **Seventh ICB** | -0.249 (-0.813) | 0.140* (1.996) | -0.106 (-1.069) | 1.562 (0.636) | 0.182*** (3.387) | 0.111*** (3.093) | 0.871 |
| **Eight ICB** | 0.810** (2.891) | 0.208 (1.515) | -0.135 (-0.797) | -3.932*** (-3.111) | 0.260*** (3.815) | 0.060 (1.022) | 0.902 |

This table reports the results of cross-sectional regression model. *ATR* is assets turnover ratio; *ER* expense ratio; *FPF* is family proportion of a mutual fund; *LNAR* is liquidity to net assets ratio; *RAR* is risk-adjusted return; $R^2$ is coefficient of determination and ICB is Investment Corporation of Bangladesh

Figures in parentheses indicate *t*-value. *, ** and *** stand for significant at 10%, 5% and 1% levels, respectively.

The intercept terms of all mutual funds show significant results except 4th ICB Mutual Funds. The coefficients of variables, *ATR* and *ER* show significant results, which indicate that there is a relationship between independent variables, *ATR* and *ER*, and dependent variable, mutual fund growth with expected signs. The coefficient of *FPF* of all mutual funds shows insignificant results, which mean that there is no relationship between *FPF* and mutual fund growth. The coefficients of *LNAR* except 1st and 3rd mutual funds and *RAR* of all mutual funds except 5th and 6th mutual funds provide insignificant results. The coefficients of determination ($R^2$) of all mutual funds are high, which indicate that the determinants of mutual fund growth explain well the growth rate.

Table 5.13 shows the results of fixed effect model mention in under panel data. In this table, the constant, and coefficients of *ATR, ER* and *RAR* provide significant results, which explain that there is a relationship between the independent variable, *ATR* and *ER*, and the dependent variable, mutual fund growth with expected signs. The *FPF* and *LNAR* have no significant relationships with mutual fund growth. The coefficient of *RAR* shows that there is significant positive relationship between *RAR* and mutual fund growth. Under fixed effect model, Wald test for equality of slope coefficient provide significant results (Chi-square statistic=90.25169 with 5 df. and F(5, 113)=18.05084).

**Table 5.13: Results of Fixed Effects Model**

| | |
|---|---|
| Dependent Variable: G | Method: Panel Least Squares |
| Sample: 1996 2011 | Periods included: 16 |
| Cross-sections included: 8 | Total panel (unbalanced) observations: 119 |

| | |
|---|---|
| *Constant* | -0.118454*** |
| | (-3.838850) |
| *ATR* | 0.827543*** |
| | (10.94262) |
| *ER* | -0.809437*** |
| | (-8.275798) |
| *FPF* | 0.000142 |
| | (0.000824) |
| *LNAR* | 0.056750 |
| | (0.721607) |
| *RAR* | 0.056750* |
| | (1.761335) |

Effects Specification

Cross-Section Fixed (Dummy Variables)

| | | | |
|---|---|---|---|
| R-squared | 0.632949 | Mean dependent var | 0.102014 |
| Adjusted R-squared | 0.591396 | S.D. dependent var | 0.151484 |
| S.E. of regression | 0.096832 | Akaike info criterion | -1.728874 |
| Sum squared resid | 0.993903 | Schwarz criterion | -1.425273 |
| F-statistic | 15.23234 | Hannan-Quinn criter. | -1.605591 |
| Prob(F-statistic) | 0.000000 | Durbin-Watson stat | 1.585638 |

This table reports the results of the following equation under fixed effect model:

$$G_i = \alpha + \beta_1 ATR_i + \beta_2 ER_i + \beta_3 FPF_i + \beta_4 d(LNAR_i) + \beta_6 RAR_i + \varepsilon_i$$

Here, *ATR* is assets turnover ratio; *ER* expense ratio; *FPF* is family proportion of a mutual fund; *LNAR* is liquidity to net assets ratio; *RAR* is risk-adjusted return.

1. Figures in parentheses indicate *t*-value. * and *** stand for significant at 10% and 1% levels, respectively.

2. Wald test for equality of slope coefficients: Chi-square statistic =90.25169 with 5 degrees of freedom, and F(5, 113)=18.05034.

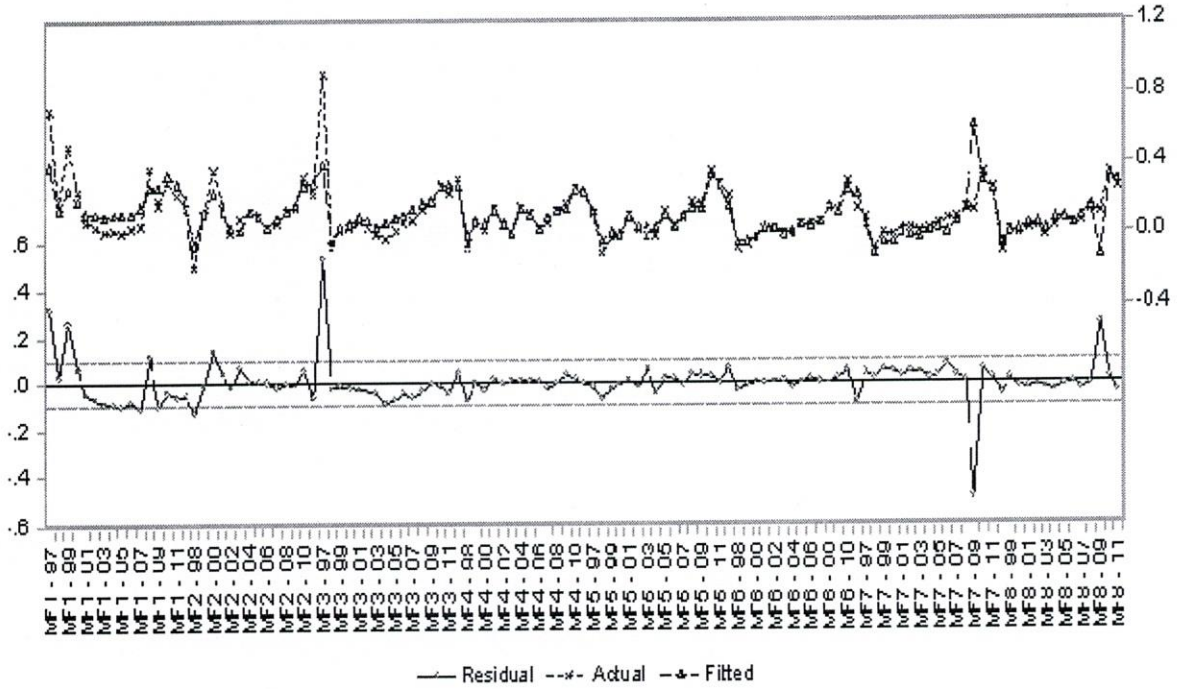



Figure 5.9: Actual Fitted and Residual graphs of panel data regression

Actual, fitted, residual graphs of panel data under fixed effect model are shown in the figure 5.9. The residuals are plotted against the left vertical axis and both the actual and fitted series are plotted against the right vertical axis. The fit is good because the fitted values nearly cover up the actual values on the graph. From the residual, we see that there are some outliers and a small number of spikes in the graph.

