



Analysis Of Systematic Risk In Select Housing Finance Companies In India

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ABSTRACT

The present paper is an attempt to study the impact of volatility and systematic risk in select Housing Finance Companies in India. During the period of rapid melt down of stock markets most of the share prices fell to their lowest levels. The movement of BSE sensex as well as five other top housing companies namely HDFC, LIC Housing Finance, GIC Housing Finance, Dewan Housing Finance Ltd and Canfinhomes were studied for a period of 5 years i.e. from March 2004 to March 2009 and the fluctuations of share prices during bullish and bearish trends were recorded. The study reveals that the proportion of systematic risk is more in HDFC Limited followed by LIC Housing Finance Limited, Can Fin Homes Limited and GIC Housing Finance Limited. Dewan Housing Finance Corporation Limited has very small proportion of systematic risk associated with it. It indicates that the housing finance companies cannot give greater returns than market returns in a bull market and did not lose more than the market lost in a bear market. The investment in housing finance stocks is stable in nature. It can be concluded that investment in housing finance stocks is more safe in volatile market conditions.

Keywords : Housing Finance, Housing Finance Stocks, Risk and return, Volatility of stocks.

1.1 INTRODUCTION

The objective of any investor is to maximize the returns from investments, subject to various constraints, primarily risk. Return is the motivating force, inspiring the investor in the form of rewards, for undertaking the investment. The importance of returns in any investment decision can be traced to the following factors:

- It enables investors to compare alternative investments in terms of what they have to offer the investor.
- Measurement of historical (past) returns enables investors to assess how well they have performed.
- Measurement of historical returns also helps in the estimation of future returns.

The rate of return is the total return the investor receives during the holding period (the period when the security is owned or held by the investor). In other words, it is the income from the security in the form of cash flows and the difference in the price of the security between the beginning and end of the holding period expressed as a percentage of the purchase price of the security at the beginning of the holding period. The general equation for calculating the rate of return is shown below:

$$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$$

Where, R = Rate of return

P_t = Price of the security at time 't' i.e., at the end of the holding period.

P_{t-1} = Price of the security at time 't-1' i.e., at the beginning of the holding period or purchase price.

D_t = Dividend or Income receivable from the security at time 't'.

Rates of return are usually stated at an annual percentage rate to allow comparison of returns between securities. Risk and return go hand in hand in investments and finance. One cannot talk about returns without talking about risk because investment decisions always involve a trade-off between risk and return. Risk can be defined as the chance that the actual outcome from an investment will differ from the expected outcome. In simple terms, risk refers to the chance that some unfavorable event will happen. In other words, risk can be defined as the uncertainty that an investment will earn its ex-

pected rate of return. It can also be defined as the probability that actual returns may deviate from expected returns. The probability that the actual returns may be lower than expected returns gives rise to investment risk. The higher the probability of actual returns being less than expected, the higher will be the investment risk.

The most famous definition of risk is provided by Frank Knight¹, who interpreted risk as 'situations where the decision-maker can assign mathematical probabilities to the randomness which he is faced with'. Knight showed some distinction between risk and uncertainty. He defined uncertainty as situations where randomness "cannot" be expressed in terms of specific mathematical probabilities.

Knight's definition can be interpreted simply as – Risk refers to outcomes that can be insured against, whereas uncertainty refers to the outcomes that cannot be insured against.

Most people often use the terms risk and uncertainty interchangeably, though they are two very different terms. Toney Merna² debates that risk and uncertainty are not the same and he distinguishes them as 'A decision is said to be subject to risk when there is a range of possible outcomes and when known probabilities can be attached to the outcome'. "Uncertainty exists when there is more than one possible outcome to a course of action but the probability of each outcome is not known". On the whole, risk can be defined as deviation of actual returns from expected returns.

1.2 MEASURES OF RISK

The most common measures of riskiness of a security are standard deviation and variance of returns.

1.2.1 Standard Deviation and Variance of Returns

Standard deviation (commonly denoted as s) of returns merely measures the extent of deviation of returns from the average value of return. Precisely put, standard deviation of returns is the square root of the average of squares of deviations of the observed returns from their expected value of return.

