An Empirical Analysis of the Value Line Earnings Predictability Index

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Abstract

The earnings of some companies are easier to analyze and predict than others. Because earnings predictability affects stock prices, investors and researchers have relied on a variety of indexes, such as the Value Line Earnings Predictability Index (VLPI), to gauge ex ante differences in predictability. This study empirically analyzes the performance of VLPI versus several other indexes. Rank correlations with subsequent earnings forecast errors are used to measure index performance. Interestingly, the results indicate that VLPI performs as well as a corresponding index based on past forecasting accuracy.

Introduction

Recognizing the importance of corporate earnings, investors and researchers use various indexes to gauge inter-firm differences in ex ante earnings predictability. This study examines the ability of the *Value Line* Earnings Predictability Index (VLPI) to rank companies, ex ante, on the basis of earnings forecast accuracy. The ability to gauge inter-firm differences in earnings predictability is important to investors because earnings uncertainty affects stock prices and market reactions to earnings (Pincus, 1983; Arnott, 1985; Imhoff and Lobo, 1992). Also, the formulation of risk in terms of inability to predict earnings is in keeping with the postulates of subjective risk assessment (Elton and Gruber, 1972, p. 8). In this vein, Fraser and Kannan (1989) used earnings forecast accuracy to evaluate changes in risk levels in the banking industry, and Moses (1990) used earnings forecast accuracy to help predict bankruptcies. Researchers have also used earnings predictability indexes to control for cross-sectional differences in earnings predictability (e.g., Imhoff and Pare, 1982; Pincus, 1983; Wolfe and Flores, 1990; Butler and Lang, 1991; Yeh, 1990).

Numerous studies have shown that stock prices are affected by earnings information. Reflecting this, Graham, Dodd, and Cottle (1962, p. 28) point out that the most important factor determining a stock's value is predicted earnings power (i.e., estimated earnings for a future span of years). Grieves and Singleton (1987) note that America's top financial analysts emphasize the prediction of corporate earnings.

To accomplish the objectives of this study, VLPI, which is based on past earnings variability, is compared to (1) PRFE, an index based on the prior year's forecast error, (2) AVFE, an index based on an average of past forecasting accuracy, and (3) BETA, an index based on market beta which has served in some studies as a proxy for earnings predictability (e.g., Yeh, 1990). Correlations indicate that VLPI approximates the performance of PRFE and AVFE. In addition, the results indicate that VLPI generally outperforms BETA.

Research Design

VLPI and the competing indexes were compared in terms of their correlations with subsequent forecast accuracy. To accomplish this, distribution-free (Spearman) rank-order correlations were computed for each index. Unlike parametric (Pearson) product-moment correlations, which measure the linear association between variables, rank correlations express the degree of association between *orderings* of variables. Because rank correlations consider magnitudes for ranking purposes only, these correlations are not affected by scale differences.

In effect, then, each competing index is viewed as an ordering of firms based on a firm-specific variable believed to be correlated with earnings predictability. Computationally, for a sample of n firms, each firm can be ranked twice so that the ith firm has an X-rank of x_i and a Y-rank of y_i. The Spearman rank correlation coefficient is defined as follows:

$$r_s = 1 - [6 \Sigma d_i^2 / N(N^2 - 1)] \quad (2)$$

where
r_s = rank correlation coefficient (Spearman),
d_i = x - y for firm i, and
N = number of firms.

In essence, the Spearman rank-order correlation is the Pearson product-moment correlation applied to rankings (Hollander and Wolf, 1973, p. 192).

Value Line forecasts of annual earnings per share (EPS) were compared to actual EPS to measure earnings predictability. Each forecast was published during the first quarter of the forecast year. Absolute relative forecast error was used to assess the accuracy of each forecast. This metric, which is computed by dividing the annual EPS forecast error by the annual EPS forecast, can be represented as follows:

$$FE = | (FEPS - AEPS)/FEPS | \quad (1)$$

where

FE = forecast error,
FEPS = forecast of EPS, and
AEPS = actual EPS.

