Examination of Index Model and Prediction of Beta –A case study examination in IT Sector

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Abstract: This study examines the determinants of stock returns of IT companies based on index model. The study examines the index model using the case analysis of stock returns of three IT Companies-Apple, Google and Microsoft. The analysis was done using the latest five-year monthly data. The study reveals that market index returns is a powerful determinant of stock returns. In terms of sensitivity as measured by beta values, Apple was most sensitive to fluctuations in market returns followed by Google and Microsoft stock returns. The study also examines the predictive ability of current beta using five-year data series of 15 IT companies. The results were statistically insignificant.

Key-Words: Beta, Index Model, Stock returns, IT companies, Apple, Google, Microsoft

1 Introduction

Index Models simply the estimation of the covariance matrix and enhance the analysis of security risk premiums. The systematic factor affects the rate of return on all stocks, the rate of return on a broad market index can plausibly proxy for that common factor.

Beta plays a significant role in the evaluation of ex post the degree of risk undertaken in the context of diversified investment strategy. Beta explains the investment risk which cannot be eliminated by diversification. Prediction of beta aims to predict the future risk of a diversified portfolio.

"When the stock market index rises or falls, the security price will tend to rise or fall also, and the rise will tend to be more or less than one. Typically, the slope (i.e., beta) will be greater than zero but less than three. Many securities have betas around one, and they tend to rise and fall in price roughly by the same percentage that the market index rises or falls. A security with a negative beta would tend to move against the market, but such securities are rare" [4]. The most important use of beta is in the evaluation of past investment performance. Beta is of immense help in assessing risk for the overall portfolio. If an accurate prediction of future beta for the portfolio is used, then it would become an important ingredient in investment decision making.

2 Objective of the study

The study uses index model for examining the determinants of security returns in the Information Technology sector. This study aims to determine the determinants of the beta. The study uses regression analysis for predicting beta. The study uses three top IT companies: Google, Apple and Microsoft to examine the relevance of single factor index model. For the prediction of beta, a sample of 15 IT Companies were included in the study.

3 Review of Literature

Using firm level data on NSE listed stocks for the period 2008-2015, empirical evidence is found with respect to the significance of company characteristics in prediction of market beta in Indian context [5]. The study finds that debt ratios and returns on investments predict market betas in Indian stock market context. The study by Bahhouth, Maysami, and Khoueiri examines the significance of beta and financial measures in predicting the riskiness of S&P 500 stocks during

the 2008 recession. This study suggests that beta has significant predictive power in predicting stocks' riskiness [1]. Baobang focuses on a study which examines an adjustment procedure for predicting betas when thin trading is present through the Canadian stocks [2]. The study by Sathanarayana and Harish investigates the stability of beta in Indian stock markets using 15 years of daily data of CNX Nifty 50 during the period 2000-2015. The results suggest that 2008 subprime crisis does not have much influence on the structure of the beta series. The study suggests that beta stability plays an important role while estimating portfolio returns and individual stock returns [6]. In a study by Hashemi and Pouraghajan, a three factor model is proposed based on which the effect (the explanatory power) of three variables market risk (beta), disclosed accounting information quality, and stock liquidity on stock return is investigated. Using time series method, the financial information of 72 TSE-listed companies over a 7-year period (2007-2013) was examined. The stock excess return was found to be significantly associated with market excess return, stock liquidity and accounting information quality [3].

4. Methodology

Index Model is estimated as

$$Ri(t) = \alpha + \beta Rm(t) + e(t) \qquad (1)$$

The intercept denoted by the Greek letter alpha is the security's expected excess return when the market excess return is zero. The slope of the line beta is the amount by which the security returns tend to increase or decrease for every 1% increase or decrease in the return on the index and therefore measures the security's sensitivity to the market index .et is the zero mean, firm specific surprise in the security return in the month t, also called the residuals.

To examine index model, we regressed the latest 60 monthly returns of Apple, Google and Microsoft on the market index S&P500 returns.

5. Predicting Beta

Adjusted betas are a simple way to recognize that betas estimated from past data may not be the best estimates of future betas. The model for determinants of beta is given as

$$CBeta = a + \beta PBeta1 + \beta 2 Firm\ Size + \beta 3 VarEar + \beta 4 VarCFO + \beta 5 GREPS + \beta 6 DivYield + \beta 7 DebtTA. \qquad (2)$$

For beta prediction we used the latest five-year financial data for 15 Information Technology companies. The total data observations for the study was 75.

Table 1: List of IT Companies

Sl. No.	Company
1	Dell Technology
2	Google
3	Microsoft
4	Apple
5	Intel
6	IBM
7	Oracle
8	Cisco
9	HP Inc.
10	Symantec
11	Salesforce.com
12	Honeywell International
13	Qualcomm Incorporated
14	Cognizant Technology
15	Accenture Plc

Table 2: Variable Definition

Variables	Definition
CBeta	Current Beta
PBeta	Past Beta
Firm Size	Normalized Revenues
VarEar	Variance of Earnings
VarCFO	Variance of Cash Flow
GREPS	Growth in earnings per share
Div Yield	Dividend yield measured by dividend to market price
Debt to asset ratio	Debt to Total Assets

The variables except current beta was taken for the period t-1.