**Table 5.14: Results of Random Effects Model**

| | | | |
|---|---|---|---|
| Dependent Variable: G | Method: Panel EGLS (Cross-section random effects) | | |
| Sample: 1996 2011 | Periods included: 16 | | |
| Cross-sections included: 8 | Total panel (unbalanced) observations: 126 | | |
| Swamy and Arora estimator of component variances | | | |
| *Constant* | -0.120206*** | | |
| | (-4.563472) | | |
| *ATR* | 0.800570*** | | |
| | (11.66762) | | |
| *ER* | -0.790080*** | | |
| | (-9.401841) | | |
| *FPF* | 0.069982 | | |
| | (0.625595) | | |
| *LNAR* | 0.055809 | | |
| | (0.760489) | | |
| *RAR* | 0.060348* | | |
| | (1.915538) | | |
| Effects Specification | | | |
| | | S.D. | Rho |
| Cross-section random | | 0.000000 | 0.0000 |
| Idiosyncratic random | | 0.096832 | 1.0000 |
| Weighted Statistics | | | |
| R-squared | 0.617844 | Mean dependent var | 0.102014 |
| Adjusted R-squared | 0.600935 | S.D. dependent var | 0.151484 |
| S.E. of regression | 0.095695 | Sum squared resid | 1.034804 |
| F-statistic | 36.53818 | Durbin-Watson stat | 1.562865 |
| Prob(F-statistic) | 0.000000 | | |

*Continued to the next page*

| Unweighted Statistics | | | |
|---|---|---|---|
| R-squared | 0.617844 | Mean dependent var | 0.102014 |
| Sum squared resid | 1.034804 | Durbin-Watson stat | 1.562865 |

This table reports the results of the following equation under random effect model:

$$G_i = \alpha + \beta_1 ATR_i + \beta_2 ER_i + \beta_3 FPF_i + \beta_4 d(LNAR_i) + \beta_6 RAR_i + \varepsilon_i$$

Here, *ATR* is assets turnover ratio; *ER* expense ratio; *FPF* is family proportion of a mutual fund; *LNAR* is liquidity to net assets ratio and *RAR* is risk-adjusted return.

1. Figures in parentheses indicate *t*-value. * and *** stand for significant at 10% and 1% levels, respectively.
2. Wald test for equality of slope coefficients: Chi-square statistic =113.7234 with 5 degrees of freedom, and F(5, 120)=22.74468

Results of random effect model are shown in table 5.14. The results of constant and coefficients of all mutual funds show about same results as getting from fixed effect model. The table 5.14 explains that the absolute *t*-ratios of the constant and the coefficients of independent variables have increased and therefore, they are more efficient under random effect model. The results of Wald test for the equality of slope coefficient are significant (Chi-square statistic =113.7234 with 5 df, and F(5, 120)=22.74468).

However, for applicability of random effects model in the panel regression, we have to test the results through Hausman Test. The result of Hausman test is shown in table 5.15. It is observed that Chi-Square statistic for cross-section random is very high 4.240726 and the *p*-value for the test is more than 1%, indicating that the random effects model is appropriate. Therefore, the random effects specification is to be preferred.

**Table 5.15: Summary Results (Hausman Test)**

| Correlated Random Effects - Hausman Test<br>Equation: Untitled<br>Test cross-section random effects | | | |
|---|---|---|---|
| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | *p*-value |
| Cross-section random | 4.240726 | 5 | 0.5153 |

** WARNING: estimated cross-section random effects variance is zero.

To test whether any differences between fixed effect and random effect estimators, the next portion of Hausman test can be analyzed. The table 5.16 shows the results of cross-section random effects test comparisons. The variances of differences are positive and small, and the associated *p*-values are high, which indicate that there is no difference between fixed effect and random effect estimators.

**Table 5.16: Cross-Section Random Effects Test Comparisons**

| Variable | Fixed | Random | Var(Diff.) | *p*-value |
|---|---|---|---|---|
| *ATR* | 0.833666 | 0.807384 | 0.001529 | 0.5015 |
| *ER* | -0.783804 | -0.766910 | 0.002769 | 0.7482 |
| *FPF* | 0.002716 | 0.088967 | 0.015435 | 0.4875 |
| *LNAR* | 0.005340 | 0.008514 | 0.000130 | 0.7810 |
| *RAR* | 0.054051 | 0.058099 | 0.000035 | 0.4933 |

**Table 5.17: Results of SUR Framework**

| | | | |
|---|---|---|---|
| Dependent Variable: G | | Method: Seemingly Unrelated Regression (SUR) | |
| Sample: 1996 2011 | | Periods included: 16 | |
| Cross-sections included: 8 | | Total panel (unbalanced) observations: 126 | |
| Linear estimation after one-step weighting matrix | | | |
| *Constant* | | -0.120206*** | |
| | | (-4.738698) | |
| *ATR* | | 0.800570*** | |
| | | (12.11563) | |
| *ER* | | -0.790080*** | |
| | | (-9.762848) | |
| *FPF* | | 0.069982 | |
| | | (0.649617) | |
| *LNAR* | | 0.055809 | |
| | | (0.789690) | |
| *RAR* | | 0.060348** | |
| | | (1.989090) | |
| Determinant residual covariance | | 0.008696 | |
| R-squared | 0.617844 | Mean dependent var | 0.102014 |
| Adjusted R-squared | 0.600935 | S.D. dependent var | 0.151484 |
| S.E. of regression | 0.095695 | Sum squared resid | 1.034804 |
| Durbin-Watson stat | 1.562865 | | |

This table reports the results of the following equation under seemingly unrelated regression (SUR) framework:

$$G_i = \alpha + \beta_1 ATR_i + \beta_2 ER_i + \beta_3 FPF_i + \beta_4 d(LNAR_i) + \beta_6 RAR_i + \varepsilon_i$$

Here, *ATR* is assets turnover ratio; *ER* expense ratio; *FPF* is family proportion of a mutual fund; *LNAR* is liquidity to net assets ratio and *RAR* is risk-adjusted return.

