

Comparing Stock Valuation Models for Indian Bank Stocks

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Abstract

The aim of investors of bank stocks is to earn reasonable returns. This paper presents the framework for valuing bank stocks using different valuation models and investigates the explanatory power of each valuation model in Indian stock market. This study is also trying to compare the performance of different valuation models in determining bank stocks price. We selected a sample of 14 banks which constitute the BSE Bankex. The period of the study is from 2000-01 to 2010-11. The methodology used is based on the implications of the theory of financial markets and fundamental analysis. The results show that adjusted R-squares of Ohlson model and P/B Model are higher than adjusted R-squares of other valuation models such as CAPM Model, DDM Model, P/E model and Excess return Model. The results of empirical analysis support that Ohlson valuation model, P/B model and P/E Model are more informative with high predictive power providing better and more accurate estimations of equity market values for bank stocks. This study also concluded that CAPM model and Dividend discount model are not reliable ones for the valuation of bank stocks in India.

Keywords: Stock valuation model, BSE Bankex, Fundamental Analysis

JEL Classification: G11

Section I - Introduction

For an investor, valuation of financial assets is important and crucial. In estimating the intrinsic value of the firm Ohlson (EBO) Model, Relative Valuation Model (P/E Model, P/B Model), CAPM Model, the discounted dividend (DD) model, and Excess return models are the dominant models.

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Theoretically, all the models are mathematically equivalent. However, due to measurement errors in the models' parameters and differences in market expectations, these valuation models may reflect different intrinsic values for a firm.

Therefore, testing these models by Bank stock data and identifying the influential variables on the price of stock related to these models in the Indian stock Market would greatly help the investors in investment process. From another perspective, investigating regression theoretical models in this study is of vital importance. By doing so we will use the coefficient of determination (R^2) as a Criterion for indicating the explanatory power of a model in explaining the changes of dependent variables (in this study includes price) and the impact of independent variables of a model in effecting on the dependent variables at a level of 5percent will be tested also. Further, by using the results, the regression coefficients of each independent variable will be specified.

Section II reviews the importance of Valuation models for bank stocks and also reviews the previous tests of the importance of different valuation models in the stock market.. Section III details the objectives of the study and presents the data and methodology used to test the importance of each valuation model for bank stocks in Indian stock market. Section IV reports the empirical results on the predictive power of different valuation models for bank stocks. Section V concludes the paper.

Section II - Valuation Models for Bankstocks

Valuation is the process of forecasting the present value of the expected payoffs to shareholders and of converting this forecast into one number that corresponds to the fundamental-intrinsic firm value. Lee (1999) argues that valuation models are merely 'pro forma accounting systems' that constitute the vehicles for articulating the assessment of future events typically in terms of accounting constructs. According to Barker (2001), a good understanding of valuation methods requires two main things. The first is an analytical review of the models, identifying their relationship and exposing their assumptions.

The second is an evaluation of the data that are available for use of these models. Therefore, there is a significant relationship between the choice of valuation models and the available data. There are some important theoretical valuation models which can be applied to equity valuation.

In this section different types of valuation models most widely used are described a, EBO Model b, P/E Model c, P/B Model d, CAPM e, Dividend discount Model f, Excess return Model. These valuation models equations are given below in Table 1.

Table 1 : Models and Equations

Model	Model Equation
EBO Model (Ohlson)	$P_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 BV_{it} + e_{it}$
P/E Model	$(P/E)_{it} = \alpha_0 + \alpha_1 BETA_{it} + \alpha_2 GROWTH_{it} + \alpha_3 PAYOUT_{it} + e_{it}$
P/B Model	$(P/B)_{it} = \alpha_0 + \alpha_1 BETA_{it} + \alpha_2 GROWTH_{it} + \alpha_3 PAYOUT_{it} + \alpha_4 ROE_{it} + e_{it}$
CAPM	$E(R_j) = R_f + \beta_j [E(R_m) - R_f]$
Simplified DDM	$V = \text{DPS}(1) / (K_e - g)$
Excess Return Model	$V = \text{BV Of Equity} + \text{PV of Expected Excess Returns}$

Review of Literature

In this section we would discuss the literature and preceding research of each model which we would like to test (i.e. simplified EBO model or Ohlson Model , CAPM , P/E model, P/B model, DDM and Excess return model).

