

Testing the Applicability of CAPM in Selected Indian Industries

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Abstract

The current study deals with the validity of Capital Asset Pricing Model in selected industries of India. The CAPM is being tested using Regression analysis with the help of Eviews 9.0 in seven industries for a period of 16 years ranging from January 2000 to April 2016 using monthly stock indices from BSE. The results prove that the model is applicable in many of the industries of Indian Stock Market for the period studied.

Keywords: Capital Asset Pricing Model, Stock Market, Stock Indices, BSE

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Introduction

The model given by Treynor, Sharpe and Lintner which establishes the relationship between Beta, Risk free asset and the Anticipated return of the market. Capital Asset Pricing Model is proved to be a boon for many of the investors all around the world. It explains the risk and return relationship or more precisely, on systematic return and the return. Taking about risk, we have two types of risk viz. systematic risk and unsystematic risk or market risk and business risk. Systematic or market risk (also known as beta) is that type of risk which will going to effect the entire industry and which cannot be minimized or avoided by way of diversification. Every business operating under that industry will be affected by this risk example market conditions, whenever market situations/conditions improve or worsen it has a simultaneous positive or negative effect on the industry as well as the businesses as a whole. No business can avoid or even diversify this type of risk. On the other hand we have unsystematic risk or business risk which is a type of risk where every business will be affected differently. One can always avoid this type of risk by way of diversification. As unsystematic risk can be avoided, therefore CAPM studies only the relationship that exists between systematic risk (beta) and return of a particular security at a particular time. The model says that there exists a positive relationship between systematic risk and return of a security. The equation of the CAPM which best describe the model is as under:

$$R = R_f + (R_m - R_f)\beta$$

R = expected return

R_f = risk free return

R_m = market rate of return

β = beta

Scope of The Study

The present study is related to the application of Capital Asset Pricing Model(CAPM) in context to the Indian Stock Market for the period 2000 to 2016. The stock market of India is studied for finding the real life applicability of Capital Asset Pricing Model i.e. to find out whether or not CAPM holds true in real life..

Need of The Study

- i. The study will help the investors to get adequate understanding about price behavior and risk return trade-off of the securities.
- ii. Although, massive studies have proved CAPM as a valid and reliable model but it is important to retest its validity and reliability because there occurs fluctuations in the stock market.

- iii. The study will enable the investors to take better investment decisions and they will be motivated to invest their surplus in capital markets, and thereby ensuring development of securities market.
- iv. And at the last, the study will help the researchers who want to pursue their research in the same or in the related area.

Literature Review

Dhankar and Singh (2005) in their comprehensive research paper with an objective of ascertaining the practicability of CAPM finds that the model does not hold true with respect to Indian Stock Market for the period studied. **Nikolaos (2009)** tested the soundness of CAPM in British Stock Market using 30 stocks of London Stock Exchange. With the implication of two step regression procedure, he concluded that CAPM does not hold true. **Basu and Chawla(2010)** investigated 50 stocks by making 10 portfolios over 5 years and the findings of the study concludes that CAPM does not accomplish as per anticipation, further they suggests that there should be a model that must be captative of including more variables which effect price behavior other than risk alone. **Choudhary and Choudhary (2010)** examined the practical aspect of Capital Asset Pricing Model in Indian Stock Market and finds that there is not any direct relationship between return of the security and Beta. Also they concluded that beta alone is not adequate enough for commenting on the return of a security, there are other factors as well like macroeconomic factors along with various firm specific factors. **Rizwan, Shaikh and Shehzadi (2013)** investigated the functionality of standard Capital Asset Pricing Model (CAPM) in Cement sector of Pakistan listed on Karachi Stock Exchange (KSE), Fifteen companies were selected as sample for the study for 5 years i.e. 2004 to 2009 and concluded that the model is not practical in its implications in the Cement sector of KSE. **Hasan, Kamil, Mustafa and Baten(2013)**examined the CAPM via portfolio performance on Bangladesh Stock Market using monthly securities returns of 80 companies for 4 years from January 2004 to December 2009. The results of this analysis show that the CAPM holds true in Bangladesh Stock Market for the period studies. **Raheja (2014)** inspected the working of CAPM in Indian Stock Market with an objective that whether the model is capable of adjudicating the expected returns or not and terminated her paper by commenting that expected return are not in line with the one which is being set by CAPM, also she further concluded that returns are not only affected by risk alone, there are other factors like political and economic which influence the returns on a security. **Shamim, Abid and Shaikh (2014)** aimed at extracting the sensibility of CAPM for companies which are listed on Karachi Stock Exchange (KSE) and the results reveals that CAPM does not function in reality in KSE for the period studied. **Kisman and**

Restiyanita (2015), determined that whether there is an affect of market excess return (given by CAPM) on companies stock returns or whether there is an affect of some other factors like GDP and Inflation (given by APT) on companies stock returns for a period of two years and concluded that APT is better than CAPM in order to forecast stock returns. **Reddy and Durga (2015)** examined the analytical aspect of CAPM in Indian Stock Market for 87 stocks from the period 1st January 2005 to August 2014 using Black Jensen Scholes methodology and concluded that CAPM partially holds true in Indian Stock Market. **Wahab and Zada (2017)**, Studied the relationship between risk and the expected return for both long as well as short term in the Pakistan Cement Industry and the results of their study concludes that observations supporting the model are very less than the observations that are against the model and hence they summarized that the model loses its validity in the Cement Industry of Pakistan.

