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CONTENTS

Stability of Beta: An Empirical Investigation on Nifty Stocks

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ABSTRACT

The concept of risk management assumes greater importance in modern day financial management. The risk involved in investment decision can be classified as systematic risk and unsystematic risk. Beta is as a proxy for systematic risk. Systematic risk assumes greater significant because it is cannot eliminated by the process of portfolio diversification. Beta reflects volatility of the stock with market. The portfolio managers make use of the beta while constructing portfolio. The objective of the study is to examine the stability of the beta in the Indian stock market with reference to selected stocks of NIFITY Index. The study adopts Chow break point test and Predictive test of chow test to testify the stability of beta and found that beta are stable in case of enlarged sample.

Introduction

In investment decision, an important element used frequently used is risk. In simple words risk can be defined as deviation of actual return from expected return. Markowitz (1952) quantified risk in terms of statistical parameter knows as variance. The risk of an asset can be classified into systematic and unsystematic risk. While the former is non-diversible risk and the latter is diversible risk. William Sharp defined systematic risk as the portion of an asset variability that can be attributed to a common factor. The objective of the study is to examine the stability of the beta in the Indian stock market from 2005 to 2009.

Importance of beta

Beta is widely accepted measures of systematic risk and is used by practitioners for capital budgeting decision, formation of portfolio and for performance evaluation. The beta has wide range of application in financial economics which include the following:

The Capital asset pricing model (CAPM) developed by Sharpe (1964) and Linter (1965) assumes that the beta coefficient is constant through time. The beta coefficient known as systematic risk measures compares the variability of an asset historical return to the market as a whole. That is, beta measures an asset expected change for every percentage in the benchmark index (Clarfeld and Bernstein,1977).

To evaluation of the performance of firms and the economic performance of individual investment decisions, the concepts of cost of capital have widely been used. Unless and until the profit of the unit is linked with equity o investment and it exceed the overall cost of und, one cannot arrive at the conclusion that the unit is viable. There are various factors that determine the cost of capital such as business risk, financial risk, inflation, uncertainty, interest rate uncertainty and liquidity risk (Patterson,1995)

Treynor (1965) has suggested that the appropriate measure of risk is the systematic risk or the beta of the portfolio. Treynor measures relate the rate of return earned over and above the risk-free rate to the portfolio beta. The portfolio beta is the slope of the characteristic line, which measures the portfolio's volatility relative to the market that is its systematic risk. The total risk of a portfolio consists of systematic and unsystematic risk and the latter can be diversified away. Treynor's measure, the return per unit of systematic risk.

Literature survey

Blume (1971), in a pioneering effort used the mean reversal technique to test the stationary of the coefficient of the market, the study found that portfolio betas tend to regress toward one over time and used this finding to produce better beta estimates.

Levy (1971) used weekly data; 52 weeks base periods; and 26 and 13 week subsequent periods and found that, portfolio betas are stable while individual security betas are unstable.

Alexander and Benson (1982) analysed two six-year sub-periods over the period 1960 to 1971 and found that 5 to 6% of stocks had varying betas. Bos and Newbold (1984) analysed ten years of datafrom 1970 to 1979 and found that 58% of stocks had varying betas.

Collins et al.(1987) analysed various sub-periods from1962 to 1981 on weekly data. When they analysed five-year sub-periods they found that 34% of stocks had varying betas. With ten-year sub-periods they found that 65% of stocks had varying betas

The hypothesis that betas are stable had been empirically rejected many times on the US market. Fabozzi and Francis (1978) analyzed six years of data from 1966 to 1971 and found that 8% of stocks had varying betas. Sunder (1980) analysed a range of sub-periods on data from 1926 to 1975. The sub-periods varied from seven years to fifty years. In the seven-year sub-periods the proportion of stocks with varying betas ranged from 2% to 47%. Over the fifty years 99% of stocks had varying betas. Alexander and Benson (1982) analysed two six-year sub-periods over the period 1960 to 1971 and found that 5 to 6% of stocks had varying betas. Bos and Newbold (1984) analysed ten years of datafrom 1970 to 1979 and found that 58% of stocks had varying betas. Collins et al.(1987) analysed various sub-periods from1962 to 1981 on weekly data. When they analysed five-year sub-periods they found that 34% of stocks had varying betas. With ten-year sub-periods they found that 65% of stocks had varying betas.