Studies related to Primary EBO Model or Ohlson Model

These stock pricing models are developed according to Edwards, Bell and Ohlson model. This model states that the stock price is a function of its book value and present value of upcoming expected abnormal profits. Many researchers simplified EBO model in which stock price is a function of profit and book value of equity capital. According to Bart, et al. (1998), Burgstahler, et al. (1997) and Collins, et al. (1997), earnings per share and book value per share have been empirically shown as significant variables in explaining stock prices and stock changes. Frankel and Lee (1998) explore relationships between share prices and accounting variables using data from 20 countries including US and Japan.

They use current earnings, current book value and earnings forecasts to see the value relevance of accounting information including dependent variable as share prices. The explanatory power of the model is high, 88% for US and 72 for other countries combined. They find that all the variables significantly relate with the market price .

Studies Related to P/E Model

P/E proportion relates the company's stock price to its current profits. P/E coefficient is a function of company's beta, growth rate, and payout ratio. Many studies have been carried out to determine whether high P/E coefficient is better than a lower one or not. For instance, the studies in this area show that lower coefficient of stock would do better than the higher ones in some countries. For example, according to Basu's (1977), Dreman (1998), Lakoishok et al (1994) the lower one would lead to anomalous positive return for the owner, while the higher one would result in abnormal negative return. Goodman and Peavey (1983) proved this result experimentally.

Studies Related to P/B Model

Many stock pricing models are developed based on price-book value ratio for each stock. According to Gordon's discount model (1934), Damodaran (1994) introduced P/B coefficient as a function of equity-capital ratio, payout ratio, growth rate and company's beta. To test this model, Damodaran (1994) used the data regarding 1987 to 1991; and obtained quite good explanatory power for each year from 1987 to 1991 for his model. The lower R^2 as 84percent is related to 1988 and the highest R^2 as 88.5 percent belong to 1989 and 1990, also the regression coefficients were obtained as expected.

Studies Related to Capital Asset Pricing Model (CAPM)

Lakonishok and Shapira(1984) find an insignificant relation between beta and returns. Further Lakonishok and Shapiro find a significant relation between returns and market capitalization values. From this he concludes that individual security return is not related to its systematic risk. In summary Reinganum finds the relationship between beta and cross sectional returns to vary across subperiods. Tinic and west finds the relationship between beta and returns to vary with months in a year.

Lakonishok and Shapiro finds the relationship between beta and returns to be weaker than the relationship between returns and other variables. By taking all these results SLB Model provides an inadequate explanation for the risk return behavior observed in capital market

Studies Related to Dividend Discount Model

Financial theory states that the value of a stock is the worth all of the future cash flows expected to be generated by the firm discounted by an appropriate risk-adjusted rate. We can use dividends as a measure of the cash flows returned to the shareholder. Gordon growth model is best suited for firms growing at a rate comparable to or lower than the nominal growth in the economy and which have well established dividend payout policies that they intend to continue into the future. **Tobias Olweny (2011)** conducted the study in Nairobi stock exchange to establish the reliability of the dividend discount model (which is based on the discounted cash flow techniques) on the valuation of common stocks. Study concluded that the dividend discount model was not reliable in the valuation of common stocks at the Nairobi Stock Exchange. **Thomas H. Payne (1999)** paper demonstrates that the valuation measure derived from using the DDM is very sensitive to the relationship between the required return on investment (Ks) and the assumed growth rate (g) in earnings and dividends.

Studies Related to Excess Return Model

In excess return model, the value of a firm can be written as the sum of capital invested currently in the firm and the present value of excess returns that the firm expects to make in the future. Given the difficulty associated with defining total capital in a bank, it makes far more sense to focus on just equity when using an excess return model to value a financial service firm. The value of equity in a firm can be written as the sum of the equity invested in a firm's current investments and the expected excess returns to equity investors from these and future investments.

