# An Empirical Study on Value-Based Performance Measures, Stakeholder Satisfaction and Stock Prices

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## Abstract

This paper examines the effects of three different types of performance measurements on the Dow Jones Industrial, Transportation, and Utilities company stock prices: traditional accounting based measures, value-added measures, and nonfinancial based measures. The accounting based measures are return on equity and return on assets; the value-added measures are market value-added and economic value-added; the nonfinancial measures are proxies of sales, times-interest-earned, and taxes representing customer and bondholder satisfaction, and government and society.

Using cross-sectional data and regression analysis, the results indicate that all performance measures have the expected relationship with prices. Return on equity has a strong and positive effect on share values. Consumer satisfaction, measured by sales volume, also showed a strong relationship with stock prices. However, the significance of the relationship between bondholder satisfactions measured by the times- interest-earned ratio and prices varied from positive to negative and was insignificant. The effect of taxes paid by corporations as proxy for the government as a stakeholder and corporate social responsibilities on share values was mostly insignificant. Overall, the results show that stock price maximization as the primary goal of a firm may lead to the satisfaction of stockholders and consumers. However the relationship between price maximization strategy and bondholders and society satisfaction require further investigations.

## Introduction

The objectives of this study are twofold. First, we examine which financial and value-based measures have the strongest effect on share values so that they can be targeted to improve a firm's performance. Second, we test whether stakeholder satisfaction with a firm's performance leads to higher stock prices. Stakeholders include any party affected by a firm's actions; the ones we consider in our study include shareholders, bondholders, customers, the government and society. The premise is that the integration of performance measures reflecting the satisfaction of these stakeholders is incorporated in the stock price, creating value for the stakeholders.

Value-added measures add value over a period of time when a firm has generated a profit in excess of a firm's true cost of capital. Proponents of value-added measures believe that

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such measures show whether shareholder wealth is being created or destroyed, and they are more in alignment with shareholder satisfaction than traditional accounting measures. Because value-added measures explicitly consider a cost of capital in the valuation process.

To test which financial ratios and value-based measures should firms target to improve their performances, we first investigate the relationship between stock prices and return on equity (ROE), return on total assets (ROA), market value added (MVA), and economic value added (EVA) for all firms in the Dow Jones Industrial, Transportation, and Utilities Indexed for the period 1980-2005. The second objective of this study is to test the relationship between stakeholder satisfaction and share values. It is assumed that return on equity, time-interest-earned ratios, sales, and the amount of taxes paid by corporations as proxies for stockholders, bondholders, consumers, and the government and society's approval of the firms' performances, respectively. In addition, the individual firm's exposure to market risk that may have an adverse effect on maximizing share values, measured by a company's beta risk, is also tested.

The literature review, methodology, data and empirical results, and conclusion follow.

**Literature Review**

An early attempt to estimate the share values using financial variables was made by Williams (1938), who introduced the dividend discount model. Miller and Modigliani (1961) argued that a firm's value is determined only by its basic earning power and its business risk. The value of the firm depends on the income produced by its assets, not on how this income is split between dividends and retained earnings. Gordon (1962) argued that a firm's value will be maximized by setting a high dividend payout ratio (Bird-in-the-Hand Theory). Graham, Dodd, and Cottle (1962) proposed that a firm's estimated earnings is the most important factor in determining stock prices. Fama (1965) argued that stock price performance resembled a random walk; in a later study (1970), he introduced the theory of the Efficient Markets Hypothesis, challenging the validity of intrinsic valuation models and the use of historical and public information in estimating stock prices. Lee, Myers, and Swaminathan (1999) compared alternative estimates of the share value for 30 stocks in the Dow Jones Industrial Index for the period 1963-1996 and found that traditional valuation methods using multiplier techniques have little predictive power.

Pitman (2003) describes his experience at British bank Lloyds from 1983 to 2001, indicating that the best long-term measure of company performance is one that creates greater value for shareholders. He maintains that using a single governing objective, generating shareholder value, was the key to satisfying other stakeholders, such as employees and customers. In a study on the relationship between stock prices and financial data, Rahgozar (2006) showed that dividend and stock prices have positive relationships and that the dividend irrelevance theory does not hold.