A number of studies on the Australian equity market have also found evidence of individual stock beta instability. Faff et al. (1992) analyzed ten years of data from 1978 to 1987. When they analysed five-year sub-periods they found that from 11% to 13% had varying betas. Faff and Brooks (1997) analysed a range of sub-periods on data over the period 1974 to 1992. When they analysed, five year sub-periods they found that the degree of beta instability ranged from 23% to41%. In seven-year sub-periods they found the degree of beta instability to range from 29% to 51%. In ten-year sub-periods the degree of stock beta instability varied from 28% to 61%. Finally, for the full nineteen years of data they found 67% of stocks to have varying betas.

Cheng and Boasson (2004) used a time weighted least square method to estimate betas of emerging markets and found that the betas for these markets do shift over time.

Data and Methodology

The data of this study is taken from ten stocks that formed a part of the NIFTY Index, such as HDFC, Cipla, ABB, Infosysis, ITC, L&T, MM, Unitech, Sterlite and Acc. These stocks are taken from ten different sectors and were the part of NIFITY Index throughout the study period. The study uses daily closing prices of ten stocks as well as nifty index. The study period is confined to five years from January 2005 to December 2009.the required data for the study had been downloaded from website of NSE. The study adopts Chow break point test and Predictive test of chow test to testify the stability of beta.

The daily return for stocks as well as market index were calculated as

$$R_{t=} (P_t /P_t-P_{t-1})$$

The following standard market model using OLS regression is used to compute beta these stocks.

$$R_{j\,t} = a_{j} + b_{j} R_{m\,t} + u_{j\,t}$$

Appling the above model, sixty monthly beta values were computed for each of ten stocks. The stability of the beta has been tested by chow break point test and predictive chow test.

The steps for running the Chow Break point test are:

1) Firstly run the regression using all the data, before and after the structural break, collect RSS_c.

$$y_t = \alpha_0 + \alpha_1 x_t + u_t$$

2) Run two separate regressions on the data before and after the structural break, collecting the RSS in both cases, giving RSS_1 and RSS_2.

$$y_t = \beta_1 + \beta_2 x_t + u_{1t}$$
$$y_t = \delta_1 + \delta_2 x_t + u_{2t}$$

3) Using these three values, calculate the test statistic from the following formula:

$$F - \frac{RSS_c - (RSS_1 + RSS_2)/k}{RSS_1 + RSS_2 / n - 2k}$$

Where critical values in the F-test tables, in this case it has F(k,n-2k) degrees of freedom.

The Predictive chow test statistic:

$$F - \frac{(RSS_c - RSS_1)/n_2)}{RSS_1/(n-k)}$$

The above test follows F distribution with v_1=n_2 v_2= (n-k) d.f., where $RSS_c$is the residual sum of square from the augmented sample with n_2 being the additional sample and$RSS_1$is the residual sum of square from the original samples with n samples

Analysis of Data

The calculated beta values exhibit no systematic pattern which is observed in the monthly beta value of sample stocks exhibited in Table I. Further beta values for the same stock are varying at different point of time. To testify the stability of beta statistically, the study has adopted chow break up test and predictive chow test

The stability of beta has been explored using monthly data on return of ten stocks for the period January 2005 to December 2009 by using Chow break point test. The study considered January 2008 as a break point and the results of the Chow break point test is exhibited in Table-II. The result infers that except Larson &Turbo all stocks exhibit stable beta and support the null hypothesis that betas are stable.

To examine the stability of beta for varying sample size, the study uses Predictive Chow Test and the results of which is shown in Table –III. The results shows that consistency of beta for eighteen months from the period of January 2005,for seven stocks except HDFC, Infosysis and L&T.the study further revealed that for the period of two years and three years from the period January 2005, except for HDFC all stocks show stability of beta. In case of a five year period from January 2005 to December 2009, all stocks exhibit stable beta.