The square of standard deviation is called variance (commonly denoted by s²). Thus, variance of security returns is the

average value of the squares of deviations of the observed returns from the expected value of return.

1.2.2 Covariance

The measure of covariance³ examines the degree of variance to which the returns from the security (share) and market vary in relation to each other. Covariance can either be positive or negative and can also be weaker or stronger. Positive covariance indicates that the returns of shares and market are moves in the same direction whereas negative covariance stands to opposite direction.

1.2.3 Beta Coefficient

The beta coefficient represented by the Greek letter Beta (β or B), measures the market risk as a non-diversifiable risk of an asset such as a stock compared to the rest of the market. It also measures volatility of the asset compared to the general market. The beta of a stock shows the relationship of the change in the price of a stock to the market⁴.

1.3 CALCULATION OF BETA

Beta is calculated by regressing the asset's return against the market portfolio. The relationship between the return for a particular asset and the market index can be expressed algebraically as,

$$RS = aS + \beta SRM + eS$$

Where,

RS = Estimated return on stock s in time period t.

aS = Estimated return on stock when the market return is 0 (Alpha value).

RM = Estimated return on the market index in the time period t.

βS = Measure of stock's sensitivity to the market index.

eS = Estimation error

$$\text{Beta } (\beta S) = \frac{\text{Cov}(R_s, R_m)}{\text{Var}(R_m)}$$

Beta measures the covariance of return on the stock (RS) with return on the market (RM) divided by the variance of market return. The beta coefficient is frequently referred as the measure of a security's systematic risk or market risk. Beta is a measure of relative systematic risk⁵, but the actual systematic risk of security 's' is $\beta_s^2 \sigma_m^2$ where β_s^2 stands to square of beta coefficient of stock 's' and σ_m^2 stands to market variance.

Most stocks have a positive beta, which means that most stocks move in the same direction as the general market. If the beta is greater than 1, then the stock moves more than the market does in the same direction. If the beta is zero, there is no market risk to that stock.

1.4 SYSTEMATIC AND UNSYSTEMATIC RISK

The risks of the securities are classified into systematic and unsystematic risks based on the relationship with market or divisibility. Systematic risk is also known as market risk or undiversified risk. It is associated with aggregate market (Stock Exchange Index, or BSE Sensex or NSE Nifty) returns. It is the proportion of total risk of the security which can not be reduced through diversification. In contrast, unsystematic risk is the company or industry specific risk that is inherent in each investment one makes. The amount of unsystematic risk present can be eradicated through appropriate diversification.

1.5 CALCULATION OF SYSTEMATIC RISK IN SELECT HOUSING FINANCE COMPANIES.

As stated above, standard deviation and variance of returns explain the risk element of specific stocks in the secondary market. Covariance, coefficient of correlation, and coefficient of determination (R²) indicate the level of relationship between stock returns and market returns. The analysis of systematic risk requires the above statistics. A sample of five top housing finance companies namely LIC Housing Finance Ltd, GIC Housing Finance Ltd, HDFC, Dewan Housing Finance Ltd and CanFin Homes were taken for the present study. The statistics of sample companies are given in Table 1.1.

**TABLE 1.1
RISK ELEMENTS AND INPUTS FOR CALCULATING SYSTEMATIC RISK**

Company Name	Company Statistics									Market Statistics		
	Average Return	SD of Return	Variance of Return	Covariance	Alpha	Beta	Coefficient of Correlation	R2	Standard Error of Beta	Average Return	SD of Return	Variance of Return
LIC Housing Finance Limited	0.0143	0.1517	0.0230	0.0085	-0.002 (-0.173)	1.331 (7.616)	0.707**	0.500	0.175	0.0126	0.0806	0.0065
GIC Housing Finance Limited	0.0106	0.1243	0.0154	0.0052	0.000 (0.021)	0.818 (4.764)	0.530**	0.281	0.172	0.0126	0.0806	0.0065
HDFC Limited	0.0186	0.1059	0.0112	0.0066	0.006 (0.653)	1.029 (9.597)	0.783**	0.614	0.107	0.0126	0.0806	0.0065
Dewan Housing Finance Corporation Limited	0.0312	0.1846	0.0341	0.0062	0.019 (0.860)	0.972 (3.567)	0.424**	0.180	0.272	0.0126	0.0806	0.0065
Can Fin Homes Limited	0.0093	0.1011	0.0102	0.0043	0.001 (0.066)	0.678 (4.891)	0.540**	0.292	0.139	0.0126	0.0806	0.0065