The belief that the best measures for maximizing shareholder wealth were traditional accounting measures such as growth in annual earnings per share and increases in return on equity was held for many years. Recently, however, the argument has been made that linkage of these conventional accounting measures is not apparent with the value of the company's shares. Earnings do not include risk assessments nor the cost of additional capital invested to finance growth.

Several studies have discussed the use of EVA and other value-based measures; Ittner and Larcker (2001) and Sprinkle (2003), with mixed empirical evidence as to the success of these measures. Stern Stewart & Co., who introduced EVA, have claimed its benefits (1994). Biddle, Bowen, and Wallace (1997) found earnings outperformed EVA in predicting stock price. Recently, Griffith (2006) found that firms using EVA to forecast stock performance would have suffered losses; Ferguson, Rentzler, and Yu (2005) found minimal correlation between EVA and stock values; Kyriazis and Anastassis (2007), found EVA useful as a performance evaluation tool, but not it being correlated with shareholders' value than other financial variables.

Beside the financial factors stated above, studies have shown the influence of nonfinancial variables on share values. Eccles et al. (2001) and others (Maines, Bartov, Fairfield, Hirst, et. al., (2002), Pitman, (2003)) have noted that more firms are using nonfinancial performance measures to evaluate firm performance at a variety of levels. Using customer satisfaction indices published by Fortune magazine, Ittner and Larcker (1998a) found that abnormal returns existed surrounding the stock returns following the release of these measures, and later they studied the relationship of nonfinancial measures on stock performance (1998b). Banker et al. (2000) studied the relationship between current nonfinancial measures and future financial variables, testing the predictive power of customer satisfaction measures. They found that customer complaints and returning customers indicated future revenue and profit for the hotel industry. Using regression analysis, Hirschey, Richardson, and Scholz (2001) studied the direct contemporaneous link between the nonfinancial measures of patent quality to research and development expense and market share value and found a positive correlation for both. Said, HassabElnaby, and Wier (2003) found that firms that employed a combination of financial and nonfinancial measures had significantly higher levels on return on assets and market returns.

Major financial stakeholders of a firm are generally considered to be the firm's stockholders and debtholders; however, a third financial stakeholder can be considered to be the government, through the collection of taxes. Using taxes as a proxy for social responsibility of corporations follows a rich body of research on the relationship of corporate social responsibility and firm performance, with mixed results on agreement of measures and results. Waddock and Graves (1997), Harrison and Freeman (1999), McWilliams and Siegel (2000). Hillman and Keim (2001) for instance, found that social issue participation, referring to use of corporate resources for social issues, such as avoidance of nuclear energy, negatively impacted shareholder wealth.

**Methodology**

To investigate significance of the relationship between each financial ratio and value-based indicators and share value, the following regression models is tested:

$$P = a_0 + a_1 X_i + \varepsilon \quad (1)$$

where,

$X_i$ = Represent either ROE, ROA, MVA, and/or EVA
P = Stock Prices
ROE = Return on Equity
ROA = Return on Total Assets
MVA = Market Value Added
EVA = Economic Value Added

To examine the relationship between proxies of stakeholder satisfactions and share values the following multiple regressions is tested.

$$P = a_0 + a_1 ROE + a_2 TIE + a_3 S + a_4 T + a_5 \beta + \varepsilon \quad (2)$$

Where,

TIE = Time-Interest-Earned Ratio
S = Sales
T = Taxes Paid
$\beta$ = Measure of Market Risk

ROE, sales, and time-interest-earned ratios are assumed to proxy the stockholder, consumer, and bondholder satisfaction in firm performance. The social responsibilities of firms is measured by the amount of taxes paid by corporations, and the market risk that individual firms are exposed to and may have an adverse effect on share values is measured by the company's beta ( $\beta$ ). It is anticipated that the variables ROE, ROA, MVA, EVA, S, TIE, and $\beta$ will have a positive effect and T to vary from positive to positive.

