A Decision Model for Investment in Stock Markets

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Abstract

Investment in stock market often yields good returns. But making money from capital market is not an easy task. Wise and timely decision will certainly benefit the investor. An active tracking mechanism can lead to timely booking of profits. Even if investment are made by considering different factors such as interest rate, inflation rate, exchange rate, P/E ratios, share price indices etc, investors have got burnt in many occasions. In this paper, we propose a model for making investment decisions in stock market. The model will be ideal for taking decisions to buy or sell or hold a particular stock by considering the market conditions prevailing at different points of time. The model will also help in identifying good stocks for retail investors for whom preservation of capital is as important as earning decent returns from investment.

1. Introduction

Generally investment is distinguished from speculation by the time horizon of the investor and often by the risk-return characteristics of the investment. The true investor is interested in a good rate of return, earned on a rather consistent basis for a relatively long period of time. Handsome returns can be achieved from the stock market by a variety of techniques.

Usually, a prospective investor reaches an investment decision to buy or sell or hold a particular stock by comparing the intrinsic value with the current market price of the stock. The intrinsic value of a stock is calculated by considering factors such as the sales, net

profit, book-value, earning per share(eps), P/E ratios, dividend paid etc.This fundamental approach is often questioned by technical analysts who act solely on the basis of the past behavior patterns in the price and the volume of the particular stock.

But the random walk theory formulated by E.F.Fama,(1965) refuted the technical analysts approach in forecasting the future price of a stock based on the past prices. The random-walk theory says that successive price changes are independent. This independence implies that prices at any time will on the average reflect the intrinsic value of the security. Furthermore, if a stock's price deviates from the intrinsic value because, among other things, different investors evaluate the available information differently or have different insights into future prospects of the firm. A Niederhoffer and Regan (1972) study suggest that stock prices are strongly dependent upon earning's changes, both absolute and relative to analysts estimates. They discovered that the common characteristics of the companies registering the best price changes included a forecast of moderately increased earnings and a realized profit gain far in excess of analyst's expectations. The worst-performing stocks were those characterized by severe earnings declines, combined with unusually optimistic fore casts. The accuracy of earnings forecasts is of enormous value in stock selection.

Another important criterion used for stock valuation is the P/E ratio. A high P/E indicates over-valuation of the stock and a low P/E indicates under-valuation of the stock. Therefore, for a proper valuation of a stock, the P/E ratio should be scientifically determined. In a survey, Bing(1971) found that seventy five percent of the analysts use the normal multiplier rules of thumb to determine the P/E ratio

In an attempt to bring some scientific evidence to the problem of "normality"in P/E's, several studies have been conducted, using statistical techniques to achieve solutions.

Whitbeck and Kisor(1963)studied a number of stocks and speculated that difference in P/E ratios between stocks could be explained by (i) projected earnings growth (ii) expected dividend payout and (iii) the variation in the rate of earning's growth, or growth risk. They also concluded that P/E is an increasing function of growth and payout and inversely related to the variation in the growth rate. In other words, higher P/E ratios were associated with higher growth and payout and less variation in the growth rate. Bower and Bower (1969) showed results similar to Whitbeck and Kisor's for a cross section of stocks. They saw the same positive effects of earnings growth and payout. They discovered that higher P/E ratios were associated with more rapid earnings growth and higher dividend payout; lower P/E ratios with less marketability, greater conformity to market price movements, and higher price variability.

The Capital Asset Pricing Model (CAPM) developed by Sharpe (1964), Linter (1965), and Mossin (1966) provide a system whereby investors are able to assess the impact of an investment in a proposed security on the risk and return of their portfolio. But CAPM was called into question by Rechard Roll (1977,1978), who argued that the model should be discarded because it was impossible empirically to verify its single economic prediction. This controversial issue is still a subject of heated debate.

Even though different factors such as the earning per share, the P/E ratio, the beta factor, returns from investments etc are considered in different models, the Book Value(BV) of the stock is not generally considered. But empirical studies showed that there is

a high positive degree of correlation between the price of a stock, its eps, BV and the share price index.

2. Stock Valuation Model

Now Let P be the price, Y be the earning per share (eps) and Z be the book-value of a stock. If X is the share price index, then the price P of the stock generally depends on X,Y and Z. If we assume that P is a linear function of X, Y and Z, then the estimated price of the stock is given by

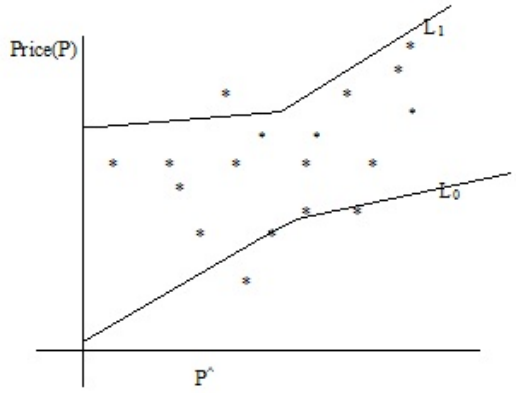
$$\widehat{P} = a_0 + a_1 X + a_2 Y + a_3 Z \qquad (2.1)$$

where a_0, a_1, a_2 a_3 are constants and ε is the error term. The constants a_0, a_1, a_2 and a_3 can be determined by the principle of least squares. The standard error of estimate S can also be determined.