1. Figures in parentheses indicate *t*-value. ** and *** stand for significant at % and 1% levels, respectively.

2. Walt Test for equality of slope coefficient: chi-square statistic=122.4730 with 5 degrees of freedom.

Finally, Generalized Least Square (GLS) regression is run using the 'Seemingly Unrelated Regression (SUR)'. Table 5.17 reports the results of SUR framework. The results of the intercept term and the coefficients of all mutual funds show about same results as fixed effect and random effect models. But if it is observed keenly in table 5.17, the results explore that the absolute $t$-ratios of the constant and the coefficients of all independent variables have increased compared to the results of fixed effect and random effect models in table 5.13 and 5.14, respectively. Therefore, the results under SUR framework are more efficient. The Chi-square statistic under Wald test is 122.4730 with 5 degrees of freedom. The weighted $R^2$ under SUR framework is 0.847, which indicates that the data are more fitted under this model than the fixed effect model or the random effect model. Finally, if the table 5.17 is compared with the table 5.13 or 5.14, it concludes that the SUR framework is more efficient.

# Chapter Six

# Findings, Conclusion and Policy Implications

## 6.1 Introduction

This is the final chapter. The objectives of this chapter are to explore the findings of the study, to discuss the limitations of the study, to provide conclusion and policy implications of the study.

This chapter is designed into four sections. Section 6.1 introduces the chapter. Section 6.2 explores the findings of the study. Section 6.3 discusses limitations of the study, which will help the researchers for further researches regarding this field. Section 6.4 provides conclusion and some policy implications of whole dissertation, which are necessary for regulating bodies, fund managers and investors and so on..

## 6.2 Findings

Finding is the substance of any work. After analyzing the empirical results of the study, the following substances are established:

**Risk-Adjusted Performance**

From the analysis of the results of risk-adjusted performance of selected Mutual Funds, the following important outcomes are observed:

The first ICB Mutual Fund's arithmetic mean, geometric mean and median are much closed among themselves. The arithmetic mean of 7th ICB Mutual Fund is very high but its geometric mean and median are not very closed like 1st ICB Mutual Fund. The 5th ICB Mutual Fund shows the second highest arithmetic mean but its geometric mean and median are lower compared to other mutual funds, which indicate that the 5th ICB Mutual Fund bears the highest risk and the 1st ICB Mutual Fund has the lowest risk of return.

Treynor ratio considers systematic risk, and from this analysis it concludes that all selected Mutual Funds are performing better compared to market index and the sixth ICB Mutual Fund shows the highest risk premium per unit of systematic risk.

According to Sharpe ratio, it is found that all selected Mutual Funds are performing better than market portfolio except 6th ICB Mutual Fund, which is the best performing fund according to Trenynor ratio. Therefore, it is said that the 6th ICB Mutual Fund has maximum unsystematic risk. The 1st and 5th ICB Mutual Funds have better performance per unit of total risk among all other selected Mutual Funds.

Based on Modigliani measure, we can reach in this decision that all mutual funds show better performance per unit of excess return compared to market. On the other hand, the

1st ICB Mutual Fund shows the best performing and the 6th ICB Mutual Fund is the worst performing funds compared to other selected Mutual Funds.

Sortino ratio counts downside risk. The results of Sortino ratio conclude that the 1st and 7th ICB Mutual Fund have the lowest underperforming return but 6th ICB Mutual Fund has maximum underperforming return within the selected period. The correlation of Sortino ratio with other risk-adjusted measures is positive except Treynor ratio and the correlation between Sortion ratio and information ratio is significantly positive.

The information ratio shows about the same results like Sortino ratio but the results are not satisfactory compared to market, which indicates that the investors of selected Mutual Funds are unable to collect accurate information from market. That is all selected mutual funds have large trucking error. Among these selected Mutual Funds, the 1st and 7th ICB Mutual Funds show better information ratio.

**Selectivity, Diversification and Market Timing Ability of Managers**

Better selection of securities in a portfolio maximizes the interests of unit holders, but better selection of securities in a portfolio is very tough for mutual fund managers. Besides, selectivity, diversification and market timing ability of mutual fund managers are also indicate managers' performance to operate mutual funds. From the empirical analysis of results, the followings are found:

The results of Jensen measure show positive value of $\alpha_P$, but not a single value of $\alpha_P$ shows significant results. Therefore, the findings indicate no manager of selected Mutual Funds has better security selection capacity in the portfolio.

The results of Treynor and Mauzy measure explore that the values of $\gamma_P$ for all selected Mutual Funds are negative. Therefore, the results interpret that the fund managers have no market timing ability in capital market. The results of Treynor and Mauzy measure also explore that the values of $R^2$ for all selected Mutual Funds are below 50%. Among the selected Mutual Funds, the 1st ICB Mutual Fund shows the highest value of $R^2$ (42%) and the 6th ICB Mutual Fund shows the lowest value of $R^2$ (10%). Therefore, the findings conclude that the mutual fund managers have low level of diversification capacity for selected Mutual Funds.

**Impact of Some Major Determinants to the Growth of Selected Mutual Funds**

The results of this section are calculated from time series/cross-sectional data by using cross-section/panel regression model. For testing stationary, long-run and short-run relationships between the determinants of mutual fund growth, different unit root tests, cointegration tests and Granger-causality tests are applied. The findings of these models for selected Mutual Funds are given below:

According to Levin, Lin and Chu unit root test, the results explore that all determinants except liquidity to net assets ratio (*LNAR*) are integrated at level, I(0). The liquidity to net

assets ratio *(LNAR)* is integrated at first difference, I(1). The results of Im, Pesaran and Shin unit root test, and Augmented Dickey Fuller (ADF)-Fisher Chi-square unit root test also provide same findings like Levin Lin and Chu test.

Kao residual cointegration test and Johansen Fisher Panel cointegration test provide the significant results of cointegration. The results interpret that there are long-run equilibrium relationship between the determinants of mutual fund growth.

The results of Granger-causality test explore that expense ratio *(ER)* causes asset turnover ratio *(ATR)* and risk-adjusted return *(RAR),* but asset turnover ratio *(ATR)* and risk-adjusted return *(RAR)* do not cause expense ratio *(ER)*. However, the expense ratio *(ER)* has bidirectional relationship with liquidity to net assets ratio *(LNAR)*. Asset turnover ratio *(ATR)* and risk-adjusted return *(RAR)* cause liquidity to net assets ratio *(LNAR)*, but liquidity to net assets ratio *(LNAR)* does not cause asset turnover ratio *(ATR)* and risk-adjusted return *(RAR)*. The asset turnover ratio *(ATR)* has significant bidirectional relationship with risk-adjusted return *(RAR)*. The findings suggest that there are short-run relationships between the determinants of mutual fund growth.