Variable Calculation:

ROE = Net Income/Total Common Equity
ROA = Net Income/Total Assets
MVA = (Stock Price) x (Common Shares Outstanding) – Total Common Equity ($)
EVA = EBIT (1-T) – Total Capital x WACC
TIE = Time-Interest-Earned Ratio = Operating Income/Interest Charges
EBIT = Operating Income= (Operating Income before Depreciation - Depreciation & Amortization)
T = Marginal Tax Rate = (Pretax Income- Net Income)/ Pretax Income
WACC= After-tax percentage cost of capital is calculated as weighted average cost of debt, preferred stock, and equity using the following formula:

$$WACC = w_d k_d (1-T) + w_p k_p + w_e k_e$$

Where, $W_d$, $W_p$, $W_e$ are the weights used for debt, preferred, and common equity.

| | | |
|---|---|---|
| $W_d$ | = | Long-term total debt/total assets |
| $W_p$ | = | Preferred stock carrying value/total assets |
| $W_e$ | = | Common equity/total assets |
| $K_d$ | = | Before tax component cost of debt=interest expenses/ (debt in current liabilities plus long-term debt) |
| $K_p$ | = | Component cost of preferred stock = preferred stock dividends/preferred stock carrying value |
| $K_e$ | = | Component cost of equity = $D_1/P_0 + G$ and $K_e = R_f + (R_m - R_f)\,\beta i$ |
| $D_1$ | = | Expected dividend |
| $P_0$ | = | Current stock price |
| $R_f$ | = | 3 - month t-bill rate |
| $R_m$ | = | Market return, measured as return on S&P 500 |
| G | = | Earning growth rate, retention rate time return on equity |
| $\beta$ | = | Measure of market risk, covariance between stock and market returns divided by variance of market return |

It is expected that changes in ROE, ROA, sales, TIE, and tax payments as measurements of stakeholders' views on firm performances to increase share values. Stockholders normally evaluate ROE when making their investment decisions. Satisfied customers, by their repeat and increased purchases, raise company sales and profit which, in turn, leads to higher share values. Of course, increases in sales may occur due to the introduction of new products, services, and/or by mergers and takeover activities. Regardless of sources of sale increase, any increase in sales could show consumer/public satisfaction for firm performance leading price increases. Bondholders also have strong interests in the financial health and performance of the firms. Higher financial risk would suggest higher potential for bankruptcy and risk to bondholders. The time-interest-earned ratio (TIE) is assumed to proxy for financial risk; a higher TIE ratio would indicate the ability of the firm to pay interest on debt and thus a more protections on the creditor's position. The social responsibilities of the firms and the outlook of a third financial stakeholder, the government, are measured by the amount of taxes paid. On the one hand, higher tax payment could present a firm as a socially responsible company that thus enhances its image and share values. On the other hand, higher taxes reduce net income to the shareholders due to double taxation and thus could have an adverse effect on share values. The net effect of taxes on share values needs to be tested statistically.

Other value-based financial indicators such as market value added (MVA) and economic value added (EVA) may also improve corporate value. MVA shows the present value of all expected future value added to the firm. EVA is a measure of operating performance that indicates how successful a firm has been at increasing the market value of a company in any given period. EVA can be thought of as the incremental contribution of a firm's operations to

the creation of MVA. MVA is the present value of all expected future EVA. EVA provides a good measure of the extent to which the firm operates in a manner that is consistent with maximizing shareholder value.

**Data and Empirical Results**

The data are obtained from the COMPUSTAT database. The sample includes data for all firms in the Dow Jones Industrial, Transportation, and Utility Averages for the period 1980.1-2005.1. Data are first used to calculate the financial series that are considered relevant to this study.

The quarterly series for each firm are then are averaged to calculate the profitability indicators (ROE & ROA), value-based measures (MVA & EVA) plus the TIE, sales, and taxes paid. The beta ( $\beta$ ) for each firm is estimated by dividing the covariance between returns in stock and the S&P500 by the variance of the market (S&P500). Missing values are replaced by the average values of the data services.