Conclusion

The results of chow break point test, reveals that nine out of ten stocks maintained stability of beta and support the null hypothesis. The results of predictive chow test, further found existence of stable beta for all stocks incase enlarged sample period of five years. Our result also support earlier studies such as Baesel (1974), Altman et al. (1974), Blume (1975), and Roenfeldt (1978) showed that the longer the estimation periods, the more stable the beta estimates become. In simple, the study concludes that both return interval and the estimation period have a greater role to play in estimation of beta.

References

1.*Blume, M. 1971. On the Assessment of Risk. Journal of Finance 26, 1-10*

2. Levy, R. A. 1971. On the Short-Term Stationarity of Beta Coefficients. Financial Analysts Journal 27, 55-62

3. Fabozzi, F. J., Francis, J. C. 1978. Beta as a Random Coefficient. Journal of Financial and Quantitative Analysts, March, 101-116.

4. Sunder, S. 1980. Stationarity of market risks: Random coefficient tests for individual stock. Journal of Finance 35, 883-896

5. Alexander, G.J., Benson, P.G. 1982. More on beta as a random coefficient. Journal of Financial and Quantitative Analysis 17, 27-36.

6. Collins, D.W., Ledolter, J., and Rayburn, J. 1987. Some further evidence on the stochastic properties of systematic risk. Journal of Business 60, 425-448.

7. Faff R., R W., Lee, J.H.H., and Fry, T.R.L. 1992. Time stationary of systematic risk: Some Australian evidence. Journal of Business Finance and Accounting 19, 253-270

8. Faff, R., Brooks, R.D. 1997. Further evidence on the relationship between beta stability and the length of the estimation period. Advances in Investment Analysis and Portfolio Management 4, 97-113

9. CHENG, J. and BOASSON, V. W. (2004) Using the Time Weighted Method to Estimate Betas of Emerging Markets, Managerial Finance, v 30 n 3, 74-87

10. BAESEL, J.B. (1974) On the Assessment of Risk: Some Further Considerations, Journal of Finance, 29, 1491-1494

11. ALTMAN, E. I.., JACQUILLAT, B. and LEVASSEUR, M. (1974) Comparative Analysis of Risk Measures: France and the United States, Journal of Finance, 29, 1495-1511.

12. BLUME, M. E. (1975) Betas and Their Regression Tendencies, The Journal ofFinance, 30, 785-795.

13. ROENFELDT, R. (1978) Further Evidence on the Stationarity of BetaCoefficients, Journal of Financial and Quantitative Analysis, March, 11-21.

Table 1: Beta Values of different Stocks

Month/ Year	Estimates of Beta Values									
	HDFC	CIPLA	ABB	INFOSYS	ITC	Land T	M &M	UNITECH	STER	ACC
Jan-05	1.14	1.41	0.41	1.02	0.19	1.06	1.16	1.52	1.68	0.73
feb	1.03	0.71	0.58	1.38	0.52	0.75	1.21	0.84	0.99	1.02
march	0.98	0.93	1.02	0.99	0.73	0.60	0.81	1.88	0.75	0.40
april	0.89	0.79	-0.05	1.36	0.54	0.83	0.46	0.63	1.33	0.61
may	0.39	0.30	0.42	1.47	0.49	1.11	1.61	-0.77	0.74	0.31
june	1.00	1.09	0.38	1.58	1.41	0.65	0.67	2.13	0.14	-0.05
july	0.95	0.96	0.60	1.11	0.18	0.34	0.57	0.02	1.05	0.88
aug	0.42	0.84	0.82	0.82	0.58	0.83	0.73	0.74	1.31	0.46
sep	0.94	0.84	0.22	0.82	3.61	0.85	0.44	0.97	1.59	0.70
oct	0.65	0.72	0.53	0.97	1.05	0.86	0.54	0.23	1.20	0.72
nov	0.61	1.11	1.21	0.91	1.42	1.01	1.32	-1.09	0.99	0.67
dec	0.62	0.62	0.73	0.84	1.20	0.72	1.33	-0.54	1.10	1.58
Jan-06	0.30	0.47	1.17	1.64	0.68	1.48	0.57	0.45	1.03	0.92
feb	1.09	1.07	0.50	0.75	1.51	1.34	0.75	0.67	0.17	0.74
march	0.59	0.90	0.18	0.83	1.48	1.17	0.98	0.57	0.95	0.96
april	0.67	2.86	1.22	1.31	1.00	0.75	0.90	-0.07	0.19	0.94
may	0.36	0.48	1.21	0.73	1.11	0.81	0.77	0.52	1.45	1.01
june	0.92	0.85	0.72	0.85	1.02	1.32	0.97	-0.43	2.07	0.97

