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Applicability of CAPM in the context of banking stock returns in Nepal

Inju Gyawali
Master of Philosophy (MPhil Scholar), Department of Finance, Kathmandu University, Kathmandu, Nepal

Abstract
Capital Asset Pricing Model (CAPM) is one of the widely used measures of calculating the expected stock return. This study aims to find the applicability of CAPM in Banking stock return in Nepal and to establish risk and return relationship for individual securities. In this paper it is also tried to find whether the individual securities are overvalued or undervalued using CAPM so as to help the investors to take their buy and sell decision. Closing prices of top five commercial banks on the basis of their market capitalization in 2019 have been considered. The basic model developed by William Sharpe (1964) and other authors in different times issued to serve the purpose. The research finds no applicability of CAPM in in banking stock return as the difference between expectations and the actual results is very high at normal risk level.

Keywords: Pricing, CAPM, measures, Capital, Nepal

1. Introduction

Capital market is the most important part of financial system. It provides the interface to the buyer and seller for exchange of financial instruments. The investors and analyst uses various model and techniques to evaluate the investment opportunities. Capital Asset Pricing Model (CAPM) is one of the important models used to evaluate any investment. This model was originally proposed by Sharpe (1964). This model provides the framework for weighing the risk against expected return for determining securities prices. The total risk comprises of two types of risks-unsystematic risk or diversifiable risk and systematic risk which is also known as non-diversifiable risk. CAPM takes into only systematic risk which is also known as market risk and represented by beta. A beta value of one is considered as the overall market average. Beta higher than one represents risk level greater than market average while beta lowers than one represents a level of risk below market average. The CAPM helps us to measure portfolio‟s risk and the return an investor can expect for taking that risk. It is the first model to present a testable hypothesis regarding risk - return relationship. The CAPM relies on theoretical market portfolio, which includes all assets such as real estate, foreign stocks, etc. The identification of the true market portfolio is very difficult. Therefore in practice, the CAPM is analyzed and tested by using some stock market index, which represents the market portfolio. The CAPM can be mathematically expressed as:

$E (Rjt) = Rft + \beta j (Rmt - Rft)$

Where,

E (Rjt)=the expected return of security ‘j’ during time period ‘t’.
Rft = the risk free rate during time period ‘t’.
βj = the beta of security ‘j’.
Rmt = the expected return on the market portfolio or expected return on index during time period ‘t’.

There is a linear relationship between risk and return. The risk premium on the stock or portfolio of stocks is a function of the risk premium on the market and varies directly with the level of beta or systematic risk. The expression (Rmt-Rft) denotes premium per unit of risk. Thus, the investors holding risky security or portfolio is expected to receive risk free rate of return plus premium or compensation for each unit of risk taken by them. Therefore,

E (Rjt) = Rft + Risk premium.

A number of simplifying assumptions lead to the basic version of the CAPM. CAPM is based on the following assumptions:

1. The market for capital assets is composed of risk averting investors, all of whom are one period expected utility of terminal wealth maximizes and find it possible to make optimal portfolio decisions solely on the basis of the means and standard deviations of the probability distributions of terminal wealth associated with the various available portfolios.
2. All investors have the same decision horizon, and over this common horizon period the means and variances of the distributions of one period returns on assets and portfolios exist.
3. Capital markets are perfect in the sense that all assets are infinitely divisible, there are transactions costs or taxes, information is costless and available to everybody, and borrowing and lending rates are equal to each other and the same for all investors.
4. Expectations and portfolio opportunities are “homogeneous” throughout the market. That is, all investors have the same set of portfolio opportunities, and view the expected returns and standard deviations of return provided by the various portfolios in the same way

The empirical studies revealed that all these assumptions are not necessary for the derivation of the model. The model can be derived even when investors have heterogeneous expectations

regarding the distribution of stock returns (Lintner, 1969), there are personal income taxes in particular differential rates on capital gains and dividends (Brennan, 1970), existence of transactions costs and considering a world without a risk free asset (Black, Jensen and Scholes, 1972) [2], and non-divisibility of assets (Mayshar, 1983) [12]. These modifications in the model are made to reflect the real world situations. But the linear relationship between risk and expected return hold good even today.

2. Literature Review

(Fama & Mac Beth, J. D, 1973)This study is concerned with New York Stock Exchange predicting the relation between average risk and return. According to this CAPM indicates positive relation between risk and return and indicates linear relationship between them.

(Andor, 1999) [1]. This study of CAPM is concerned with Hungarian Capital Market. For the purpose of this study data from 31st July 1991 to1st June 1999 was taken.17 Companies monthly data was used, these companies where listed on Budapest Stock Exchange (BSE). Relation between company's beta and average returns was measured by regression analysis. This shows the positive conclusion of Hungarian Capital Market.

(Cudi Tuncer Gursoy, G. R,2007) examined the validity of CAPM in Turkey market on 10 stocks for the period of 1995-2004.It was found that there is no relationship between beta coefficients and ex-post premiums of selected stocks. The results showed that high beta stocks perform better in up-market conditions whereas low-beta portfolio is better investment in down-market.