**Unit Roots and Cointegration Tests**

The Augmented Dickey-Fuller (1979) and Phillips-Perron (1988) tests are employed to investigate the stochastic behavior of the variables included in the regressions. Unit root results (not reported here) reveal that all variables but sales (S) and taxes (T) are integrated of order one and are nonstationary (variables S and T are stationary). Differencing the time series to create stationary in regression analysis is a normal practice, but many researchers have argued that such differencing may result in a loss of information about the long-run relationships between variables (Sims, (1980)). Stock and Watson (1988) have indicated that if time series are co-integrated of the same order, an ordinary least square (OLS) regression yields a "super-consistent" estimator for the co-integrating parameters without differencing. The Johansen cointegration (1995) approach is applied to test whether the data series used in this study are cointegrated of the same order and can be included in the same regression. The test results confirm that (though not reported here) at least one cointegrated equation at the 0.05 level between variable P and the rest of the variables except MVA exist. Such results imply that all integrated variables with the same order can be included in the same regression models without differencing the data. However, to include variables P and MVA in the regression analysis, they both need to be differenced to create stationary series.

We begin our analysis with a brief look at the estimated variables and descriptive statistics on the Dow Jones 30 (DJ30), Transportation 20 (DJ 20), and Utility 15 (DJ15) stocks. Table I presents descriptive statistics on DJ30, DJ20, DJ15, and on DJ65. The DJ65 series is constructed by pulling data from the other three indexes. Table II summarizes the regression results using stock prices of DJ65 companies as the dependent variable and the ROE, ROA, MVA, and EVA as independent variables. The test results reveal which variable has the furthermost influence on the share values. Table III includes the Ordinary Least Squares

regressions results using stock prices as the dependent variable and ROE, TIE, Sales (S), Taxes (T), and beta( $\beta$ ) measure of market risk as exogenous variables.

As was expected and shown in Table I, stock prices of the utility companies are less volatile than the industrial and transportation firms. The volatility measured by the standard deviation (SD) and coefficient of variation (CV) for DJ15 are $5.538 and 0.187 while they are $15.15 and 0.257 for DJ30, and $13 and 0.346 for the DJ20, respectively. The market risk measured by the average beta is lower for DJ15 than DJ30, DJ20, and DJ65. They are 0.823, 1.57, 1.121, and 1.303 respectively. The DJ30, DJ20, and DJ65 share values have the highest correlation coefficient with MVA than the remaining variables appearing in Table I.

An analysis of regressions (1) through (4) appearing in Table II suggests that all value-based performance measures have a significant relationship with the stock prices at the 5 percent significance level. The R-squares of the regressions vary across different equations from 18 percent to 79 percent with regression (3) having the highest R-square. The estimated results imply that among the four independent variables, the MVA is the most important performance indicator. The MVA shows the present value of all expected future value added to the firm.

The results of simple regressions (1) through (4) appearing in Table III, reveal that all proxies of stakeholders' approval of firms' performances have the expected signs. The return on equity (ROE) in equation (1) has a strong positive effect on share values at 5 percent significant level. The reaming variables time-interest-earned ratio, sales, and taxes as shown in regressions (2), (3), and (4) have strong and positive effect on stock prices indicating that stakeholders satisfaction lead to price improvements. Regression (5) tests the effect of market risk on share value. The estimated result implies that higher market risk and share values have a positive relationship. Regression (6) includes all variables into the test. Although all variables have the expected signs their significance levels diminishes. Elimination of insignificant variables from the regression (6) and addition of performance measures EVA and TIE yielded the best results that are presented in equation (7). The time-interest-earned ratio which proxies the bondholder satisfaction with firm performance has a strong significant effect on share values.

Historical experience indicates that when the stock market undergoes changes, prices of most individual securities also change, thus a declining market tends to push individual stock prices down, whereas the reverse occurs in a rising market. Also, higher taxes signify lower net income to the share holders; this could unfavorably impact share value. Normally, a higher TIE ratio indicates lower financial risk and thus has a positive effect on prices. The regressions (2) and (7) show the strong and positive effect of TIE on share values. In general, lower interest expenses and/or higher operating incomes lead to higher TIE ratios that improve firm's financial status. However, due to the high market interest rates, firms may decide to lower debt financing and consequently its interest expense. According to the Trade-off theory in finance, a firm's stock price will be maximized if it uses virtually 100 percent

debt. Thus, reduction of interest costs due to any decline in debt financing could improve the stock prices.