** = Significant at 0.01 level

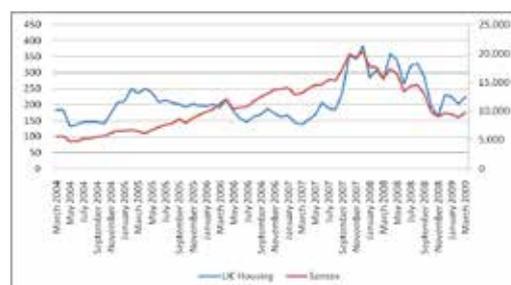
Note: 't' values are presented in bracket

Source: Compiled from the respective share prices at the BSE after adjusting stock actions (Appendix).

1.5.1 Calculation of Systematic Risk of LIC Housing Finance Limited

The average monthly returns from the equity shares of LIC Housing Finance Ltd., was 1.43 per cent (0.0143) in the secondary market during the study period. When the risk of return is expressed in terms of standard deviation and variance, the statistic numbers were 0.1517 and 0.0230 respectively. The movements in the share price of LIC Housing Finance Limited, and the Sensex during the study period are illustrated in figure 1.1.

**FIGURE 1.1
MOVEMENT OF LIC HOUSING FINANCE LIMITED'S SHARE PRICE AND BSE SENSEX DURING THE STUDY PERIOD**



Source: Compiled from the share prices of LIC Housing Finance Ltd., at the BSE after adjusting stock actions (Appendix III).

LIC Housing Finance Ltd., has a beta of 1.331 based on the monthly returns during April 2004 to March 2009, which shows the slope of the monthly returns in relation to market returns (BSE Sensex returns). A beta of 1.331, which is more than 1, indicates that the fluctuations in returns from the shares of the company are more than the market returns. The standard error of beta coefficient (0.175) fixes the confidence range of the estimated beta of the company between 0.981 and 1.681.

Alpha Value is the intercept of the company's returns curve. It stands at -0.002, which means the returns from the company's equity shares will be at negative 0.2 per cent, when the market return is zero. If it is assumed that the monthly returns from Sensex is 1 per cent, the expected monthly returns from LIC Housing Finance can be calculated with its beta of 1.331 as follows.

$$\begin{aligned} R_{st} &= \alpha + \beta_s R_m \\ &= -0.002 + (1.331 \times 0.01) \\ &= 1.13\% \end{aligned}$$

The positive coefficient of correlation (0.707) which is significant at 0.01 level, is found between the monthly returns from LIC Housing Finance Ltd., and market returns. It means that the market returns and the returns from LIC Housing Finance shares are moving in the same direction. Table 1.1 depicts the coefficient of determination (R²) of the company at 0.50. It indicates that the variance in the returns of LIC Housing Finance Ltd's shares is explained by the changes in the market returns to the extent of 50 per cent. This is the proportion of systematic risk of the company which cannot be diversified. It means 50 per cent of the variance of LIC Housing Finance Ltd., is systematic risk and the remaining 50 per cent variance is the proportion of unsystematic risk. Thus, the total risk of LIC Housing Finance Ltd., (0.0230) can be divided into systematic and unsystematic risks as under:

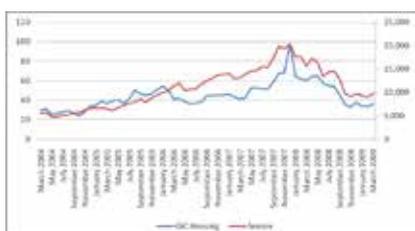
Total Risk = Systematic risk + Unsystematic risk

$$\begin{aligned} \text{Systematic Risk} &= \beta_s^2 \sigma_m^2 \\ &= 1.3312 \times 0.0065 \\ &= 0.0115 \\ \text{Unsystematic risk} &= \sigma_m^2 - (\beta_s^2 \sigma_m^2) \\ &= 0.0230 - 0.0115 \\ &= 0.0115. \end{aligned}$$