Value of Equity = Equity Capital invested currently + Present Value of Expected Excess Returns to Equity investors
The excess returns, defined in equity terms, can be stated in terms of the return on equity and the cost of equity. Excess Equity return = (Return on equity – Cost of equity) (Equity capital invested).

Aswath Damodharan from Stern University conducted the study in February 2009, on Goldman Sachs, perhaps the best-regarded investment bank in the world, was trading at a market capitalization for equity of \$48.7 billion, well below its book value of equity of \$60.6 billion. A significant factor underlying the stock price collapse was the decline in profitability at the firm, which reported \$2,322 million in net income in 2008, well below the \$11,599 million it reported as profits in the previous year. Goldman paid out \$850 million in dividends during 2008. To value Goldman Sachs, we begin with the current cost of equity. Using the average beta of 1.50, reported by investment banks in 2008, in conjunction with a treasury bond rate of 3% and an equity risk premium of 6%, yields a cost of equity of 12% for the firm and using this model he estimated the intrinsic Value Per Share = \$125.29 as when February 2009, Goldman Sachs was trading at \$ 96.45 per share. Here he proved that excess return model can also be considered as a reliable model for valuing bank stocks in US stock market .

In general, accounting research supports the superiority of the EBO model in estimating a firm's intrinsic value, at least for U.S. firms. Frankel and Lee (1999) use the EBO model to estimate fundamental firm equity value (V), then evaluate the model's ability to explain stock prices (P) of U.S. sample firms. Francis et al. (2000) find that valuation errors from the EBO model are smaller than those from the DD and other models, and the EBO model is better able to explain variation in current prices than the other models.

Section III: Objectives of the Study

1. To know the theoretical framework for the valuation of bank stocks.
2. To determine the explanatory predictive power of equity valuation models for bank stocks.
3. To determine and empirically test the fundamental variables role in a collection of selected models of bank stock evaluation in Indian stock market.

Research Methodology

i. Data

The sample period for the study extends from March 2000-01 to March 2010-11 for the 14 bank stocks included in BSE Bankex. 14 bank stocks including private sector banks and public sector banks taken for the study purpose.

Data required was collected in the form of secondary data on fundamental variables from March 2001- March 2010 taken from CMIE Prowess database for the analysis purposes.

Secondary data was used in the study. The following fundamental variables were collected:

1. Market prices of the stock.
2. Annual earnings per share
3. Annual Book value per share
4. Beta of Stock.
5. Annual growth rate in EPS.
6. Dividend payout ratio
7. Yearly Return on equity.
8. Risk free rate
9. Market returns.
10. Yearly DPS.
11. Book value of equity.

ii. Methodology

In this research linear regression models have been used to determine the explanatory power of each valuation model. The purpose of the study is to present some valuation models applicable to the Indian banking sector and test which model explains the largest proportion of the cross-sectional variation in equity values. Tests include the estimation of linear regressions with dependent variable the bank stock price and several components of financial statements as the independent variables. For comparing the explanatory power of research models in valuing the stock of companies listed on Indian stock exchange, we use adjusted R-square of the models.

In another expression, we can show that which valuation models, results are closer to real stock prices. To do so, different regression models must be tested. In this section, first the significance of impacts of independent variables on the dependent variable and determining R^2 in each model will be regarded and in the second place the relative importance of each independent variable will be discussed.

The integrity of regression assumptions can be determined by considering residuals distribution and its relationships with other variables. Residuals include the difference between the observed values of a dependent variable and the predicted values by regression line. The assumptions of these models should be regarded. In regression analysis considering linearity, normality, stability of variance and independence of observations is of vital importance. In this research, these assumptions were considered, but not mentioned here for brevity.