EPS forecasts were adjusted for stock dividends and stock splits that occurred between the forecast date and the earnings announcement date. Firms with small denominators (less than |.20|) were excluded and FEs in excess of |3| were set at |3| in order to avoid outlier problems. The results therefore were not driven by extreme observations.

The first index, VLPI, which is based solely on earnings variability, has been published by *Value Line* for many years. This index is derived from five years of earnings data (Pincus, 1983). The method used to determine predictability is based on the volatility of quarterly year-to-year comparisons for each company relative to all *Value Line* companies. First, the percentage change in earnings (i.e., annual growth rate) is computed for each quarter within the five-year time span preceding the forecast period. Next, the standard deviation of these growth rates is computed. Finally, an index ranging from 5 to 100 is constructed from these standard deviations. At this point, each firm is assigned an index number between 5 and 100. Firms with the most unstable (i.e., most variable) income streams are assigned an index number of 5, while firms with the most stable (i.e., least variable) income streams are assigned an index value of 100. VLPI is calibrated in increments of 5. The expected sign of the correlation between earnings variability and EPS forecast errors is positive. However, because high earnings variability is coded by *Value Line* with a low index number and vice versa, a negative sign is expected for the VLPI-FE correlation.

The second and third indexes were derived from previous forecasting performance. These were included because past accuracy can be viewed as a likely indicator of future accuracy. PRFE, the second index, was derived from the prior year's forecast errors. Thus, for example, the forecast error for 1980 (FE80) was used as an index for FE81. For the following year, FE81 became the new (i.e., updated) index, and so forth. AVFE, the fourth index, was also based on past forecasting accuracy. However, it was generated by averaging forecast errors accumulated from all previous years beginning with 1980. Thus, for example, AVFE85 (the index preceding FE86) consisted of the average of forecast errors for the previous six years (FE80-FE85). Because PRFE and AVFE were derived from previous forecasting experience, a positive correlation is expected for each of these indexes.

The fourth index, BETA, consisted of market betas from *Value Line*. BETA, which reflects the effects of operating and financial leverage on security returns, has been linked to earnings predictability (Stewart, 1973; Barefield and Comiskey, 1975; Beaver, Clarke and Wright, 1979; Comiskey, Mulford, and Porter, 1986) and used in a number of studies as a proxy for inter-company differences in EPS forecasting difficulty and earnings riskiness (e.g., Imhoff and Pare, 1982; Collins and Kathari, 1989; Kallapur, 1990; Yeh, 1990). This linkage between BETA and earnings predictability has been noted by the Financial Analysts Federation (Stewart, 1973) Because high betas reflect high uncertainty, a positive sign is expected for the BETA-FE correlation.

Empirical Results

Table 1 provides a summary of EPS forecasting accuracy across years for 185 *Value Line* firms meeting the data requirements for the study. In all, there were 1,110 forecasts (FE81-FE86) for the six-year correlation

Table 1
EPS Forecast Error By Year

Year	FE	Median
1980	FE80	.1333
1981	FE81	.1412
1982	FE82	.2933
1983	FE83	.1412
1984	FE84	.1215
1985	FE85	.2133
1986	FE86	.1088

Table 2
Spearman Rank Correlations by Index

Panel A. VLPI Correlations

Index	FE81	FE82	FE83	FE84	FE85	FE86	Average
VLPI80	-.5153	-.4984	-.4291	-.3460	-.3006	-.2708	-.3934
VLPI81		-.5089	-.4104	-.3745	-.3244	-.2716	-.3780
VLPI82			-.4447	-.4872	-.4026	-.3634	-.4245
VLPI83				-.5550	-.4645	-.4546	-.4914
VLPI84					-.4696	-.4245	-.4470
VLPI85						-.4888	-.4888