1.5.2 Calculation of Systematic Risk of GIC Housing Finance Limited

The average monthly returns from the equity shares of GIC Housing Finance Ltd., was 1.06 per cent (0.0106) on the BSE during the study period. The risk of return is expressed in terms of standard deviation and variance. The standard deviation and variance were 0.1243 and 0.0154 respectively. The movements in the share price of LIC Housing Finance Limited, and the Sensex during the study period are illustrated in figure 1.2.

FIGURE 1.2
MOVEMENT OF GIC HOUSING FINANCE LIMITED'S SHARE PRICE AND BSE SENSEX DURING THE STUDY PERIOD



Beta shows the slope of the monthly returns in relation to the market returns (BSE Sensex returns). GIC Housing Finance Ltd., has a beta of 0.818 based on the monthly returns for the period, April 2004 to March 2009. A beta of 0.818 which is less than 1 means that the volatility in the returns from the company's share price is less than the market returns. The standard error of beta coefficient at 0.172 fixes the confidence range of estimated beta of the company between 0.474 and 1.162.

Alpha Value is the intercept of the company's returns curve. Here it is equal to the origin of X-axis. It means the returns from GIC Housing Finance's equity shares will be at zero per cent when the market return is zero. The company's calculated beta is 0.818; if it is assumed that the monthly returns from Sensex is 1 per cent, then the expected monthly returns from GIC Housing Finance Ltd., will be as follows:

$$\begin{aligned} R_{st} &= \alpha + \beta_s R_m \\ &= 0.00 + (0.818 \times 0.01) \\ &= 0.818\% \end{aligned}$$

The positive coefficient of correlation (0.530) which is significant at 0.01 level, is found between the monthly returns of GIC Housing Finance Ltd., and the monthly market returns. It means the market returns and the returns from the shares are moving in the same direction.

Table 1.1 depicts the coefficient of determination (R²) of the company is at 0.281. It indicates that the variance in the returns of GIC Housing Finance Ltd's share price is explained by the changes in the market return to the extent of 28.1 per cent. This is the proportion of systematic risk of the company which is undiversifiable. It means only 28.1 per cent of the variance of GIC Housing Finance Ltd., is systematic risk and the remaining 71.9 per cent variance is the proportion of unsystematic risk. Thus, the total risk of GIC Housing Finance Ltd., (0.0154) can be divided into systematic and unsystematic risks as under:

Total Risk = Systematic risk + Unsystematic risk

$$\begin{aligned} \text{Systematic Risk} &= \beta_s^2 \sigma_m^2 \\ &= 0.8182 \times 0.0065 \\ &= 0.0043 \\ \text{Unsystematic risk} &= \sigma_m^2 - (\beta_s^2 \sigma_m^2) \\ &= 0.0154 - 0.0043 \\ &= 0.0111. \end{aligned}$$

1.5.3 Calculation of Systematic Risk of HDFC Limited

The average monthly returns from the equity shares of HDFC Ltd., during the study period at the BSE was 1.86 per cent (0.0186). The standard deviation and variance of the company stood at 0.1059 and 0.0112 respectively.

Beta shows the slope of the monthly returns in relation to the market returns (BSE Sensex returns). HDFC Ltd., has a beta of 1.029 based on the monthly returns during May 2004 to March 2009. A beta of 1.029, which is more than 1, means that the volatility in the returns from the company's shares is more than the market return. The standard error of beta coefficient is 0.107 which fixes the confidence range of the estimated beta of the company between 0.815 and 1.243.

