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A Note on Testing an Aggressive Investment Strategy Using Value Line Ranks

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ONE OF THE BETTER known investment advisory services is the Value Line Investment Survey. An unresolved debate has been in progress in the literature for a decade as to whether the performance of the Value Line Investment Service is inconsistent with the Efficient Market Hypothesis. For example, Black [2] states that the VL system can produce extra returns even when transaction costs are considered, but he does not report his exact test procedure or any quantitative results of his study. On the other hand, Kaplan and Weil [10, 11] do not believe that VL can generate abnormal returns. We shall show in the following sections that the VL system represents a borderline case. When transaction costs are neglected, abnormal returns are obtained. When realistic transaction costs are used, active trading according to VL recommendations does not yield abnormal returns. For a Buy-and-Hold policy, however, VL recommendations do yield abnormal returns, even when transaction costs are considered.

I. One-Year Buy-and-Hold Results

Exactly one hundred stocks are always held in the VL Rank-1 list. A passive investment strategy would accept the 100 Rank-1 stocks at the beginning of each calendar year, hold the portfolio unchanged for one year, and then adjust the portfolio to the 100 Rank-1 stocks at the beginning of the next year.

Value Line has described the returns obtained from such VL B-H portfolios, compared to the returns from all 1700 stocks watched by Value Line (i.e. Market B-H). No transaction costs were applied, and dividends were not included (Value Line [20, p. 867]). It is reported that the VL B-H portfolios outperformed Market B-H in every year from 1965 to 1978 with a single exception (1970). The probability of this happening by chance is 0.00085. However, in two other years (1975 and 1976) the Value Line Contribution (VLC) is very small. Even if we count these two years also as failures, the probability of obtaining the VL results by chance is only 0.0286. The return over the 14-year period is 350 percent, which equals an average annual return of 11.3 percent.

The VL results were independently checked using the CRSP Monthly Master tape (Fisher and Lorie [6]) for the four years of this study (1974-77). Since not all VL stocks are carried on the CRSP tapes, there were only 86-90 stocks in our portfolios. Allowing for differences in the population of stocks, and for the

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Table I
Value Line B-H Yields Compared with Our Work

Year	1974	1975	1976	1977
VL "100"				
VL Table	-23.1	51.6	35.3	15.8
Our work	-19.9	56.7	43.3	17.7
Market				
VL Table	-29.6	51.2	35.1	5.8
Our work	-25.5	58.3	43.4	8.5
VL "100" minus Market				
VL Table	6.5	0.4	0.2	10.0
Our work	5.6	-1.6	-0.1	9.6

Source of VL data: *Value Line Selection and Opinion*, 19 January 1979, p. 867.

inclusion of dividends in our work¹, our agreement with VL is excellent: The four years 1974–1977 were the years for which we happened to have VL data, and hence can be considered a random selection from all fourteen VL years. In view of this and the Table I agreement, it is reasonable to accept the entire 14-year Value Line table.

The VL results (which neglected dividends) can be converted to include transaction costs independently for each of the fourteen years by the relation

$$1 + R(tc) = (1 + R)(1 - c)/(1 + c)$$

where

- $R(tc)$ is the one-year buy-and-hold return,
including transaction costs;
- R is the one-year buy-and-hold return,
excluding transaction costs; and
- c is transaction costs, expressed as a fraction
of the transaction amount.

Applying the above relationship, it was found that the VL B-H portfolios outperformed Market B-H in the presence of transaction costs as they did without transaction costs. The Buy-and-Hold probability statements already given hold, therefore, in the presence of transaction costs. Transaction cost was 2.0 percent before 1 May 1975 and 1.25 percent thereafter. Transaction cost is always stated on a one-way basis. The annual abnormal return was found to be 8.6 percent over the years 1965–1978.

The above analysis is conservative as it assumes that an investor would sell out his entire portfolio and rebuy every year. At the end of 1974, 1975, and 1976, sixteen, five, and six stocks respectively, were carried into the new year. Allowing for not selling and rebuying these stocks would raise the 4-year yield from 111.7 percent to 114.8 percent.

¹ Actual dollar amounts of dividends were credited to the portfolio for stocks held on the ex-dividend date. Overall, this amounted to about 4.5 percent annually.

II. Active Trading Results

A. Introduction

Value Line states that their active trading strategy has outperformed the market in each of the fourteen consecutive years (1965–1978) their present system has been in effect (Value Line [20, p. 866]). The probability of this happening by chance is 0.000061. No transaction costs are applied, and dividends are not included.

The claims are indeed striking, and show that if a portfolio were updated weekly to consist always of the 100 Rank-1 stocks, over the 14-year period it would have earned a 1081 percent return. The previous algebraic conversion to bring in the effect of transaction costs is not possible here because active trading requires the factor $(1 - c)/(1 + c)$ to be compounded in a complicated manner, depending on timing and on particular stocks traded.