Objectives of the Study

- i. To check whether there exists a relationship between risk and return in the Indian Stock Market or not.
- ii. To test the validity of CAPM in Indian Stock Market.

Data and Methodology

Data

For the purpose of my study, the monthly stock indices of Indian Stock market are chosen. The monthly stock indices of BSE (India) are obtained from the database of CEIC. Monthly indices of different industries are taken and general indices BSE30 also has been taken as surrogate of the overall market. Market indices i.e., BSE30 will serve as market return and industrial indices will serve as stock returns for commenting on the practical aspect of Capital Asset Pricing Model. Rate of Return on Government Securities is taken as a means of Risk Free Rate. The analysis and the interpretation performed in this study are for a period starting from January 2000 to April 2016 using monthly closing indices.

For the purpose of the analysis, seven sectors (or industries viz. automobile, consumer goods, FMCG, Information and Technology, Metal, Oil and Gas, and Public Sector Undertaking) are taken based on the availability of the data which is then regressed with market indices.

Methodology

1. Data is being analyzed using Regression analysis for excess returns of market and excess return on industries return with the help of E-views 9. For the purpose of analysis, the stock indices are first transformed into returns and then the excess return is being computed by deducting rate of

Government securities from the respective returns. And finally, regression is applied on the individual stock excess returns and the market stock excess returns and on the basis of that analysis, applicability of Capital Asset Pricing Model is determined as per Chris Brooks. Introductory Econometrics for Finance, Cambridge, 2nd edition, pp 77-81.

Analysis and Interpretation

Market indices i.e. BSE30 is being regressed separately with different industry indices to comment on the applicability of the model in the respective industry. Excess return BSE30 is independent variable in all the cases and the respective industry returns are dependent variable.

Excess return BSE and Excess return Automobile.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ALPHA	0.854120	0.415039	2.057925	0.0409
EREMIBSE30	1.052204	0.042673	24.65719	0.0000

The above analysis shows that the beta coefficient estimate is 1.0522 and the p-value of the t-ratio is 0.0000 which signifies that the excess return on the market proxy has meaningful illustrative power for the variability of the excess return of Automobile industry. For testing the validity of CAPM, Wald-Test Coefficient Restrictions and type C(2)=1. was applied by going to the view menu in the regression window and then by selecting coefficient diagnostics. After that the p-value of t-test, f-test and chi-square test were checked, if they come out to be greater than 0.05 than that means our null hypothesis is correct and we can accept the Null Hypothesis which says that beta is significantly equal to one, which suggests that CAPM holds true in Automobile sector in India. Since the p-value of t-test, f-test and chi-square test calculated is greater than 0.05 and also R-square and Adjusted R-square is coming out to be 0.759044 and 0.757796 respectively which shows goodness of fit, thus the null hypothesis is accepted.

Similarly, excess return for all other industries and market excess return have been regressed and the results are as follows:

Excess return market and Consumer Goods

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ALPHA	1.894297	0.514333	3.683014	0.0003
EREMIBSE30	1.225085	0.052882	23.16619	0.0000

The Beta coefficient estimate is coming 1.225085 and the p- value of the t-ratio is 0.0000 which again signifies that the excess return on the market proxy has meaningful illustrative power for the variability of the excess return of Consumer Goods industry. The significance level of beta was checked in the same manner as done before in case of the Automobile industry. The results showed that null hypothesis has been rejected and beta was not significant enough to explain the validity of CAPM, therefore, CAPM does not holds true in Consumer goods industry in India. Further, the R-squared and Adjusted R-squared were 0.735498 and 0.734127 respectively which shows goodness of fit.

Excess return market and Fast Moving Consumer Goods

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ALPHA	-2.260304	0.420008	-5.381568	0.0000
EREMIBSE30	0.613614	0.043184	14.20923	0.0000

The Beta coefficient here in this industry was 0.6136 and the p-value of the t-ratio was 0.0000 and after further reviewing the value of beta the null hypothesis was rejected here and it was found that CAPM is not valid in FMCG industry as well. The values of R-squared and Adjusted R-squared were 0.511271 and 0.508739 respectively.

Excess return market and Metal

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ALPHA	2.370067	0.611943	3.873018	0.0001
EREMIBSE30	1.381621	0.062918	21.95891	0.0000

Beta coefficient is 1.3816 and p-value of the t-ratio is 0.0000 which again signifies that excess return market and excess return metal are moving in same order but after testing the validity of CAPM it was found that beta value has no significant explaining power or the alpha value does not equates with zero which means CAPM is invalid in this industry also. The values of R-squared and Adjusted R-squared were 0.714156 and 0.712675 respectively.