Overall, the cross-sectional regression results on D65 indicate that all profitability ratios and value-based performance measures have a significant relationship with stock prices. All variables used to measure stakeholder satisfaction showed a strong effect on prices. As performance measure the EVA had the best results. The results indicate because of the strong relationship between ROE, EVA, TIE, Sales, and Taxes and stock prices any improvement in share values will satisfy all stakeholders of the firm.

**Conclusion**

This paper studies first the relationship between several performance measures with stock prices. Using cross-section data combining information from DJ30, DJ20, and DJ15 to form DJ65 we find that the market-value-added variable has the strongest relationship with stock prices. This finding implies that targeting any of the profitability ratios (ROE & ROA) and value-based performance measures (EVA & MVA) will yield a higher corporate value. We also examine the relationship between stock price and stakeholders' satisfaction measured using some proxies. We find that stockholder interests in firm performance measured by ROE to have a significant and positive estimated coefficient with stock prices. The bondholders' satisfaction measured by TIE, consumer satisfaction measured by the increases in sales, corporate social responsibilities measured by the amount of taxes paid all showed a positive relationship with share values. Although a higher TIE ratio means better liquidity and more protection for creditorsk, higher market interest rates may imply that companies with higher debt could face higher interest expenses which, in turn, lead to a higher cost of capital that lower net income and cause prices to decline. Moreover, the higher interest costs increase a firm's financial risk at the potential displeasure of debt holders. Consumer satisfaction, as measured by sales, has a positive and significant relationship with the prices, indicating that stock price maxinization makes firms' customers satisfied with its performance. The test results show the corporate social responsibility, measured by the amount of taxes paid, and share values move in the same direction meaning that price maximization and corporate social responsibilities are correlated. Overall, the results show that stock price maximization as the primary goal of a firm may lead to the stakeholder satisfaction.

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Table I.
Descriptive Statistics on Dow Jones Industrial, Transportation, Utility, and Composite Indexes Over 19801- 2005.1

| Variables | Price | ROE | ROA | MVA | EVA | TIE | Sales | Tax | $\beta$ (beta) |
|---|---|---|---|---|---|---|---|---|---|
| **DJ30** | | | | | | | | | |
| Correlation | 1.00 | 0.29 | 0.24 | 0.85 | 0.28 | -0.13 | -0.01 | 0.19 | 0.08 |
| Mean | 58.83 | 4.65 | 1.89 | 42.55 | 0.95 | 21.82 | 8562 | 345.52 | 1.57 |
| SD | 15.15 | 2.01 | 1.24 | 15.67 | 0.99 | 33.27 | 8046 | 273.85 | 0.69 |
| CV | 0.257 | 0.43 | 0.65 | 0.37 | 1.04 | 1.53 | 0.94 | 0.79 | 0.44 |
| **DJ20** | | | | | | | | | |
| Correlation | 1 | 0.33 | 0.11 | 0.64 | 0.33 | 0.37 | 0.76 | 0.78 | 0.32 |
| Mean | 37.56 | 1.04 | 1.09 | 19.82 | 1.04 | 17.78 | 1213.02 | 33.273 | 1.121 |
| SD | 13.00 | 9.05 | 0.97 | 11.83 | 1.05 | 39.59 | 1183.24 | 46.06 | 0.84 |
| CV | 0.346 | 8.67 | 0.88 | 0.59 | 1.00 | 2.23 | 0.97 | 1.38 | 0.75 |
| **DJ15** | | | | | | | | | |
| Correlation | 1 | 0.09 | 0.03 | 0.46 | 0.05 | 0.26 | 0.16 | 0.52 | 0.04 |
| Mean | 29.59 | 2.48 | 0.68 | 10.27 | 0.025 | 2.889 | 1629.35 | 63.69 | 0.823 |
| SD | 5.538 | 1.23 | 0.32 | 5.638 | 0.724 | 1.095 | 573.96 | 44.53 | 0.363 |
| CV | 0.187 | 0.49 | 0.47 | 0.55 | 28.96 | 0.38 | 0.35 | 0.69 | 0.44 |
| **DJ65** | | | | | | | | | |
| Correlation | 1 | 0.33 | 0.42 | 0.89 | 0.43 | 0.19 | 0.40 | 0.54 | 0.40 |
| Mean | 45.53 | 3.04 | 1.32 | 28.11 | 0.62 | 16.00 | 4698.87 | 184.47 | 1.303 |
| SD | 17.98 | 5.39 | 1.10 | 18.80 | 1.00 | 31.81 | 6544.98 | 240.31 | 0.676 |
| CV | 0.385 | 1.77 | 0.83 | 0.67 | 1.61 | 1.99 | 1.39 | 1.30 | 0.52 |

Note: Price is the average price of all DJ30, 20, 15, and 65 third quarter stock prices, ROE is return on equity, ROA is return on assets, MVA and EVA are market and economic value-added, TIE is time-interest-earned ratio, Tax is the average tax paid, and $\beta$ represents the market risk.