Since in this research we intend to review 6 valuation models

- a, EBO Model
- b, P/E Model
- c, P/B Model
- d, CAPM
- e, Dividend discount Model
- f, Excess return Model.

Hypotheses for each model were considered separately. Significance impacts of independent variables of the model on its dependent variable is expressed in the hypothesis (Table 2)

Table 2: Relation between Dependent Variable and Independent Variable

Model	EBO	P/E	P/B	CAPM	DDM	Excess return Model (ER)	
Dependant variable	Market price	Market price	Market price	Market price	Market price	Market price	
Independent variables	BVPS	*	-	*	-	-	
	EPS	*	*		*		
	Beta	-	*	*	*	*	
	EPS GROWTH	-	*	*	-	*	
	ROE	-	-	*	-	-	
	Rf	-	-	-	*	*	
	Rm	-	-	-	*	*	
	DPR	-	-	-	-	*	
	BVof Equity	-	-	-	-	-	*
	PV of ER	-	-	-	-	-	*
	O/S Shares No	-	-	-	-	-	*

Symbol * means that we expect a significant relation between the independent and dependent variable

Section IV Empirical Results on Valuation Models

Basic EBO Model

Dependent variable of the model is the market price of each stock (P), and its two independent variables are earning per share (E) and book value of each stock (BV). Therefore Two hypotheses about meaningfulness and relationship between independent and dependent variables have been tested.

Table 3: Stock Valuation Prediction(EBO – Ohlson Model)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.772 ^a	.597	.590	219.140	.597	93.896	2	127	.000	1.012

a. Predictors: (Constant), BVPS, EPS

b. Dependent Variable: MP

The estimation output of the EBO model (Bt) shows that the model has a very high explanatory power ($R^2 = 0.590$ on average). This suggests that current book value per share and earnings per share are the important variables in explaining the market equity values of bank stocks. The results in table 3 indicates that the regression model for the time horizon are statistically significant at 1% which is indicated by the F statistics. Adjusted r^2 of .590 Indicates that regressed factors are able to explain 59.0 % of the variation in the dependant variable (share price) of this model.

This result is, also, highlighted when the model consists of the components of current book value per share since it has higher explanatory power (adjusted $R^2=0.6014$ on average) as compared to EPS with (adjusted $R^2= .5176$).

The R^2 (0.6014) indicates that BVPS is able to explain 60.14 % of variation in the dependant variable.

The explanatory power of earnings for stock price is analysed by calculating the coefficient of determination and R^2 of this EPS Model indicates that regressed factor is able to explain 51.76 % of the variation in the dependant variable (Share price). Nevertheless the average value of adjusted R^2 suggests that *EPS* alone explains a relatively small proportion of the total variation of equity values. Thus, profit and loss accounting numbers individually do not provide sufficient explanatory power for equity valuation of bank stocks. But, collectively, earnings and book value offer the best value relevance for bank stock valuation. The Durbin Watson value gives a value of 1.012, so auto correlation does not cause significant problems in the interpretation of results also.

P/E Model

This model has 3 independent variables as Beta, EPS growth rate and EPS when the market price is taken as the dependent variable.

Thus, 3 related and positive hypothesis were formulated that showed the relationship between independent variables and dependent variable (Market price). Relative importance of three independent variables such EPS growth rate, Beta and EPS were studied using P/E Model.

Table 4. Stock Valuation Prediction using P/E Model

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	Change	df1	df2	Sig. F Change	
1	.743 ^a	.552	.541	231.861	.552	51.732	3	126	.000	1.226

a. Predictors: (Constant), EPS GRO, BETA, EPS

b. Dependent Variable: MP

Relative importance of three independent variables such growth rate, Beta and EPS for the study is .8 percent, 1.7 percent and 47.8 percent respectively. R^2 for P/E model given as .541 indicates that regressed factors are able to explain 54.1 % of the variation in the dependant variable (Share price) respectively.

This tells that Historical P/E (and hence EPS as a value driver) is one of the best approach for equity valuation of bank stocks in the Indian context.