The results of time series analysis for different mutual funds are different. The results of the 1st Mutual Fund interpret that asset turnover ratio *(ATR)* has significant positive impact on mutual fund growth, i.e., if the asset turnover ratio of first mutual fund increases, the growth of that mutual fund also increases. The coefficients of expense ratio *(ER)* and liquidity to net asset ratio *(LNAR)* are negative, which indicate that their relation

is inverse with mutual fund growth. The results of 3rd ICB Mutual Fund produce same results like 1st ICB Mutual Fund. The results of 2nd, 4th, 5th, and 6th ICB Mutual Funds investigate that the asset turnover ratio *(ATR)* has significant positive impact on mutual fund growth and expense ratio *(ER)* has significant negative impact on mutual fund growth. The results of risk-adjusted return *(RAR)* of the 5th, 6th and 7th ICB mutual funds show significant positive impact on the mutual fund growth. Most results of family proportion of mutual fund *(FPF)* show the positive relationship with mutual fund growth, but the 8th ICB Mutual Fund shows significant negative impact on mutual fund growth. The liquidity to net asset ratio *(LNAR)* of seventh and eighth ICB Mutual Funds has significant positive impact on mutual fund growth. The results interpret that the values of $R^2$ for all mutual funds are more than 85%, which indicates that the determinants of mutual fund growth are strongly positively correlated with one another. The intercept terms of all mutual funds except 4th and 7th ICB Mutual Funds are significantly negative, which interpret that if all determinants are unchanged, then mutual fund growth will fall significantly.

The results of fixed effects panel model interpret that the asset turnover ratio *(ATR)* and risk-adjusted return *(RAR)* have significant positive impact on mutual fund growth, i.e., if the asset turnover ratio and risk-adjusted return increase, then the growth of mutual funds also increases. The expense ratio *(ER)* shows significant negative relationship with mutual fund growth. The intercept term also shows same relation with mutual fund growth like expense ratio *(ER)*. Under this model, Wald test provides the significant results for equality of slope coefficient.

The results of random effects panel model and seemingly unrelated regression *(SUR)* framework provide same results like fixed effects model. But if the results are observed keenly, it will be fund that the results of random effect model are more significant that fixed effect model and the results of SUR framework are stronger than either fixed effect or random effect models. Therefore, the findings conclude that the asset turnover ratio *(ATR)* and risk-adjusted return *(RAR)* have significant positive impact on mutual fund growth and the expense ratio *(ER)* has significant negative impact on mutual fund growth. The family proportion of a mutual fund *(FPF)* and liquidity to net assets ratio *(LNAR)* show insignificant relationship with mutual fund growth.

## 6.3 Limitations of the Study

In the research world, no research is out of limitations. The present study considers a number of limitations, which will help the researchers for further study. These limitations are as follows:

The current study examines only the 8 prominent ICB Mutual Funds, but not examines all mutual funds traded in Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE), this is because the data unavailability of all mutual funds. If all mutual funds are considered, the findings might be different.

The weakness of the study is that the number of observations is very small: only 16 observations for risk-adjusted measures, selectivity, market timing and diversification

capacity of fund managers, and for time series regression model from the study period of 1995-96 to 2010-11. For panel data analysis, the number of observation is only 126. If the data are collected monthly or quarterly basis and the number of observations would be more than 126 and the results might be more significant. But monthly or quarterly data are not available for the study period.

Dhaka Stock Exchange (DSE) general index is taken as the benchmark for the study, which may or may not represent the whole market accurately. If the DSE 20 index or DSE all shares price index is considered, the finding might be different.

The interest rate of 364-day Bangladesh Treasury bill is considered as risk free rate of return in this study. If three month T-bill return or government savings certificate rate of return is taken as risk free rate of return, the findings might be different.

The current study is limited by the period form 1995-96 to 2010-11 to evaluate the performance of selected Mutual Funds, not from their commencement period. But all information is not available from their commencement period. If all observations from the commencement period of all selected Mutual Funds are considered, the finding might be more significant.

The final weakness of this study is that after the financial year 2010-11, the data of selected Mutual Funds are not included in this dissertation, because from 1st December 2012, the all securities' face value changes and becomes equal face value for all securities (Tk.10 per security) in Dhaka Stock Exchange (DSE) and Chittagong Stock

Exchange (CSE). If it is possible to include the information after 2012, the findings might be more significant.

### 6.4 Conclusion and Policy Implications

This study investigates the growth and development of ICB Mutual Funds, the ICB mutual funds risk-adjusted performance with selectivity, market timing and diversification using performance evaluation techniques and tests whether the impact of some major determinants on mutual funds growth using cross-sectional data/panel regression data.

The average portfolio returns outperform the market index return. The risk premium per unit of systematic risk or total risk is acceptable. The excess mutual funds return over risk free returns are also better performing than market return of risk-free returns. By analyzing, it is found that the correlation between ICB Mutual Funds with market index is low. It happens because of lacking of skilled investor, lack of skilled fund managers, weak institutional framework, asymmetric regulation, lack of proper academic qualification of fund managers etc. Therefore, it is recommended that the investors should invest in mutual funds carefully.

The results of Jensen measure show positive values of $\alpha_P$, but they are not significant. Therefore, the findings explore that the performance of mutual fund managers is not superior. Net selectivity of all selected funds is positive which indicates that the funds

have diversification capability though this study shows low diversification of the mutual funds.

The results of Treynor and Mauzy quadratic equation show that the value of $\gamma_P$ for all ICB Mutual Funds is negative, which indicates that the market timing ability of ICB Mutual Fund managers is not good. Therefore, it is suggested that the funds' managers should increase their market timing ability. The success of this sector depends on the performance of funds and the role of regulatory bodies. Excellent performance and stringent regulations will increase the popularity of mutual funds in Bangladesh.

Most of the determinants affect the growth of selected Mutual Funds as expected by the author and other researchers. The results of fixed effects model, random effects model and SUR framework indicate that the asset turnover ratio and risk-adjusted return have significant positive impact on the growth of mutual funds and the expense ratio has significant negative impact on the growth of mutual funds growth. The liquidity to net assets ratio and family proportion of mutual funds do not provide significant impact on mutual fund growth.

The authority should monitor that no scheme of mutual fund together invest more than 20% of its assets in shares, debentures or other securities of a single company or group and no scheme of the fund invest more than 25% of its assets in shares, debentures or other securities in any industry.

The initial issue expense rate in respect to the schemes is about 5% according to the Ordinance. It is suggested that the initial issue expenses should be minimized. It is further suggested that the recurring expenses should be controlled for the betterment of unit holders.

Bangladesh Security and Exchange Commission (BSEC) needs to examine the recurring expenses of mutual funds. At present, there is no clarity on this and it seems to promote asset growth at the cost of existing investors.

The risk-adjusted performance of ICB Mutual Funds is comparatively better than the market return. However, the downside risk and tracking errors of these funds are noticeable. Therefore, it is suggested that the fund managers should control underperforming return as well as they should provide related information so that the investors can minimize the tracking errors.

The selectivity, market timing and diversification capacity of ICB Mutual Fund managers are not satisfactory. The fund managers should improve their skillness to select undervalued securities in the portfolios, to structure a portfolio with relatively high beta during a market rise and relatively low beta during market decline, and to select the securities in the portfolio with opposite direction so that it is possible to add return required to justify diversification decisions.