B. Experimental Procedure

Portfolios were created and managed over a year's time, using prices from CRSP Daily tapes, Value Line information, and transaction costs which would have been available to an investor. An original portfolio of 86, 90, 86, and 88 stocks was available at the start of years 1974–1977 respectively, consisting of those stocks ranked “1” by Value Line which were also represented in the CRSP file. The portfolio was examined for each week of an entire year. If any stock dropped in rank, it was sold and replaced by an incoming Rank-1 stock, resulting in a long series of sell-buy-sell operations. Dividends were credited to the portfolio if paid during the time a dividend-paying stock was held, based on the number of shares held.² Transaction costs were not charged against dividends. Stocks which had attained Rank-1 at an earlier date were not considered eligible for purchase, because the question of timing (i.e. acting promptly when a new recommendation appears) may be important. If purchase of a non-CRSP stock was called for, that amount of money was prorated over all other stocks being purchased on that date. After continuing this process for the entire year, a return (unadjusted for risk) was obtained with zero transaction cost. The return was also calculated for a Buy-and-Hold policy, where the original 86–90 stocks were held for the entire year. The increment of active trading over Buy-and-Hold yield was taken as the Value Line Active Trading Contribution (VLATC). The reason for using VL Buy-and-Hold as the bench mark is to take advantage of the “matched pair” technique. The use of matched pairs is a well known statistical technique to control extraneous variance [12, p. 310], [3, p. 17].

In another phase of the work, the population of Rank-1 stocks was divided into five subportfolios, each containing 17–19 stocks. Each of the subportfolios was the basis for an independent study. The reasons for considering subportfolios are twofold: (1) the procedure is more representative of what is available to the “average” investor; and (2) the procedure permits another statistical test of the significance of our results. (The various statistical tests are outlined in a later

² Actual dollar amounts of dividends were credited to the portfolio for stocks held on the ex-dividend date.

section). The average return from five subportfolios should not be expected to duplicate the return from the single large portfolio. Active trading produces a complicated geometric series involving both different stocks and different holding times, and the sum of several geometric series is not identical to the geometric series of the sum of the components.

C. Experimental Results

The procedure was carried out for calendar years 1974 through 1977. The portfolio standard deviations from the Buy-and-Hold results shown in Column 7 of Table II apply to the B-H results in Column 5 and were assumed to apply to the VL Active Trading results in Column 4. The standard deviation of VLATC (Column 6) was calculated assuming no covariance between Columns 4 and 5, and is given in Column 8. These assumptions seem mild, and the outcome is in agreement with that from a different statistical approach, discussed below. The Returns Gains (VLATC in Column 6) are point estimates, and can be declared significant if their magnitude is greater than two standard deviations above zero (Mendenhall and Scheaffer [16, p. 274]). From Column 9 we see that at zero transaction costs, the VLATC is significant for three of the four years studied. The lower half of Table II shows that when reasonable transaction costs are used, the VLATC can no longer be declared significant.

Table II
Returns from Active Trading

Year (1)	No. of Stocks in Port- folio (2)	One- Way Trans- action Costs, % (3)	Return, %			Std. Dev.		No. of Std. Devs. for VLATC (9)
			Active Trad- ing (4)	B-H (5)	Gain VLATC (6)	Port- folio (7)	Gain (8)	
1974	86	0	-2.66	-20.29	17.63	3.56	5.03	3.5
1975	90	0	73.77	50.90	22.87	5.10	7.21	3.2
1976	86	0	54.34	40.78	13.56	4.06	5.74	2.4
1977	88	0	20.32	13.93	6.39	2.71	3.83	1.7
1974	86	2.00	-16.96	-23.35	6.40	3.42	4.84	1.3
1975	90	1.25 ^a	55.84	46.16	9.68	4.97	7.03	1.4
1976	86	1.25	40.96	37.35	3.61	3.96	5.60	0.6
1977	88	1.25	11.08	11.16	-0.08	2.64	3.73	—

^a Transaction cost was 2.0 percent before 1 May 1975 and 1.25 percent thereafter.

The B-H results above adhere to the initial and final dates for active trading in each year as required by VL publication dates. They thus differ somewhat from Table I, which begins with 2 January and ends with 31 December in each year.

As already noted, the year-by-year analysis is conservative. Adjusting for not selling and rebuying stocks at the end of years 1974, 1975, and 1976 would increase the number of standard deviations in the lower half of Column 9 to 1.6, 2.0, 1.2, and 0.3, so that 1975 just achieves significance, while the other years remain insignificant.