Panel B. PRFE Correlations

Index	FE81	FE82	FE83	FE84	FE85	FE86	Average
PRFE80	.4074	.2736	.2075	.1800	.1694	.1128†	.2251
PRFE81		.4994	.3236	.4484	.2818	.3011	.3709
PRFE82			.5767	.5312	.4671	.4612	.5090
PRFE83				.4453	.3999	.4626	.4359
PRFE84					.4036	.4218	.4127
PRFE85						.4385	.4385

Panel C. AVFE Correlations

Index	FE81	FE82	FE83	FE84	FE85	FE86	Average
AVFE80	.4074	.2736	.2075	.1800	.1694	.1128†	.2251
AVFE81		.4761	.3377	.4052	.3101	.2642	.3587
AVFE82			.5320	.5530	.4443	.4205	.4874
AVFE83				.5765	.4961	.4775	.5167
AVFE84					.5139	.5066	.5103
AVFE85						.5236	.5236

Panel D. BETA Correlations

Index	FE81	FE82	FE83	FE84	FE85	FE86	Average
BETA80	.2389	.4059	.2560	.2537	.3033	.2943	.2920
BETA81		.3840	.2483	.2650	.2969	.3068	.3002
BETA82			.1953	.2762	.2995	.2928	.2660
BETA83				.2797	.3081	.2882	.2920
BETA84					.2866	.2639	.2753
BETA85						.1914	.1914

† Significance level = .126 (all others significant at .05 level)

sample (1981-1986), and an additional 185 forecasts (FE80) for the two forecast error indexes (PRFE and AVFE). The two years with the highest forecast errors were 1982 and 1985, with median errors of .2933 and .2133, respectively. The year with the lowest median error was 1986, with a median error of .1088. The sample period thus spans a variety of forecasting experiences. Firm sizes ranged from $51.3 million to $37.1 billion (1981 sales), with medians ranging from $860.5 million (1981 sales) to $80.7 billion (1986 sales). All firms were calendar year firms.

Table 2 presents rank correlations for the 1981-1986 forecast period. The correlation coefficient with the highest explanatory power was .5767 for PRFE82-FE83; the correlation coefficient with the lowest explanatory power was .1128 for PRFE80-FE86 and AVFE80-FE86. The BETA correlations were clustered within a range of .2145 (.1914 to .4059), followed by the VLPI correlations within a range of .2842 (.2708 to .5550).

Table 3 provides a summary of the rank correlations for each fully-updated index (i.e., each index based on most recent information available at the time of each forecast). In effect, this table controls for index age by comparing only the correlations of the indexes that have been fully updated with information available on the forecast date. To prepare Table 3, first-year correlations from Table 2 (located along lower diagonal--beginning with row one, column one) were summarized by index. Table 3 indicates that VLPI had first-year correlations averaging -.4970. PRFE and AVFE had similar first-year correlations averaging .4618 and .5049, respectively. These differences were not statistically significant (Wilcoxon test, α =.10). BETA, however, had significantly lower first-year correlations averaging .2627 (Wilcoxon test, α = .10). In addition, Table 3 (column eight) indicates that VLPI had first-year correlations with a range of .1103 (from -.4447 to -.5550), while AVFE, PRFE, and BETA had ranges of .1691, .1693, and .1926, respectively. This suggests that VLPI correlations are relatively stable across years.

The results also indicate that the performances of VLPI and AVFE were most similar where those indexes were based on estimation periods of similar length. Since AVFE is based on a cumulative average of prior years (from one year, FE81, to six years, FE86), AVFE was most comparable to VLPI where it was based on approximately four to six years of data (from FE84 to FE86). For those comparisons, AVFE performance averaged .5380 (with a range of .0529), while VLPI performance averaged .5045 (with a range of .0854). Reflecting the detrimental effects of using a single-year index versus a multi-year index, the performance of PRFE over the same time span (FE84 to FE86) was only .4291 versus .5380 for AVFE. These differences, however, were not significant (Wilcoxon test, α = .10).