The results given in Table 3 suggest that 39.5% of variation in Apple returns is explained by the market SP500 returns. The adjusted R square value was 0.395. The result was statistically significant at all levels of significance. The beta value is 1.206. The coefficient of intercept was significant at 10%.

Table 3: Single Index Model –Regression Results for Apple Stock

Regression Statistics					
Multiple R	0.637				
R Square	0.405				
Adjusted R Square	0.395				
Standard Error	0.051				
Observations	60.000				
ANOVA					
	df	SS	MS	F	Significance F
Regression	1	0.103	0.103	39.513	0.000
Residual	58	0.151	0.003		
Total	59	0.253			
	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.012	0.007	1.779	0.081	
Market Index Returns	1.206	0.192	6.286	0.000	

Table 4: Single Index Model – Regression Results for Google Stock

Regression Statistics					
Multiple R	0.631				
R Square	0.398				
Adjusted R Square	0.388				
Standard Error	0.044				
Observations	60.000				
ANOVA					
	df	SS	MS	F	Significance F
Regression	1	0.07	0.07	38.35	0.00
Residual	58	0.11	0.00		
Total	59	0.19			
	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.003	0.006	0.564	0.575	
Market Return	1.029	0.166	6.193	0.000	

Table 4 shows that the F value is statistically significant. The Adjusted R Square value for the model was 0. 388. It can be interpreted that 38.8% of variation in Google stock can be explained by the variance in S&P500 returns. One of the determinant of google stock return is the market return. The result was statistically significant at all levels. The beta value was 1.029.

Table 5: Single Index Model – Regression Results for Microsoft Stock

Regression Statistics					
Multiple R	0.60				
R Square	0.36				
Adjusted R Square	0.35				
Standard Error	0.05				
Observations	60				
ANOVA					
	df	SS	MS	F	Significance F
Regression	1	0.07	0.07	33.25	0.00
Residual	58	0.13	0.00		
Total	59	0.20			
	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.01	0.01	1.66	0.10	
Market Return	1.01	0.18	5.77	0.00	

In Table 5 the adjusted R Square is 0.35. Hence it can be interpreted that approximately 35% of variation in Microsoft stock returns can be attributed to the market return fluctuations. The beta value is 1.01.

Table 6 shows the result of the dependent variable of current beta regressed on variables of leverage (debt to total assets), Firm size measured by log of normalized revenues, variance of cash flow (measured by EBITDA), variance of earnings (measured by EBIT), year on year average growth rate in earnings, dividend yield measured by dividend paid divided by market price. None of the variables were statistically significant.

Table 6: Prediction of Current Beta

Regression Statistics					
Multiple R	0.238				
R Square	0.057				
Adjusted R Square	-0.042				
Standard Error	0.584				
Observations	75				
ANOVA					
	df	SS	MS	F	Significance F
Regression	7	1.38	0.20	0.58	0.77
Residual	67	22.88	0.34		
Total	74	24.25			
	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.26	0.39	0.67	0.50	
PBeta	0.00	0.00	-0.07	0.94	
FirmSize	0.00	0.00	-0.30	0.76	
VarEar	0.00	0.00	0.42	0.68	
VarCFO	-0.01	0.01	-0.48	0.64	
GREPS	0.00	0.00	-1.24	0.22	
DivYield	0.03	0.06	0.47	0.64	
DebtTA	0.01	0.33	0.04	0.97	

6 Conclusion

This study examines the determinants of stock returns of IT companies based on index model. The study examines the index model using the case analysis of stock returns of three IT Companies- Apple, Google and Microsoft. The analysis was done using the latest five-year monthly data. The study reveals that market index returns is a powerful determinant of stock returns. In terms of sensitivity as measured by beta values, Apple was most sensitive to fluctuations in market returns followed by Google and Microsoft stock returns. The study also examines the predictive ability of current beta using five-year data series of 15 IT companies. The results were statistically insignificant.

References:

[1] Bahhouth V, Maysami R, and Khoueiri R. Significance of beta and financial measures in predicting the riskiness of S&P 500 Stocks during the downturn of year 2008. *International Journal of Business, Accounting and Finance*. 2010; 4(2):12-18.

[2] Boabang F. An Adjustment Procedure for Predicting Betas When Thin Trading is Present: Canadian Evidence. *Journal of Business Finance & Accounting*. 1996;23(9-10):1333-1356.

[3] Hashemi M, Pouraghajan A. A three factor model and excess return in an emerging market: A case study of listed companies on Tehran Stock Exchange. *Journal of Commerce and Accounting Research*. 2017; 6(3):1-13.

[4] Rosenberg B, Guy J. Prediction of Beta from Investment Fundamentals. *Financial Analysts Journal*. 1995;51(1):101-112.

[5] Saji T. Predicting Market Betas. *Paradigm*. 2018;22(2):160-174.

[6] Sathyanarayana S, Harish S. An Empirical Study on Stability of Beta in Indian Stock Market with Special Reference to CNX Nifty 50, *IUP Journal of Financial Risk Management*. 2017; 14(1):16-35.