(Rahman, Baten, & Ashraf-Ul- Ala, 2006) This study was conducted in Bangladesh. It was checked whether CAPM is good indicator in Bangladesh. This study was done for the period of 1999-2003. This study of CAPM showed support to CAPM. Five variable stock returns, market size, sales were used to do study of CAPM and it has shown significant relation with stock return

Gupta (1981) [7]. studied a large sample companies and computes average annual returns for thirty five-year periods between 1961and 1976. Each year‟s high and low price for the sample shares were considered. A total of 606 equity shares for one or more holding periods were considered in the study. The data was collected from Bombay, Calcutta and Madras stock exchanges. The long-term rates on equities were less than that on debentures, preference shares, Company deposits and long-term bank deposits, most of the time. The average annual returns were computed to be 3.21 per cent for 1961-66; 10.40 per cent for 1966-71; and 5.00 per cent for 1971-76. The belief that equities provided hedge against inflation was found to be unfounded. The author doubted the applicability of CAPM in the Indian capital market Gupta and Seghal (1993) [8]. tested CAPM over the period April 1979 to March 1989. They employed average monthly share prices of 30 shares forming BSE Sensitive index and portfolio method constructing three equally–weighted and three value-weighted portfolios. They also explicitly addressed questions of non-linearity and the role of residual risk in explaining returns. They concluded that CAPM did not seem to be a suitable descriptor of asset pricing in the Indian capital market during the study period.

Choudhary, S. C. (2010) [3]. examined CAPM for the Indian Stock market using monthly stock returns from companies of BSE 500 index for the period of January 1996 to December 2009.It is found that higher beta is not associated with higher level of returns. The finding of the study contradicts with the hypothesis of CAPM. The study concluded that beta is not sufficient to determine the expected returns of securities

Pravin, C. & Dhananjay, P. (2019) [5]. Presented a study about an Empirical analysis of CAPM in Indian stock market with reference to S & P BSE Sensex for the period Jan 2011 to 2015. The CAPM Model Based on expected rate of return on an asset is directly proportional to its Beta with the Market Return. So, this study test the hypothesis the beta is the only factor that determine the return from the asset and asset return linearly related to the betas of the assets and the only risk that influence the return is the systematic risk is not established. The concluded that CAPM propositions do not hold true in Indian stock market, specifically for S&P BSE Sensex Indexed stock for the specified period.

Koirala, S. (2015) [10]. conducted a study about Modified Capital Asset Pricing Model With Evidence From Nepal Stock Exchange, it is found that the proposed modification, abbreviated as MCAPM, provides nontrivial contribution to the limitation of conventional CAPM with simplicity to test and apply. This study also highlights the application of the proposed modification to Arbitrage Pricing Theory of asset pricing.

Karki D. & Ghimire B. (2016) [9]. investigated the relevance of CAPM single factor and Fama-French three factor (Fama-French) models to explain the return for cross sectional portfolios in the context of Nepalese stock market over the period of August 2007 to July 2013 and estimate the factor models after correcting for the violation of classical linear regression assumptions, the result showed that three factor model has better explanatory power over CAPM. The estimations of Fame-French showed that Excess market return (ER) and Value factor is more significant than Size factor in model fitting. Finally, the study tested for the seasonality in Nepalese stock return using the dummy variable. The results showed significant seasonality effect for fiscal year end thus indicating possibility of tax loss effect in Nepalese stock market but seasonality effect on account of festival period is found to be insignificant.

3. Objectives of the study

The major objective of this study is to test the applicability of CAPM in Nepalese banking stock return.

To test, the main objectives is sub divided into further sub objectives.

1. To measure the risk of selected securities
2. To measure the rate of return expected by the investors using CAPM model.
3. To find whether the selected securities are undervalued or overvalued.

4. Methodology

To test the applicability of CAPM in the banking stock return, adjusted monthly close prices of top 5 commercial bank's with highest market capitalization in 2019 have been chosen for the period from January 2016 to December 2019.The monthly adjusted closing price of individual stock and Nepse is collected from Nepse chart. The companies are chosen from the list of 27 commercial banks listed in Nepse. For risk free rate of return the average monthly return of 91 days T-bill has been used. CAPM formula has been used to know the beta of stocks for stipulated

period. For testing the applicability, of CAPM in Nepal, first the beta of each stock is calculated for different companies under the different years. The Beta coefficient (Slope) is calculated by regressing each stock's monthly return against the market return. Using the CAPM the expected returns of each stock is calculated from 2016 till 2019 for the top five companies having the highest market capitalization in 2019. Finally the actual return is compared to the expected return calculated using CAPM to find the Reliability of return calculated using CAPM.

$E(RJ) = Rf + \beta j (Rm - Rf)$

Where,

E (RJ) = the expected return of security 'j'

Rf = the risk free rate

βj = the beta of security 'j'.

Rm = the expected return on the market portfolio.