The growth rate of ICB Mutual Funds is positively and significantly affected by asset turnover ratio and risk-adjusted return but negatively affected by expense ratio. The family proportion of mutual funds and liquidity to net assets ratio do not show significant results. If the more scientific research and sophisticated data analysis techniques are used, the results of family proportion of mutual funds and liquidity to net assets ratio might provide significant impact on mutual fund growth. Therefore, it is suggested for further research.

Finally, though there are some weaknesses and limitations of mutual funds, the findings conclude that the overall investment performance of ICB Mutual Funds is superior to market index performance. Overall results suggest that mutual funds in Bangladesh are able to add value in the economy of Bangladesh. Therefore, the study suggests the rationale investors to pour their money into mutual funds for stock investment when they face high uncertainties in the capital markets.

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*Appendix A*

## 1. The $R^2$ Criterion

One of the measures of goodness of fit of a regression model is R-square ( $R^2$) statistic. It can be defined as:

$$R^2 = 1 - \frac{\hat{\varepsilon}'\hat{\varepsilon}}{(y-\bar{y})'(y-\bar{y})}$$

Where, $R^2$ lies between 0 and 1. The closer it is to 1, the better is the fit. $\hat{\varepsilon}$ is the estimated error terms, $\hat{\varepsilon}'$ is the transpose of estimated error terms, $\bar{y}$ is the mean of the dependent variable, i.e.; $\bar{y} = \frac{\sum_{t=1}^{T} y_t}{T}$, and $T$ is the total number of observations.

## 2. Adjured $R^2$

A penalty for adding regressors to increase the $R^2$ value, Hentry Theil develops the adjusted $R^2$, denoted by $\bar{R}^2$, which can be computed as:

$$\bar{R}^2 = 1 - (1 - R^2)\frac{T-1}{T-k}$$

Where, k is the number of samples, $T-1$ is the degrees of freedom for numerator and $T-k$ is the degrees of freedom for denominator. From this formula, $\bar{R}^2 \leq R^2$, showing the adjusted $R^2$ penalizes for adding more regressiors. For comparing purposes, $\bar{R}^2$ is a better measure than $R^2$.

### 3. Standard Error of regression (S.E. of Regression)

The standard error of the regression is a summary measure based on the estimated variance of the residuals. It is simply the standard deviation of dependent variable in a regression line. The standard error of the regression is computed as:

$$s = \sqrt{\frac{\hat{\varepsilon}'\hat{\varepsilon}}{T-k}}$$

Where, $s$ is the standard error of the regression. It is used as a summary measure of the goodness of fit of the estimated regression line.

### 4. Sum of Square Residuals

The sum of square residuals can be used in a variety of statistical calculations. The formula for sum of Residual Square is as follows:

$$\hat{\varepsilon}'\hat{\varepsilon} = \sum_{t=1}^{T} (y_t - X_t'b)^2$$

Where, $y$ is the dependent variable and $X$ is the explanatory variable, $b$ is slope coefficient of explanatory variable. It is a measure of the discrepancy between the data and estimated model. A small value of sum of square residuals indicates a tight fir of the model to the data.

### 5. Durbin-Watson Statistic

The Durbin-Watson statistic measures the serial correlation in the residuals. The statistic is computed as:

$$DW = \frac{\sum_{t=2}^{T}(\hat{\varepsilon}_t - \hat{\varepsilon}_{t-1})^2}{\sum_{t=1}^{T}\hat{\varepsilon}_t^2}$$

Where, $DW$ is the Durbin-Watson statistic. As a rule of thumb, if the DW is less than 2, there is evidence of positive serial correlation.

### 6. Akaike Information Criterion

The idea of imposing a penalty for adding regressors to the model is carried in the Akaike Information Criterion, which is defined as:

$$AIC = \frac{2l}{T} + \frac{k \log T}{T}$$

Where, $l$ is the log likelihood, $\frac{2l}{T}$ is the penalty factor. In comparing two or more models, the model with the lower value of $AIC$ is preferred.

### 7. Schwarz Criterion

Similar in spirit of the $AIC$, the Schwarz criterion is defined as:

$$SC = -\frac{2l}{T} + \frac{k \log T}{T}$$

Where, $\frac{2l}{T}$ is the penalty factor. $SC$ imposes a harsher penalty than $AIC$. Like $AIC$, the lower the value of $SC$, the better the model.

### 8. Hannan-Quinn Criterion

The Hannan-Quinn criterion employs another penalty function:

$$HQ = -2\left(\frac{l}{T}\right) + \frac{2k\log(\log(T))}{T}$$

Where, $2\frac{l}{T}$ is the penalty factor. Like $AIC$ and $SC$ , the lower the value of $HQ$, the better the model.

### 9. *F*-Statistic

The *F*-statistic reported in the regression output is from a test of the hypothesis that all of slope coefficients (excluding the constant, or intercept) in a regression are zero. For ordinary least square models, the *F*-statistic is computed as:

$$F = \frac{R^2/(k-1)}{(1-R^2)/(T-k)}$$

Under the null hypothesis with normally distributed errors, this statistic has an *F*-distribution with *k-1* numerator degrees of freedom and *T-k* denominator degrees of freedom. The *p*-value given just below of the *F*-statistic is the marginal significance level of the *F*-test. If the *p*-value is less than the significance level, the null hypothesis will be rejected that all slope coefficients are equal to zero.

*Appendix B*

**Table 1: P/E ratio of ICB Mutual Funds**

| Year | 1st ICB | 2nd ICB | 3rd ICB | 4th ICB | 5th ICB | 6th ICB | 7th ICB | 8th ICB |
|---|---|---|---|---|---|---|---|---|
| 1995-96 | 31.52 | 94.65 | 29.24 | 21.83 | 13.66 | 12.67 | 9.79 | - |
| 1996-97 | 14.91 | 9.88 | 3.33 | 6.65 | 9.70 | 5.90 | 8.77 | 7.58 |
| 1997-98 | 10.55 | 44.80 | 23.68 | 16.26 | 18.86 | 23.65 | 32.74 | 54.76 |
| 1998-99 | 5.63 | 11.57 | 12.20 | 9.94 | 16.41 | 23.70 | 10.70 | 9.20 |
| 1999-00 | 6.04 | 4.10 | 8.25 | 9.44 | 15.14 | 12.36 | 13.74 | 12.77 |
| 2000-01 | 8.83 | 5.61 | 7.99 | 6.33 | 6.99 | 8.93 | 9.94 | 10.15 |
| 2001-02 | 7.59 | 9.50 | 7.73 | 7.31 | 8.84 | 8.41 | 8.57 | 8.65 |
| 2002-03 | 9.73 | 9.01 | 10.77 | 11.69 | 11.53 | 10.71 | 9.71 | 12.55 |
| 2003-04 | 13.10 | 7.61 | 16.95 | 7.14 | 15.23 | 12.26 | 10.76 | 9.79 |
| 2004-05 | 12.54 | 10.15 | 13.32 | 7.91 | 8.38 | 5.32 | 10.41 | 9.63 |
| 2005-06 | 11.62 | 10.90 | 7.19 | 9.69 | 8.23 | 7.52 | 6.70 | 8.64 |
| 2006-07 | 14.26 | 11.83 | 9.47 | 9.95 | 11.06 | 10.73 | 10.30 | 12.30 |
| 2007-08 | 24.08 | 31.46 | 17.54 | 20.21 | 33.57 | 20.87 | 33.17 | 24.47 |
| 2008-09 | 15.01 | 16.56 | 10.37 | 10.82 | 15.66 | 13.59 | 17.85 | 14.77 |
| 2009-10 | 15.42 | 10.12 | 10.70 | 12.04 | 12.39 | 7.14 | 10.64 | 8.15 |
| 2010-11 | 16.17 | 12.20 | 10.41 | 9.66 | 8.99 | 6.36 | 9.19 | 5.75 |