P/B Model

This model has 4 independent variables including beta, equity capital return ratio, growth rate and BVPS. Thus, in every year 4 hypotheses were formulated that showed positive relationship between independent variables and market price of share. Fourth hypotheses were accepted at significant level of 5 percent.

R^2 of the model in mentioned years was also 60.8 percent respectively for bank stocks in India compared with R^2 of Damodaran's research which was estimated around 84 percent. The empirical results indicate that book value per share is the most important variables in the valuation of Indian bank stocks, since they have significant coefficients for all the 10 accounting years taken for the study purpose.

Table 5. Stock Valuation Prediction using P/B Model

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.788 ^a	.620	.608	214.311	.620	51.035	4	125	.000	1.163

a. Predictors: (Constant), BVPS, EPS GRO, BETA, ROE

b. Dependent Variable: MP

The importance of the relevant P/B ratios in investment decisions must be placed in this wider context for public and private sector banks in BSE Bankex. The analysis made extensive reference to the P/B ratio as a superior relative valuation multiple, enables an investor to keep track of how the market is valuing a bank stock when compared to its actual book value. The Durbin Watson value gives a value of 1.163 tells that auto correlation does not cause significant problems in the interpretation of results for P/B Model. The results in table 5 indicates that the regression model for the time horizon are statistically significant at 1% which is indicated by the F statistics.

CAPM

Dependent variable of this model is the market price of share derived from expected return calculated using CAPM, and the independent variables are Beta and stock market returns. Since this model has two independent variables, so two hypothesis was tested for this model.

Table 6. Stock Valuation Prediction using CAPM

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F	df1	df2	Sig. F Change	
1	.181 ^a	.033	.017	339.337	.033	2.141	2	127	.122	.953

a. Predictors: (Constant), rm, Beta

b. Dependent Variable: Market price

Here the CAPM's true predictive power is questionable. When realized returns are compared to what the CAPM would have expected, we find that the model is often incorrect. This model tells that beta and market return does not have significant relation with market price of bank stocks. We find that CAPM models achieved an R² measure of only about 0.017. While this is relatively low R² value is one of the main reasons for CAPM is outdated from stock market. In addition, many researchers believe that other risk factors have significant impact on expected returns in the market. These critiques are in many ways interrelated; improvements in any one of these areas are bound to have an effect on others. Because the predictive and explanatory power of the CAPM is bound by the structure of the model, it is the assumption of a single risk factor which has spurred much recent academic research into security price analysis. It is obvious that there are a myriad of risk factors facing banks today. Some of these factors are market risk, currency risk, Credit risk, Interest rate risk etc.; and given that the CAPM uses a single factor to describe aggregate risk, it seems logical that a model including more sub-factors might provide a more descriptive and predictive model.

Dividend Discount Model

The dividend discount model assumes that the only cash flows obtained when holding equity are represented by dividends. To value the stock, the expected future dividends are discounted by an appropriate discount rate that can vary during the holding period. These discount rates can be adjusted for possible risks involving the payout of the dividends.

The traditional model, as described above, was first altered by Gordon (1962) to account for a constant growth in future dividends. He posed that both the growth rate of the dividends (and earnings) should be taken as a constant stable growth rate. Because of this assumption, dividends could be forecasted into infinity. This model, the Gordon growth model, therefore, does not account for any flexibility in growth rates. This model taken independent variables as EPS, DPR, R_f, Beta, R_m, EPS Growth rate and Market price as dependent variable.

Table 7. Stock Valuation Prediction using Dividend Discount Model

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.751 ^a	.564	.547	230.475	.564	32.118	5	124	.000	1.119

a. Predictors: (Constant), EPSGROWTH, Beta, r_m, EPS, DPR

b. Dependent Variable: Market price

Even though the predictive power of dividend discount model is high, we can understand that the dividend discount model cannot be relied in the valuation of their bank stocks at the BSE. The results are attributed to among other factors, the inefficient market (BSE), inappropriate discounting factors, information differentials and measurement and evaluation problems. Dividend discount model works only for bank stocks with consistent Dividend Yield record in the past.