july	0.92	0.65	0.97	1.60	0.97	1.20	1.45	0.42	1.68	0.85
aug	0.34	0.63	0.60	0.39	1.32	1.33	1.58	1.81	1.63	0.82
sep	0.96	1.35	0.45	0.96	0.99	2.09	0.83	1.16	1.56	1.03
oct	1.70	0.78	0.89	1.17	0.95	0.93	1.11	0.96	1.18	0.78
nov	0.64	0.83	0.62	0.19	1.08	0.95	1.09	3.12	1.22	0.67
dec	0.83	0.62	1.39	0.60	0.92	0.93	1.16	1.86	1.48	1.64
Jan-07	1.20	0.74	0.60	0.78	0.77	0.95	1.29	1.19	0.90	1.06
feb	0.78	1.04	0.98	0.97	0.08	1.39	1.25	1.25	1.04	1.06
march	1.13	0.68	0.89	1.08	0.76	1.36	1.03	0.26	0.88	0.69
april	0.95	1.39	0.66	0.79	0.67	1.06	1.31	1.45	1.36	0.92
may	0.79	0.53	0.27	0.78	0.69	0.50	1.05	0.96	0.85	0.39
june	1.11	0.63	-1.13	0.08	0.55	1.55	1.18	1.83	1.51	1.94
july	1.28	0.52	1.72	0.40	-0.37	1.65	0.70	1.60	2.00	0.84
aug	0.87	0.60	1.17	0.62	0.74	0.94	0.97	0.46	1.69	1.12
sep	1.38	0.03	0.31	0.57	0.29	0.69	1.10	0.89	0.99	0.57
oct	0.98	0.41	0.64	0.18	0.59	1.30	0.70	1.30	1.11	1.43
nov	1.76	0.21	0.86	0.90	0.66	1.04	0.51	1.34	1.94	0.35
dec	0.81	0.18	0.65	0.55	0.31	0.70	0.79	0.87	1.54	0.42
Jan -08	0.82	0.80	0.85	0.54	0.98	0.84	0.86	1.93	0.99	0.75
feb	0.50	0.45	0.56	0.58	0.81	1.01	0.79	1.87	1.29	0.54
march	1.01	0.33	0.94	1.10	0.60	1.14	0.31	1.51	1.09	0.61

april	1.17	0.85	0.71	0.82	0.75	1.27	0.95	1.27	0.64	0.12
may	0.98	0.39	0.53	1.11	1.14	1.18	0.65	1.45	0.79	0.85
june	1.24	0.65	0.78	0.83	0.61	1.08	0.82	1.92	0.81	0.98
july	1.61	0.43	0.93	0.68	0.72	1.28	0.83	1.56	0.65	0.65
aug	1.65	0.37	0.57	0.47	0.50	1.18	0.78	1.94	0.19	0.98
sep	1.26	0.58	0.86	0.98	0.39	1.07	0.65	1.40	1.31	0.26
oct	0.86	0.65	1.06	0.72	0.49	0.74	1.37	1.98	1.63	0.64
nov	0.84	0.47	0.96	0.63	0.36	1.12	0.75	0.96	1.67	0.64
dec	0.82	0.53	0.79	0.64	0.60	1.16	1.19	1.86	1.28	1.34
Jan-09	0.82	0.37	0.69	0.58	0.38	1.12	0.75	1.94	1.63	0.70
feb	0.94	0.23	0.90	0.90	0.17	1.08	1.15	1.67	1.49	0.83
march	1.12	0.26	0.52	0.77	0.92	1.28	0.77	1.57	1.34	0.66
april	0.53	0.74	0.67	0.55	0.07	1.35	1.20	1.32	1.45	0.42
may	0.97	0.52	0.66	0.81	0.73	1.34	1.31	1.50	1.29	0.68
june	0.47	0.51	1.23	0.43	0.81	1.40	1.07	2.16	1.18	1.40
july	0.79	0.42	1.11	0.56	0.32	1.32	1.10	1.83	1.10	0.89
aug	0.41	0.56	0.98	0.67	1.21	1.19	1.50	1.62	1.53	1.15
sep	0.55	0.41	1.19	0.64	0.66	1.29	1.58	2.43	2.14	1.25
oct	0.50	0.52	0.87	0.66	0.72	0.72	0.98	2.37	1.53	0.14
nov	0.72	0.34	0.74	0.91	0.84	0.73	1.09	1.95	1.71	0.99
dec	0.99	0.09	0.46	0.66	0.75	0.86	1.38	2.18	1.67	0.44