Alpha Value is the intercept of the company's share price returns curve. It stands at 0.006 indicates that the returns from the company's equity shares will be at 6 per cent, when the market return is zero. The company's calculated beta is 1.029; if it is assumed that the monthly return from Sensex is 1 per cent, then the expected monthly return from HDFC Ltd., will be

$$\begin{aligned} R_{st} &= \alpha + \beta_s R_m \\ &= 0.006 + (1.029 \times 0.01) \\ &= 1.629\% \end{aligned}$$

The coefficient of determination (R²) of the company is at 0.614. It indicates that variance in the returns of HDFC Ltd's

share price is explained by the changes in the market return to the extent of 61.4 per cent. This is the proportion of systematic risk of the company which is undiversifiable. It means 61.4 per cent of the variance of the company is systematic risk and the remaining 38.6 per cent variance is the proportion of unsystematic risk.

Thus, the total risk of HDFC Ltd., (0.0112) can be divided into systematic and unsystematic risks as under:

$$\begin{aligned} \text{Total Risk} &= \text{Systematic risk} + \text{Unsystematic risk} \\ \text{Systematic Risk} &= \beta_s^2 \sigma_m^2 \\ &= 1.0292 \times 0.0065 \\ &= 0.0069 \\ \text{Unsystematic Risk} &= e^2 \\ &= \sigma_m^2 - (\beta_s^2 \sigma_m^2) \\ &= 0.0112 - 0.0069 \\ &= 0.0043. \end{aligned}$$

1.5.4 Calculation of Systematic Risk of Dewan Housing Finance Corporation Limited

The average monthly returns from secondary market transactions for Dewan Housing Finance Corporation Ltd., was 3.12 per cent (0.0312) during the study period (April 2004 - March 2009). The standard deviation and variance of returns of the company during the same period stood at 0.1846 and 0.0341 respectively.

Beta shows the slope of the monthly returns in relation to the market returns (BSE Sensex returns). Dewan Housing Finance Corporation Ltd., has a beta coefficient of 0.972 based on the monthly returns during the period, April 2004 to March 2009. A beta coefficient of 0.972, which is less than 1, means that the volatility in the returns from the company's shares is less than the market return. The standard error of beta coefficient is 0.272 which fixes the confidence range of the estimated beta of the company between 0.428 and 1.516.

Alpha Value is the intercept of the company's returns curve. It stands at 0.019, which means the return from Dewan Housing Finance Corporation Ltd.,'s equity shares will be at 1.9%, when the market return is zero. The company's calculated beta is 0.972; if it is expected that the monthly return from Sensex is 1 per cent, then the expected monthly return from Dewan Housing Finance Corporation Ltd., will be:

$$\begin{aligned} R_{st} &= \alpha + \beta_s R_m \\ &= 0.019 + (0.972 \times 0.01) \\ &= 2.87\% \end{aligned}$$

The positive coefficient of correlation (0.424) which is significant at 0.01 level, is found between Dewan Housing Finance Corporation Ltd's monthly returns and the monthly market returns. It means fluctuations in market returns and returns from Dewan Housing Finance Corporation Ltd., shares are in the same direction.

Table 1.1 shows the coefficient of determination (R2) of the company at 0.180 which is a very small value. It means the variance in the returns from Dewan Housing Finance Corporation Ltd's shares is explained by the changes in the market return only to the extent of 18 per cent. This is the proportion of systematic risk of the company which is undiversifiable. It means only 18 per cent of the variance of Dewan Housing Finance Corporation Ltd., is systematic risk and the remaining 82 per cent variance is the proportion of unsystematic risk which can be diversified.

Thus, the total risk (Variance) of Dewan Housing Finance Corporation Ltd., (0.0341) can be divided into systematic risks and unsystematic risks as given below:

$$\begin{aligned} \text{Total Risk} &= \text{Systematic risk} + \text{Unsystematic risk} \\ \text{Systematic Risk} &= \beta_s^2 \sigma_m^2 \\ &= 0.9722 \times 0.0065 \\ &= 0.0061 \end{aligned}$$

$$\begin{aligned} \text{Unsystematic risk} &= e^2 \\ &= \sigma_m^2 - (\beta_s^2 \sigma_m^2) \\ &= 0.0341 - 0.0061 \\ &= 0.028. \end{aligned}$$

1.5.5 Calculation of Systematic Risk of Can Fin Homes Limited

The average monthly returns from the equity shares of Can Fin Homes Ltd., was 0.93 per cent (0.0093) in the secondary market during the study period. The risk of return is expressed in terms of standard deviation and variance. The standard deviation and variance were 0.1011 and 0.0102 respectively.