**Table 2: ROE of ICB Mutual Funds**

| Year | 1st ICB | 2nd ICB | 3rd ICB | 4th ICB | 5th ICB | 6th ICB | 7th ICB | 8th ICB |
|---|---|---|---|---|---|---|---|---|
| 1995-96 | 38.39 | 8.33 | 16.08 | 25.75 | 23.33 | 16.44 | 18.96 | - |
| 1996-97 | 60.74 | 35.92 | 58.80 | 45.65 | 28.99 | 30.58 | 21.17 | 23.81 |
| 1997-98 | 33.20 | 7.42 | 7.96 | 16.59 | 12.59 | 6.96 | 5.62 | 2.87 |
| 1998-99 | 46.48 | 28.72 | 15.82 | 23.80 | 13.37 | 6.73 | 11.06 | 11.21 |
| 1999-00 | 34.58 | 42.16 | 18.42 | 20.70 | 13.28 | 9.68 | 9.33 | 8.74 |
| 2000-01 | 23.61 | 28.34 | 20.92 | 29.90 | 23.86 | 14.39 | 13.39 | 12.13 |
| 2001-02 | 26.45 | 16.38 | 20.02 | 14.44 | 17.36 | 15.22 | 13.48 | 13.15 |
| 2002-03 | 20.52 | 17.67 | 16.23 | 14.43 | 13.38 | 11.81 | 12.04 | 9.21 |
| 2003-04 | 25.03 | 25.85 | 16.19 | 28.63 | 14.80 | 12.80 | 13.54 | 14.06 |
| 2004-05 | 26.55 | 24.08 | 20.36 | 26.33 | 25.65 | 17.86 | 16.16 | 16.54 |
| 2005-06 | 29.23 | 19.06 | 24.39 | 19.42 | 20.26 | 18.08 | 18.46 | 14.88 |
| 2006-07 | 29.48 | 20.71 | 23.99 | 21.64 | 22.90 | 18.18 | 18.28 | 15.70 |
| 2007-08 | 44.21 | 25.95 | 28.57 | 26.35 | 30.56 | 26.18 | 25.07 | 22.51 |
| 2008-09 | 44.33 | 28.63 | 31.83 | 30.11 | 32.22 | 27.34 | 26.18 | 24.28 |
| 2009-10 | 50.02 | 40.63 | 38.35 | 37.23 | 43.11 | 38.33 | 39.04 | 39.09 |
| 2010-11 | 47.21 | 43.25 | 42.16 | 39.91 | 45.13 | 39.57 | 42.03 | 41.72 |

**Table 3: Growth of Mutual Funds in Bangladesh**

| Listing Year | No. of Companies | Paid-up Capital (Taka in mn.) |
|---|---|---|
| 1980 | 1 | 8.00 |
| 1984 | 2 | 13.00 |
| 1985 | 3 | 23.00 |
| 1986 | 4 | 33.00 |
| 1987 | 5 | 48.00 |
| 1988 | 6 | 98.00 |
| 1995 | 7 | 128.00 |
| 1996 | 8 | 178.00 |
| 1997 | 9 | 228.00 |
| 2000 | 10 | 643.00 |
| 2003 | 11 | 743.00 |
| 2005 | 13 | 1098.00 |
| 2006 | 13 | 1098.00 |
| 2007 | 14 | 1198.00 |
| 2008 | 16 | 3573.00 |
| 2009 | 21 | 7523.00 |
| 2010 | 32 | 23023.00 |
| 2011 | 37 | 29480.00 |
| 2012 | 40 | 36438.00 |

**Table 4: Gross Income Total Expenses and Net Income of ICB Mutual Funds**

**(Taka in lacs)**

| Year | 1st ICB Mutual Fund | | | 2nd ICB Mutual Fund | | | 3rd ICB Mutual Fund | | |
|---|---|---|---|---|---|---|---|---|---|
| | GI | TE | NI | GI | TE | NI | GI | TE | NI |
| 1995-96 | 42.32 | 7.42 | 34.90 | 9.39 | 2.94 | 6.45 | 27.70 | 6.36 | 21.34 |
| 1996-97 | 97.46 | 3.22 | 94.24 | 35.56 | 3.94 | 31.62 | 152.50 | 3.09 | 149.41 |
| 1997-98 | 70.24 | 10.52 | 59.72 | 13.44 | 8.19 | 5.25 | 24.09 | 5.40 | 18.69 |
| 1998-99 | 132.96 | 7.15 | 125.81 | 33.98 | 11.50 | 22.48 | 41.98 | 4.44 | 37.54 |
| 1999-00 | 127.38 | 10.74 | 116.64 | 57.65 | 12.99 | 44.66 | 52.08 | 7.07 | 45.01 |
| 2000-01 | 87.97 | 3.04 | 84.93 | 46.63 | 11.26 | 35.37 | 58.35 | 4.30 | 54.05 |
| 2001-02 | 106.49 | 7.67 | 98.82 | 39.15 | 18.62 | 20.53 | 61.96 | 8.55 | 53.41 |
| 2002-03 | 86.64 | 9.52 | 77.12 | 43.74 | 19.81 | 23.93 | 53.10 | 10.36 | 42.74 |
| 2003-04 | 102.34 | 6.89 | 95.45 | 55.65 | 16.26 | 39.39 | 53.23 | 12.02 | 41.21 |
| 2004-05 | 135.36 | 33.64 | 101.72 | 81.72 | 41.34 | 40.38 | 94.78 | 42.47 | 52.31 |
| 2005-06 | 119.06 | 4.20 | 114.86 | 47.72 | 14.69 | 33.03 | 83.44 | 17.33 | 66.11 |
| 2006-07 | 141.73 | 21.33 | 120.40 | 79.95 | 41.88 | 38.07 | 116.16 | 47.05 | 69.11 |
| 2007-08 | 310.95 | 62.68 | 248.27 | 168.76 | 115.19 | 53.57 | 231.40 | 138.54 | 92.86 |
| 2008-09 | 320.97 | 32.04 | 288.93 | 239.11 | 171.34 | 67.77 | 284.62 | 163.22 | 121.40 |
| 2009-10 | 469.34 | 46.01 | 423.33 | 282.53 | 155.10 | 127.43 | 302.81 | 118.43 | 184.38 |
| 2010-11 | 505.30 | 20.14 | 485.16 | 308.05 | 142.95 | 165.10 | 367.75 | 119.41 | 248.34 |