Excess Return Model

According to this model, value of a bank stock can be written as the sum of capital invested currently in the firm and the present value of excess returns that the firm expects to make in the future. This model has 3 independent variables including book value of equity, present value of excess returns and number of equity shares outstanding and dependant variable as market price also.

Table 8. Stock Valuation Prediction using Excess Return Model

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					RSquare Change	F Change	df1	df2	Sig. F Change	
1	.737 ^a	.543	.532	254.643	.543	49.912	3	126	.000	1.075

a. Predictors: (Constant), NOOF SHARES, PV OF EXCESS RETURN, EQUITY CAPITAL INVESTED

b. Dependent Variable: Market price

The output of the regression with independent variables as beginning-of-year book value of equity invested , abnormal income and no of outstanding shares supports the above results . The results show that the combined abnormal model has 53.2 percent explanatory power . However, the coefficients of both book value and abnormal earnings are significant in all years. As for the magnitude of the coefficients, the results are the same as for the excess return models. The weight on abnormal earnings increases while that on book value slightly decreases over time. Both coefficients are statistically significant in the regressions also.

Comparison of the Models

As mentioned above, the value of adjusted R² statistic is used for comparison among valuation models. Based on this so-called coefficient of determination, one can first notice that the EBO Model that contain the components of book value per share and earnings per share give higher adjusted R², even when the results of the regressions are taken into account.

By comparing all the valuation models we can reach the conclusion that the basic EBO Model which captures the spirit of clean surplus relation is the most appropriate model for equity valuation. In particular, the EBO models with the highest average values of R^2 (0.59 on average) are the models which combine earnings ($EBITDA_t$) with balance sheet components (Book value per share), irrespective of whether these items are taken from period t or $t-1$. The EBO model, PE Model and PB Model outperforms the CAPM model for the bank stocks in Indian Stock market.

Thus, despite the different extent of compliance with the clean surplus assumption of the sample markets, the EBO model & PB Model outperforms the other models in explanatory power in the banking sector.

Section V Summary and Conclusion

The empirical tests that are applied to equity valuation for Banks in the examined banking sector are based on the following models: a) EBO Model b) CAPM c) P/E Model d) P/B Model e) Dividend Discount Model f) Excess Return valuation model which captures the spirit of the value relevance of fundamental accounting factors. Six alternative equity valuation models are introduced and tested empirically, using the estimation method on a sample of 14 Indian bank stocks included in BSE Bankex. These tests include the estimation of linear regressions with the various banks market price as the dependent variable and various components taken from the financial statements as independent variables. Overall, the results of the empirical analysis indicate that the linear accounting-based valuation model (EBO Model) that incorporates both stock and flow components, provides greater explanatory power and thus better captures the different aspects of equity values of bank stocks in the Indian banking sector. The paper's findings are generally consistent with the empirical evidence of prior studies concerning the Feltham and Ohlson (1995) valuation model suggesting that the combined model is more informative than models based only on assets or earnings. Therefore, with the use of this valuation model, fundamental analysis can identify mispriced securities and thus yield abnormal returns.

The study also made extensive reference to the P/B ratio as a superior relative valuation multiple, enables an investor to keep track of how the market is valuing a bank stock when compared to its actual book value.

Higher explanatory power of EBO Model and P/B Model tells that Book value per share is the most relevant variable influencing bank stock prices in BSE Bankex. Tests also provide evidence against the CAPM and findings of CAPM Model are not supportive of the theory's basic statement that higher risk (beta) is associated with higher levels of return. Study also proven that CAPM's true explanatory power for bank stocks is questionable in the Indian stock market. Dividend discount model also cannot be relied in the valuation of their bank stocks at the BSE Bankex due to inappropriate discounting factors, information differentials and measurement and evaluation problems.

We conclude that EBO model and Relative valuation models (P/B Model, P/E Model) outperforms other valuation models for bank stocks in Indian stock market.

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