Comparing Table 3 with Table 1, it appears that 1982, the year with the lowest forecast accuracy, did not have an adverse effect on index performance. Indeed, every index performed above its average for that year. Interestingly, the BETA correlation was lowest in 1986, one of the easier years to predict, and highest in 1982. Swings such as these indicate that BETA was not as consistent over time as the other indexes.

Table 4 provides a summary of the impact of index age on performance. By definition, an index becomes outdated if it is not updated with timely information (e.g., new observations to a time series). Therefore, the age of an index is likely to reflect the negative impact of information obsolescence on index performance. To prepare Table 4, correlations from Table 2 were grouped by index age and averaged. Thus, for example, the average rank correlation for VLPI was -.4971 (the average of the six correlations along the lower diagonal of Panel A). For VLPI, PRFE, and AVFE the age of the index had a negative impact on correlations with subsequent earnings predictability (years one through six). VLPI performance declined by 45.5 percent (from -.4971 to -.2708) as the age of the index increased from zero to five years (rows one to six). Corresponding declines for PRFE and AVFE averaged 75.6 percent (from .4618 to .1128) and 77.7 percent (from .5049 to .1128), respectively. For BETA, however, index age did not appear to affect its performance, since its correlation coefficient remained within a relatively narrow range regardless of index age (between .2627 and .3050). The average new index correlation for BETA (located in row one) was similar to the older index correlations (located in rows two through six). Together, the correlation averages presented in Table 4 indicate that BETA provides some ability to rank firms on earnings predictability, but its correlation was not as high as VLPI and the two other indexes.

Table 3
Summary of Rank Correlations for Indexes
Containing Most Timely Information (Fully Updated)

Index	FE81	FE82	FE83	FE84	FE85	FE86	Average	Range
VLPI [-]	-.5153	-.5089	-.4447	-.5550	-.4696	-.4888	-.4970	.1103
PRFE [+]	.4074	.4994	.5767	.4453	.4036	.4385	.4618	.1693
AVFE [+]	.4074	.4761	.5320	.5765	.5139	.5236	.5049	.1691
BETA [+]	.2389	.3840	.1953	.2797	.2866	.1914	.2627	.1926

[ ] indicates expected sign.

Table 4
Impact of Index Age on Performance

Age of Index	Forecasts (#)	Average Rank Correlation VLPI	PRFE	AVFE	BETA
New	FE81-FE86 (6)	-.4971	.4618	.5049	.2627
1 Year	FE82-FE86 (5)	-.4570	.3900	.4334	.3005
2 Years	FE83-FE86 (4)	-.4152	.3964	.3836	.2772
3 Years	FE84-FE86 (3)	-.3446	.3076	.3035	.2811
4 Years	FE85-FE86 (2)	-.2861	.2352	.2168	.3050
5 Years	FE86 (1)	-.2708	.1128	.1128	.2943

Conclusions

The earnings of some corporations are easier to analyze and predict than others. This study was designed to evaluate the ability of VLPI and several other indexes to rank companies on the basis of their earnings predictability in subsequent years. No previous study has provided such evidence even though *Value Line* has provided VLPI for many years. Correlations indicate that VLPI, which is based solely on past earnings variability, performed as well as an index based on past forecasting performance.

Suggestions For Future Research

Given the potential difficulty and additional cost associated with collecting data on past forecasting performance, it appears for a *Value Line* sample that VLPI would be preferable in terms of time and cost to an index constructed from past forecasting performance. The results of this study thus lend support to the practice of using VLPI as an index of earnings predictability (Pincus, 1983; Butler and Lang, 1991; Teets, 1992). In addition, the results suggest that future research designs might extend the application of VLPI. Perhaps, for example, VLPI could be used more extensively to help analyze price-earnings ratios or earnings response coefficients.

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