Table II.

Regression Results on the DJ65 Showing the Stakeholder Satisfaction from Firm Performances. The Dependent Variable is "Stock Price." The Independent Variables Are ROE, ROA, MVE, and EVA.

$$P = a_0 + a_1 X_i + \varepsilon$$

| | Independent Variables | | | | | |
|---|---|---|---|---|---|---|
| **Regression No** | Intercept | ROE | ROA | MVA | EVA | $R^2$ |
| (1) | 42.11612 | 1.124644 | ____ | ____ | ____ | 0.113 |
| | (17.29) | (2.84) | | | | |
| (2) | 36.39644 | ____ | 6.900855 | ____ | ____ | 0.179 |
| | (11.39) | | (3.71) | | | |
| (3) | 21.51274 | ____ | ____ | 0.854606 | ____ | 0.799 |
| | (11.80) | | | (15.82) | | |
| (4) | 38.19112 | ____ | ____ | ____ | 7.014106 | 0.181 |
| | (13.09) | | | | (2.82) | |

Note: Note: Price is the average of the third quarter stock prices of each firm in DJ30, DJ20, and DJ15 aggregated to form DJ65. ROE is return on equity, ROA is return on total assets, MVA is the market-value-added, and EVA is the economic value added. Missing data for variable T and TIE were replaced by median of the data set and for beta by mean of the data set; t-statistics are in the parentheses.

Table III.

Regression Results on the DJ65 Showing the Stakeholder Satisfaction from Firm Performances. The Dependent Variable is "Stock Price." The Independent Variables Are ROE, TIE, S, T, and $\beta$.

$$P = a_0 + a_1 ROE + a_2 TIE + a_3 S + a_4 T + a_5 \beta + \varepsilon$$

| | Independent Variables | | | | | | |
|---|---|---|---|---|---|---|---|
| **Regression No** | Intercept | ROE | TIE | S | T | β | $R^2$ |
| (1) | 42.11612 | 1.124644 | ----- | ----- | ----- | ----- | 0.113 |
| | (17.29) | (2.84) | | | | | |
| (2) | 35.24417 | ----- | 1.354078 | ----- | ----- | ----- | 0.326 |
| | (13.44) | | (5.52) | | | | |
| (3) | 40.37535 | ----- | ----- | 0.001099 | ----- | ------ | 0.160 |
| | (15.87) | | | (3.46) | | | |
| (4) | 38.15258 | ----- | ----- | ----- | 0.007963 | ----- | 0.286 |
| | (15.89) | | | | (5.02) | | |
| (5) | 34.27517 | ----- | ----- | ----- | ----- | 9.583365 | 0.128 |
| | (6.83) | | | | | (2.80) | |
| (6) | 24.84266 | 3.111881 | 0.013890 | 0.000611 | 0.007183 | 4.390593 | 0.388 |
| | (4.52) | (1.82) | (0.16) | (1.36) | (0.44) | (1.05) | |

$$P = a_0 + a_1 EVA + a_2 TIE + \varepsilon$$

| | | | | |
|---|---|---|---|---|
| (7) | 29.01785 | 6.543400 | 1.645375 | $R^2$ =0.523 |
| | (10.05) | (3.41) | (5.07) | |

Note: Price is the average of the third quarter stock prices of each firm in DJ30, DJ20, and DJ15 aggregated to form DJ65. ROE is return on equity, TIE is time-interest-earned ratio, S is sales, T is Taxes paid, and β represents the market risk. Missing data for variable T and TIE were replaced by median of the data set and for beta by mean of the data set; t-statistics are in the parentheses.