$\beta j = Cov(Rj, Rm) / \sigma m2$

5. Data Presentation and Analysis

Table 1: Top five commercial bank with high market capitalization in 2019

Rank	bank	No. of listed share	Market price (in Rs.)	Market capitalization (Arba)
1	NABIL bank	90048000	770	69.34
2	Nepal investment bank (NIB)	127697488	464	59.25
3	Everest bank	80268637	644	51.69
4	Standard chartered bank (SCB)	80114306	625	60.07
5	Himalayan bank	85202559	542	46.18

Source: www.investopaper.com

Table 2: (2016)

Companies	Rf(risk free rate)	Rm (market rate of retun)	Rm-Rf	β (beta)	β(Rm-Rf)	Expected return= Rf+ β(Rm-Rf)	Actual return	Valuation
NABIL bank	1.176	1.7817	0.6057	1.058	0.6408	1.817	-1.377	overvalued
NIB	1.176	1.7817	0.6057	0.65	0.394	1.57	-3.268	overvalued
Everest bank	1.176	1.7817	0.6057	1.773	1.074	2.25	-0.974	overvalued
SCB	1.176	1.7817	0.6057	1.91	1.156	2.332	-1.474	overvalued
Himalayan bank	1.176	1.7817	0.6057	1.626	0.985	2.161	-0.483	overvalued

Table 3: (2017)

Companies	Rf(risk free rate)	Rm (market rate of retun)	Rm-Rf	β (beta)	β(Rm-Rf)	Expected return= Rf+ β(Rm-Rf)	Actual return	Valuation
NABIL bank	1.57	0.703	-0.867	0.723	-0.627	0.943	-2.25	Overvalued
NIB	1.57	0.703	-0.867	0.716	-0.62	0.95	0.14	Overvalued
Everest bank	1.57	0.703	-0.867	1.232	-1.07	0.5	-5.9	Overvalued
SCB	1.57	0.703	-0.867	1.37	-1.188	0.39	-3.97	Overvalued
Himalayan bank	1.57	0.703	-0.867	1.287	-1.116	0.46	-2.29	Overvalued

Table 4: (2018)

Companies	Rf(risk free rate)	Rm (market rate of retun)	Rm-Rf	β (beta)	β(Rm-Rf)	Expected return= Rf+ β(Rm-Rf)	Actual return	Valuation
NABIL bank	3.64	-1.34	-4.98	0.54	-2.67	0.97	-1.88	overvalued
NIB	3.64	-1.34	-4.98	0.12	-0.59	3.05	-1.54	Overvalued
Everest bank	3.64	-1.34	-4.98	0.82	-4.09	-0.45	-4	Overvalued
SCB	3.64	-1.34	-4.98	0.59	-2.94	0.7	-4.03	Overvalued
Himalayan bank	3.64	-1.34	-4.98	0.60	-2.99	0.65	-2.77	Overvalued

Table 5: (2019)

Companies	Rf(risk free rate)	Rm (market rate of retun)	Rm-Rf	β (beta)	0β(Rm-Rf)	Expected return= Rf+ β(Rm-Rf)	Actual return	Valuation
NABIL bank	3.32	0.223	-3.097	1.22	-3.78	-0.46	-1.51	Overvalued
NIB	3.32	0.223	-3.097	0.85	-2.63	0.69	-4.02	Overvalued
Everest bank	3.32	0.223	-3.097	0.802	-2.48	0.84	0.37	Overvalued
SCB	3.32	0.223	-3.097	1.55	-4.8	-1.48	-0.91	Undervalued
Himalayan bank	3.32	0.223	-3.097	1.50	-5.05	-1.73	1.56	Undervalued

From the above data it was found that stocks of top five commercial banks (in terms of highest market capitalization) are overvalued during 2016 to 2019, except SCB and HBL in 2019. Which means stock was traded at higher than fair market value. As per the risk return relation, stock which have highest beta (risk) should earn highest return. But here we can found that, in 2016, the beta of SCB was highest i.e. 1.156, as per risk return relation, SCB must have earned highest return i.e. 2.332 calculated by CAPM and actually it earned return of -1.474 which was less than the actual return of Himalayan bank whereas its beta was less than SCB.

Similarly, in 2017 NIB has the lowest beta i.e, 0.716, as per rule, NIB must have earned lowest return on the contrary NIB earned highest return i.e, 0.14 and Everest bank earned lowest return which have highest beta. CAPM based on the idea of systematic risk (Beta) that investors need to be compensated for in the form

of a risk premium. Thus higher beta should provide higher expected return, but in 2018 Everest bank have highest beta, with lowest expected return as compared to other banks. Because in 2018 market risk premium was negative due to negative return of market. It also can be found that risk free securities were yielding higher than risky securities (banking stock) during 2016 to 2019.

6. Conclusion

The purpose of this research is to test the applicability of CAPM in Banking Stock Returns in Nepal. Closing returns of top five companies in 2019 of four years from 2016 to 2019 have been considered. Results show that stocks return doesn't depend on the stock beta and the results of CAPM cannot be relied upon. It is found that the difference between expectation and actual return is very significant at normal risk level. So, any result may mislead the investors to forecast future movement of stocks. The intensity of differences implies that CAPM has no applicability in banking stock return in Nepal.

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