Table 2: F(Chow Break Point Test) Statistic of Different Stocks

Stock	F(Cal)	F(Tab)
HDFC	0.642	3.320
CIPLA	0.683	
ABB	3.629	
INFOSYES	0.307	
ITC	0.699	
L and T	10.902*	
M and M	0.012	
UNITECH	0.954	
STERLITE	0.798	
ACC	0.556	

Note:* indicates the test statistic F is significant at 5% level of significance

Table 3: Calculated F(Predicative test of Chow test) Values of Different Stock for Varying Sample Sizes

Stocks	n = 18		n = 24		n = 36		n = 60		
	F(Cal)	F(Tab)	F(Cal)	F(Tab)	F(Cal)	F(Tab)	F(Cal)	F(Tab)	F(Tab)
HDFC	5.693*	3.320	5.524*	2.910	4.548*	2.740	0.198	3.15-3.23	
CIPLA	1.950		2.053		2.254		0.207		
ABB	2.127		2.145		1.157		0.018		
INFOSYES	5.551*		2.374		2.741		0.180		
ITC	1.509		1.559		1.748		0.158		
L and T	4.159*		2.262		1.700		-0.012		
M and M	1.908		1.963		2.126		0.073		
UNITECH	0.163		0.171		0.180		0.187		
STERLITE	0.311		0.359		0.461		-0.035		
ACC	2.413		2.546		2.222		0.112		3.15

Note:* indicates the test statistic F is significant at 5% level of significance

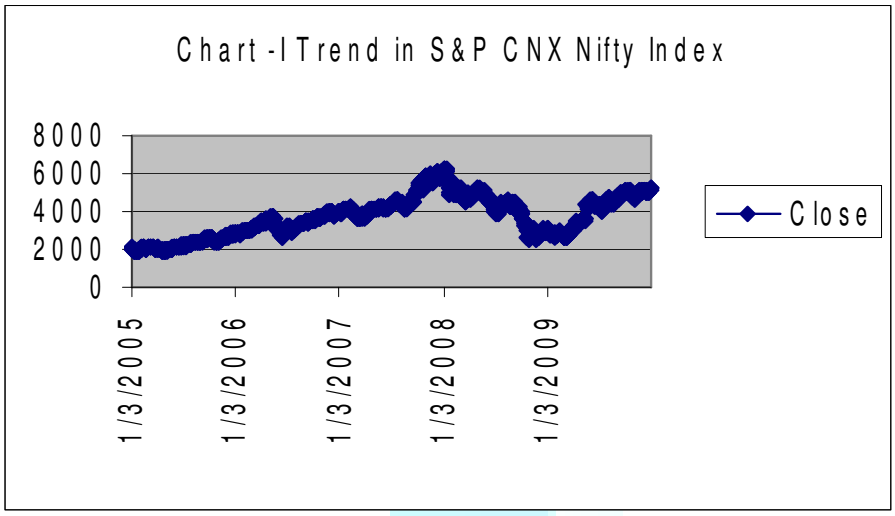
Chart -I Trend in S&P CNX Nifty Index
8000
6000
4000
2000
0
1/3/2005
1/3/2006
1/3/2007
1/3/2008
1/3/2009
Close