Beta shows the slope of the monthly returns in relation to the market returns (BSE Sensex returns). Can Fin Homes Ltd., has a beta of 0.678 based on the monthly returns during the period April 2004 to March 2009. A beta of 0.678 means that the volatility in returns from the shares of the company is less than market returns. The standard error of beta coefficient which is 0.139, fixes the confidence range of the estimated beta of the company between 0.40 and 0.956.

Alpha Value is the intercept of the company's returns curve. As it stands at 0.001, it means the returns from Can Fin Homes Ltd's equity shares stand at 0.1 per cent when the market return is zero. The company's calculated beta is 0.678 and if it is assumed that the monthly return from Sensex is 1 per cent, then the expected monthly return from the company will be:

$$\begin{aligned} R_{st} &= \alpha + \beta_s R_m \\ &= 0.001 + (0.678 \times 0.01) \\ &= 0.778\% \end{aligned}$$

The positive coefficient of correlation (0.54) which is significant at 0.01 level, is found between the company's monthly returns and monthly market returns. It means, the market returns and the returns from the shares of the company are moving in the same direction.

Table 1.1 depicts the coefficient of determination (R2) of the company at 0.292 which is very small. It means the variance in the returns of Can Fin Homes Ltd's shares is explained by the changes in the market return only to the extent of 29.2 per cent. This is the proportion of systematic risk of the company which is undiversifiable. It means only 29.2 per cent of the variance of the company is systematic risk and the remaining 70.8 per cent variance is the proportion of unsystematic risk.

Thus, the total risk of Can Fin Homes Ltd., (0.0102) can be divided into systematic risks and unsystematic risks as under:

$$\begin{aligned} \text{Total Risk} &= \text{Systematic risk} + \text{Unsystematic risk} \\ \text{Systematic Risk} &= \beta_s^2 \sigma_m^2 \\ &= 0.6782 \times 0.0065 \\ &= 0.0030 \\ \text{Unsystematic risk} &= e^2 \\ &= \sigma_m^2 - (\beta_s^2 \sigma_m^2) \\ &= 0.0102 - 0.0030 \\ &= 0.0072. \end{aligned}$$

1.6 COMPARISON OF SYSTEMATIC RISK AND OTHER STATISTICS OF SAMPLE COMPANIES

Table 1.2 depicts the beta coefficient, systematic risk and unsystematic risk of select housing finance companies based on the historical data.

**TABLE 1.2
BETA COEFFICIENT, SYSTEMATIC RISK AND UNSYSTEMATIC RISK OF SELECT COMPANIES**

S. No.	Items	LIC Housing Finance Ltd.	GIC Housing Finance Ltd.	HDFC Ltd.	Dewan Housing Finance Corporation Ltd.	Can Fin Homes Ltd.
1	Beta Coefficient	1.331	0.818	1.029	0.972	0.678
2	Variance	0.0230	0.0154	0.0112	0.0341	0.0102
3	R2	0.50	0.281	0.614	0.180	0.292
4	Systematic Risk	0.0115	0.0043	0.0069	0.0061	0.0030
5	Unsystematic Risk	0.0115	0.0111	0.0043	0.0280	0.0072

Source : Compiled from the respective share prices

It is evident from the above Table that out of the five select housing finance companies, three companies have less than one beta coefficient and two companies have more than one beta. The proportion of systematic risk is more in HDFC Limited followed by LIC Housing Finance Limited, Can Fin Homes Limited and GIC Housing Finance Limited. Dewan Housing Finance Corporation Limited has very small proportion of systematic risk associated with it. It means that less volatility in the returns can be observed from the pack of housing finance stocks. It indicates that the housing finance companies cannot give greater returns than market returns in a bull market and will not lose more than the market returns in a bear market. The investment in housing finance stocks is defensive in nature. Overall, it can be concluded that investment in housing finance stocks is more safe in volatile market conditions.

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