*Continued to the next page*

**Table 4: Gross Income Total Expenses and Net Income of ICB Mutual Funds**

**(Taka in lacs)**

| Year | 4th ICB Mutual Fund | | | 5th ICB Mutual Fund | | | 6th ICB Mutual Fund | | |
|---|---|---|---|---|---|---|---|---|---|
| | GI | TE | NI | GI | TE | NI | GI | TE | NI |
| 1995-96 | 42.17 | 5.75 | 36.42 | 54.30 | 5.89 | 48.41 | 115.29 | 13.41 | 101.88 |
| 1996-97 | 90.74 | 6.36 | 84.38 | 72.61 | 6.27 | 66.34 | 237.05 | 8.15 | 228.90 |
| 1997-98 | 34.35 | 6.54 | 27.81 | 36.75 | 11.36 | 25.39 | 65.38 | 18.38 | 47.00 |
| 1998-99 | 48.27 | 5.91 | 42.36 | 42.67 | 16.64 | 26.03 | 69.81 | 27.56 | 42.25 |
| 1999-00 | 46.59 | 9.27 | 37.32 | 42.58 | 17.36 | 25.22 | 80.62 | 21.40 | 59.22 |
| 2000-01 | 80.27 | 18.70 | 61.57 | 68.78 | 19.12 | 49.66 | 111.05 | 21.61 | 89.44 |
| 2001-02 | 69.31 | 22.80 | 46.51 | 60.28 | 23.80 | 36.48 | 127.08 | 30.79 | 96.29 |
| 2002-03 | 54.86 | 23.90 | 30.96 | 55.32 | 26.24 | 29.08 | 110.08 | 35.87 | 74.21 |
| 2003-04 | 87.97 | 17.98 | 69.99 | 56.55 | 25.04 | 31.51 | 112.16 | 32.81 | 79.35 |
| 2004-05 | 105.34 | 34.04 | 71.30 | 154.98 | 93.97 | 61.01 | 196.77 | 80.98 | 115.79 |
| 2005-06 | 71.73 | 18.03 | 53.70 | 91.11 | 40.97 | 50.14 | 165.63 | 42.97 | 122.66 |
| 2006-07 | 116.63 | 53.53 | 63.10 | 164.88 | 103.38 | 61.50 | 251.50 | 121.27 | 130.23 |
| 2007-08 | 289.93 | 204.20 | 85.73 | 544.08 | 447.69 | 96.39 | 509.09 | 295.89 | 213.20 |
| 2008-09 | 269.25 | 154.97 | 114.28 | 299.57 | 181.73 | 117.84 | 360.25 | 110.25 | 250.00 |
| 2009-10 | 391.99 | 214.27 | 177.72 | 451.70 | 238.18 | 213.52 | 569.67 | 116.34 | 453.33 |
| 2010-11 | 443.90 | 209.87 | 234.03 | 513.79 | 229.86 | 283.93 | 644.82 | 115.95 | 528.87 |

*Continued to the next page*

**Table 4: Gross Income Total Expenses and Net Income of ICB Mutual Funds**

**(Taka in lacs)**

| Year | 7th ICB Mutual Fund | | | 8th ICB Mutual Fund | | |
|---|---|---|---|---|---|---|
| | GI | TE | NI | GI | TE | NI |
| 1995-96 | 81.96 | 11.75 | 70.21 | - | - | - |
| 1996-97 | 101.67 | 16.77 | 84.90 | 207.10 | 50.86 | 156.24 |
| 1997-98 | 52.22 | 32.07 | 20.15 | 58.67 | 41.91 | 16.76 |
| 1998-99 | 78.42 | 39.09 | 39.33 | 99.37 | 33.31 | 66.06 |
| 1999-00 | 70.40 | 37.84 | 32.56 | 93.80 | 43.11 | 50.69 |
| 2000-01 | 109.25 | 61.55 | 47.70 | 135.61 | 64.19 | 71.42 |
| 2001-02 | 110.33 | 61.34 | 48.99 | 128.45 | 49.13 | 79.32 |
| 2002-03 | 112.58 | 68.77 | 43.81 | 96.74 | 42.44 | 54.30 |
| 2003-04 | 111.61 | 61.44 | 50.17 | 131.78 | 46.33 | 85.45 |
| 2004-05 | 176.70 | 113.98 | 62.72 | 201.24 | 94.69 | 106.55 |
| 2005-06 | 162.93 | 85.93 | 77.00 | 160.59 | 61.04 | 99.55 |
| 2006-07 | 244.17 | 161.59 | 82.58 | 270.22 | 159.59 | 110.63 |
| 2007-08 | 720.04 | 591.47 | 128.57 | 667.25 | 488.74 | 178.51 |
| 2008-09 | 739.49 | 289.49 | 150.00 | 478.64 | 264.40 | 214.24 |
| 2009-10 | 688.53 | 388.91 | 299.62 | 755.65 | 292.01 | 463.64 |
| 2010-11 | 765.14 | 361.03 | 404.11 | 843.53 | 227.24 | 616.29 |