Excess return market and Information Technology

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ALPHA	-0.320579	0.799699	-0.400875	0.6890
EREMIBSE30	1.007130	0.082223	12.24876	0.0000

Beta coefficient here is 1.0071 and p-value of the t-ratio is again 0.0000 which means the excess return on the market proxy has meaningful expository power for the variability of the excess return of IT industry and after diagnosing the coefficient beta it was thus concluded that CAPM is valid in IT industry. The values of R-squared and Adjusted R-squared were 0.437370 and 0.434455 respectively.

Excess return market and Oil and Gas

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ALPHA	0.208918	0.471810	0.442801	0.6584
EREMIBSE30	1.007860	0.048510	20.77621	0.0000

Beta coefficient is 1.0078 and p-value of the t-ratio is 0.0000 and coefficients are also explaining the significant part which means that CAPM is applicable in this particular industry also.

The values of R-squared and Adjusted R-squared were 0.691027 and 0.689427 respectively.

Excess return market and Public Sector Undertaking

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.437816	0.482706	0.907004	0.3655
EREMIBSE30	1.079572	0.049631	21.75215	0.0000

Beta coefficient here is 1.0795 and p-value of the t-ratio is again 0.0000 and coefficient diagnostics again suggests that CAPM is also valid in this industry as well. The values of R-squared and Adjusted R-squared were 0.710278 and 0.708777 respectively.

Findings

Return of the industry indices as well as market indices is computed by using E-Views version 9 by the following formula:

$$RBSE30 = 100 * \log(BSE30/BSE30(-1))$$

Where, RBSE30 = return BSE30, BSE30 = indices of Bombay Stock Exchange, BSE30(-1) = one period lag of the series.

Return can also be computed by using the following formula:

$$RBSE30 = 100 * dlog(BSE30)$$

Results of the return will be same from both the formulas.

By using the above formula with the help of E-views, returns of all the industries were computed.

Similarly, Returns for all the industries were computed and returns for market indices as a whole were also computed and then excess return were computed separately for all the industries as well as for the market. After that the excess returns market were regressed one by one separately with all the eight industries chosen and the result showed that CAPM was valid in some of the industries and invalid in some of the industries for the period studied here.

Conclusion

As depicted in the above tables, it was observed that p value of the t-ratio was 0.0000, which signifies that the excess return on the market proxy has meaningful interpretive power for the variability of excess return on all of the industries mentioned here. And after diagnosing the value of the beta coefficient, it is been concluded that CAPM is valid in Automobile, IT, Oil and Gas, PSUs while it is invalid in Consumer Goods industry, FMCG and Metal Industry.

References

- Basu, D., & Chawla, D. (2010). An empirical test of capm-the case of indian stock market. *Global Business Review*, 11 (2), 209-220.
- Brooks, Chris., Introductory Econometrics for Finance, Cambridge, 2nd edition, pp 77-81.
- Choudhary, K., & Choudhary, S. (2010). Testing capital asset pricing model: empirical evidences from indian equity market. *Eurasian Journal of Business and Economics*, 3 (6), 127-138.
- Dhankar, R. S., & Singh, R. (2005). Application of capm in the indian stock market a comprehensive reassessment. *Asia- Pacific Business Review*, 1 (2), 1-12.
- Hasan, Md. Z., Kamal, A. A., Mustafa, A., & Baten, Md. A. (2013). Analyzing and estimating portfolio performance of bangladesh stock market. *American Journal of Applied Sciences*, 10 (2), 139-146.

Kisman, Z., and Restiyanita, M. S. (2015). The validity of capital asset pricing model (capm) and arbitrage pricing theory (apt) in predicting the return of stocks in indonesia stock exchange 2008-2010. *American Journal of Economics, Finance and Management*, 1 (3), 184-189.

Loukeris, N. (2009). An empirical evaluation of capm's validity in the british stock exchange. *International Journal of Applied Mathematics and Informatics*, 3 (1), 1-8.

Rizwan, S., Shaikh, S. J., & Shehzadi, M. (2013). Validity of capital asset pricing model (capm): Evidence from cement sector of pakistan listed under karachi stock exchange. *Kuwait Chapter of Arabian Journal of Business and Management Review*, 2 (6), 66-80.

Reddy, M. S., and Durga, S. (2015). Testing the validity of capm in indian stock markets. *International Journal of Multidisciplinary Research and Development*. 2 (2), 56-60.

Raheja, K. (2014). CAPM-empirical study of nse stocks. *Indian Journal of Applied Research*, 4 (4), 129-130.

Shamim, M. A., Abid, Y., & Shaikh, E. A. (2014). Validity of capital asset pricing model in pakistan's capital market (karachi stock exchange). *Journal of Emerging Issues in Economics, Finance and Banking (JEIEFB) An Online International Research Journal*, 3 (4), 1141-1149.

Wahab, Y., and Zada, H. (2017). testing the short term and long term applicability of capm: A case of pakistani cement industry. *Research Journal of Finance and Accounting*. 8 (7), 6-19.