Decision Rule

Using the simple thumb rule one can take a decision to sell the stock if $P > \widehat{P}$. On the other hand, if $P < \widehat{P}$ buy the stock for a price P. A more general rule can be given as follows

Let L_0 and L_1 be the lower and upper confidence bands at 95% level of confidence. Then the chance that the price of the stock will exceed L_1 is 0.025. Therefore, sell the stock if the price of a stock $P > L_1$. In this case the risk involved in selling the stock is 0.025. In other words, the opportunity chance that will be lost for not selling the stock for a higher price is only 0.025. Similarly, if $P < L_0$, buy the stock for a price P. In this case the risk involved in making the investment is again 0.025. Similar types of decisions can be taken for any given risk α.



3. Illustration

In The following is the regression of the price(Y) of a share of Reliance Industries limited(RIL) on its book value (X_1), the share price index(X_2)and its eps (X_3).

Model Summary

Model	R	R Square	Adjusted R Square	Std.Error of the Estimate
1	.938[a]	.880	.858	67.2207
2	.936[b]	.876	.862	66.3894

a. Predictors:(Constant), x_3,x_2,x_1
b. Predictors:(Constant),x_2,x_1

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig
1 Regression	560805.20	3	186935.08	41.370	<.001[a]
Residual	76816.54	17	518.62		
Total	637621.80	20			
2 Regression	558285.90	2	279143	63.333	<.001[b]
Residual	79335.86	18	4407.55		
Total	637621.80	20			

a. Predictors:(Constant), x_3,x_2,x_1
b. Predictors:(Constant),x_2,x_1
c. Dependent Variable : Y

The above F test indicates that the coefficients of all the independent variables are not zeroes

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
1 (Constant)	-238.792	68.390		-3.492	.003
X_1	1.758	.677	.584	2.596	.019
X_2	.200E-02	.020	.664	4.167	.001
X_3	-3.594	4.814	-.219	-.747	.465
2 (Constant)	-210.047	55.827		-3.762	.001
X_1	1.322	.339	.440	3.902	.001
X_2	.174E-02	.014	.581	5.158	.000

a. Dependent Variable : Y

In the above stepwise regression the variable X_3 is excluded resuming in the regression

$$Y = 1.322X_1 + 0.07174X_2 - 210.047 \qquad (2.2)$$

Let the book value of RIL be X_1=Rs 357.40. Then the estimated value of Y when the index X_2 is Rs1266.80. Also L_1=1051.24and L_2=1482.36

The normal P-P plot of regression standardized residual given in figure 2 justifies the fit also In the case of RIL share; the book value and the index determine its price. The eps has no major role in it. But for some other stocks, the various factors have their own roles in determining the price.

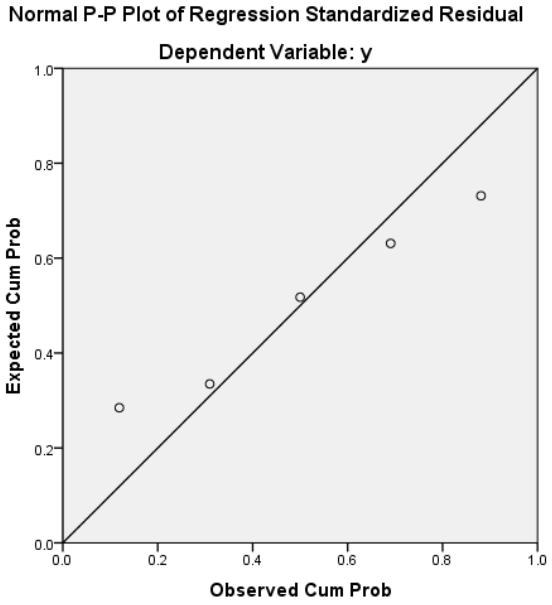


Figure 2 Normal P-P Plot of Regression

4. Conclusion

One of the serious drawbacks of the most famous Capital Asset Pricing Model(CAPM) for evaluating stock prices is that it does not consider into account the various factors determining the price of a stock. It utilizes mainly the securities β factor that is not enough to determine the price. The importance given to the book-to-market and size by Fama-French(1996), Pontiff and Schall(1998), Xinting and Ming(2005) etc. is also not sufficient to take investment decisions as they not giving any weight age to stock market index which measures the pulse and direction of the business activity. Our model not only gives importance to the book value and earnings

growth but also the market sentiments. Further, the present model gives a measure of the risk in investment decisions.

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