**Table 5: Relationship among NAV, EPS and DPS of ICB Mutual Funds**

**(Taka in lacs)**

| Year | 1st ICB Mutual Fund | | | 2nd ICB Mutual Fund | | | 3rd ICB Mutual Fund | | |
|---|---|---|---|---|---|---|---|---|---|
| | NAV | EPS | DPS | NAV | EPS | DPS | NAV | EPS | DPS |
| 1995-96 | 181.83 | 69.79 | 60.00 | 154.83 | 12.89 | 42.00 | 132.68 | 21.34 | 28.00 |
| 1996-97 | 310.30 | 188.47 | 70.00 | 176.07 | 63.24 | 45.00 | 254.09 | 149.41 | 38.00 |
| 1997-98 | 359.74 | 119.44 | 70.00 | 141.57 | 10.49 | 30.00 | 234.79 | 18.69 | 35.00 |
| 1998-99 | 541.38 | 251.63 | 100.00 | 156.52 | 44.95 | 32.00 | 237.32 | 37.54 | 38.00 |
| 1999-00 | 674.66 | 233.29 | 125.00 | 213.84 | 89.32 | 35.00 | 244.34 | 45.01 | 40.00 |
| 2000-01 | 719.53 | 169.86 | 170.00 | 249.59 | 70.75 | 40.00 | 258.38 | 54.05 | 45.00 |
| 2001-02 | 747.14 | 197.61 | 175.00 | 250.65 | 41.06 | 42.00 | 266.79 | 53.05 | 50.00 |
| 2002-03 | 751.85 | 154.23 | 180.00 | 270.92 | 48.86 | 45.00 | 263.40 | 42.72 | 50.00 |
| 2003-04 | 762.74 | 190.89 | 200.00 | 304.69 | 78.77 | 50.00 | 254.60 | 41.21 | 50.00 |
| 2004-05 | 766.18 | 203.44 | 210.00 | 335.45 | 80.75 | 55.00 | 256.91 | 52.31 | 52.00 |
| 2005-06 | 785.90 | 229.72 | 210.00 | 346.49 | 66.05 | 55.00 | 271.02 | 66.10 | 52.00 |
| 2006-07 | 816.72 | 240.82 | 190.00 | 367.65 | 76.15 | 62.00 | 288.12 | 69.11 | 56.00 |
| 2007-08 | 748.84 | 331.03 | 265.00 | 412.79 | 107.14 | 75.00 | 324.99 | 92.86 | 65.00 |
| 2008-09 | 869.08 | 385.24 | 310.00 | 473.34 | 135.55 | 95.00 | 381.38 | 121.40 | 85.00 |
| 2009-10 | 1123.52 | 564.44 | 400.00 | 633.20 | 254.86 | 200.00 | 480.76 | 184.38 | 140.00 |
| 2010-11 | 1370.50 | 646.98 | 500.00 | 763.40 | 330.21 | 250.00 | 589.10 | 248.34 | 185.00 |

*Continued to the next page*

**Table 5: Relationship among NAV, EPS and DPS of ICB Mutual Funds**

**(Taka in lacs)**

| Year | 4th ICB Mutual Fund | | | 5th ICB Mutual Fund | | | 6th ICB Mutual Fund | | |
|---|---|---|---|---|---|---|---|---|---|
| | NAV | EPS | DPS | NAV | EPS | DPS | NAV | EPS | DPS |
| 1995-96 | 141.46 | 36.42 | 41.00 | 138.31 | 32.28 | 30.00 | 123.93 | 20.37 | 20.00 |
| 1996-97 | 184.84 | 84.39 | 45.00 | 152.53 | 44.23 | 35.00 | 149.71 | 45.78 | 24.00 |
| 1997-98 | 167.65 | 27.81 | 32.00 | 134.46 | 16.93 | 22.00 | 135.10 | 9.39 | 18.00 |
| 1998-99 | 178.01 | 42.36 | 35.00 | 129.82 | 17.35 | 20.00 | 125.55 | 8.45 | 15.00 |
| 1999-00 | 180.33 | 37.32 | 36.00 | 126.63 | 16.81 | 21.00 | 122.40 | 11.85 | 16.00 |
| 2000-01 | 205.91 | 61.57 | 38.00 | 138.73 | 33.11 | 23.00 | 124.28 | 17.89 | 17.00 |
| 2001-02 | 214.42 | 46.51 | 40.00 | 140.05 | 24.32 | 24.00 | 126.54 | 19.26 | 17.50 |
| 2002-03 | 214.50 | 30.96 | 40.00 | 144.90 | 19.39 | 24.00 | 125.63 | 14.84 | 17.50 |
| 2003-04 | 244.49 | 69.99 | 45.00 | 141.91 | 21.01 | 24.00 | 124.00 | 15.87 | 17.50 |
| 2004-05 | 270.78 | 71.30 | 48.00 | 158.58 | 40.67 | 27.00 | 129.65 | 23.16 | 18.50 |
| 2005-06 | 276.48 | 53.69 | 48.00 | 165.01 | 33.43 | 27.00 | 135.69 | 24.53 | 18.50 |
| 2006-07 | 291.58 | 63.10 | 52.00 | 179.01 | 41.00 | 33.00 | 143.23 | 26.05 | 23.00 |
| 2007-08 | 325.32 | 85.73 | 60.00 | 210.27 | 64.26 | 45.00 | 162.87 | 42.64 | 30.00 |
| 2008-09 | 379.59 | 114.28 | 80.00 | 243.83 | 78.56 | 56.00 | 182.87 | 50.00 | 37.00 |
| 2009-10 | 477.31 | 177.72 | 125.00 | 330.17 | 142.34 | 100.00 | 236.54 | 90.67 | 75.00 |
| 2010-11 | 586.34 | 234.02 | 165.00 | 419.46 | 189.29 | 135.00 | 267.31 | 105.77 | 90.00 |

*Continued to the next page*

**Table 5: Relationship among NAV, EPS and DPS of ICB Mutual Funds**

**(Taka in lacs)**

| Year | 7th ICB Mutual Fund | | | 8th ICB Mutual Fund | | |
|---|---|---|---|---|---|---|
| | NAV | EPS | DPS | NAV | EPS | DPS |
| 1995-96 | 123.40 | 23.40 | 18.00 | - | - | - |
| 1996-97 | 133.70 | 28.30 | 21.00 | 131.25 | 31.25 | 18.00 |
| 1997-98 | 119.42 | 6.72 | 14.00 | 116.60 | 3.35 | 12.00 |
| 1998-99 | 118.53 | 13.11 | 13.00 | 117.81 | 13.21 | 12.00 |
| 1999-00 | 116.39 | 10.86 | 13.50 | 115.95 | 10.14 | 12.50 |
| 2000-01 | 118.79 | 15.90 | 14.00 | 117.73 | 14.28 | 13.00 |
| 2001-02 | 121.12 | 16.33 | 14.50 | 120.60 | 15.86 | 13.50 |
| 2002-03 | 121.27 | 14.60 | 14.50 | 117.96 | 10.86 | 13.50 |
| 2003-04 | 123.50 | 16.73 | 15.00 | 121.55 | 17.09 | 14.00 |
| 2004-05 | 129.41 | 20.91 | 16.00 | 128.86 | 21.31 | 15.00 |
| 2005-06 | 139.07 | 25.67 | 16.00 | 133.77 | 19.91 | 15.00 |
| 2006-07 | 150.60 | 27.52 | 22.50 | 140.90 | 22.13 | 18.00 |
| 2007-08 | 170.95 | 42.86 | 30.00 | 158.60 | 35.70 | 25.00 |
| 2008-09 | 190.95 | 50.00 | 35.00 | 176.45 | 42.85 | 32.00 |
| 2009-10 | 255.82 | 99.87 | 70.00 | 237.17 | 92.73 | 65.00 |
| 2010-11 | 320.53 | 134.70 | 95.00 | 295.43 | 123.26 | 90.00 |



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