Table III
Returns from Active Trading According to Value Line Ranks
(Subportfolios, Sell-Rank-Rule = 2)

Year	No. of Stocks in Port- folio	% Return without Transaction Costs				% Return with Transaction Costs			
		Trans- action Costs, %	Active Trad- ing	B-H	Gain (VLATC)	Trans- action Costs, %	Active Trading	B-H	Gain (VLATC)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1974	18	0	-0.91	-23.10	22.19	2.00	-16.26	-26.05	9.79
	18		-13.30	-14.43	1.13		-27.00	-17.72	-9.28
	17		-2.41	-35.77	33.36		-16.67	-38.23	21.56
	17		-5.83	-21.39	15.56		-19.53	-24.41	4.88
	17		-6.29	-6.94	0.65		-8.62	-10.53	1.91
1975	19	0	87.76	74.66	13.10	1.25 ^a	70.74	69.17	1.57
	19		62.49	40.01	22.48		45.51	35.63	9.88
	18		35.92	46.78	-10.86		20.94	42.18	-21.24
	18		90.45	49.09	41.40		70.77	44.37	26.40
	18		53.34	43.26	10.08		36.53	38.76	-2.23
1976	18	0	43.31	51.04	-7.73	1.25	29.54	47.37	-17.83
	18		65.24	46.30	18.94		51.30	42.73	8.57
	17		42.33	33.80	8.53		29.21	30.54	-1.33
	17		60.42	38.44	21.98		46.41	35.06	11.35
	17		37.31	33.40	3.91		25.84	30.16	-4.32
1977	18	0	12.95	12.03	0.92	1.25	3.10	6.65	-3.55
	18		24.53	16.41	8.12		15.28	10.81	4.47
	18		4.92	14.21	-9.29		-2.53	8.72	-11.25
	18		22.95	11.79	11.16		13.85	6.42	7.43
	18		18.37	15.23	3.14		10.27	9.66	0.61

^a Transaction cost was 2.0 percent before 1 May 1975 and 1.25 percent thereafter. Transaction cost is always stated on a one-way basis.

To permit a completely different statistical approach, the procedure was also carried out with the stocks divided into five subportfolios in each year. The data in Table III are abstracted from the full set of runs made. There are five subportfolios for each of four years: a total of 20 subportfolios. At zero transaction cost, 17 of the 20 (Column 6) show a positive Value Line Active Trading Contribution. The probability of 17 or more positive results occurring by chance is 0.00129. At zero transaction cost, the VLATC is, therefore, significant.

Using reasonable transaction costs, however, only 12 of the 20 subportfolios show a positive VLATC (Column 10). The probability of 12 or more positive VLATCs occurring by chance is 0.2517, hence we conclude that the VLATC is not significant in the presence of reasonable transaction costs.

In summary, our study indicates that when transaction costs are not considered, active trading according to VL rank information yields abnormal returns, in agreement with VL claims. However, in the presence of realistic transaction costs (2.0 percent before 1 May 1975 and 1.25 percent thereafter) the VLATC cannot be shown to be significant. The percentage transaction cost quoted is applied both "in" (when a security is purchased) and "out" (when a security is sold).

III. The Effect of Beta

In our work, there are two complicating factors in attempting the analysis of residuals from the Sharpe-Lintner Capital Asset Pricing Model, as was done by Jaffe [8] and by Mandelker [15]. This technique is aimed at removing the effect of risk as a confounding variable.

First, for each year, the Beta of the VL portfolio remains rather constant over the year, and regressions involving Beta as an explanatory variable would not be reliable. Second, each member of Jaffe's portfolio contains an "event" (an insider transaction), as does each member of Mandelker's portfolio (a merger). By contrast, only two to four members out of the 90 stocks in our VL weekly portfolios contain an "event" (they are bought or sold).

In view of these considerations, it was deemed reasonable to investigate the effect of Beta by the pragmatic procedures to be described.

Buy-and-Hold

A previous section has shown that VL Rank-1 Buy-and-Hold appears to outperform, with statistical significance, the VL Market Buy-and-Hold portfolios. To determine if this result could be explained by VL having chosen stocks with particular risk characteristics, the portfolios for each year were divided into three equal-size subportfolios containing respectively, low Beta, medium Beta, and high Beta stocks. In the work to be reported, Beta was calculated³ from monthly returns over the period 1974–1977. The results when using reasonable transaction costs are given in Table IV.

For the falling market of 1974, returns decrease with increasing Beta, both for the Market and for the VL portfolios, as would be predicted. For 1975, 1976, and 1977, years of rising markets, returns increase with increasing Beta both for the Market and for the VL portfolios, again as would be predicted. There are discrepancies in 1976 and 1977 for VL, which could be accounted for by the large variation associated with portfolios containing only about 30 stocks. However, the quantity of interest is the Value Line Contribution (VLC). There is no consistent trend of VLC with Beta, whether or not the question of rising versus falling markets is considered.

Active Trading

Tables II and III have shown that VLATC is significant (except for 1977) if transaction costs are neglected, but that VLATC is not significant in the presence of transaction costs.

To clarify any possible effect of Beta, the work was extended by dividing the stock into three subportfolios, containing respectively, low Beta, medium Beta, and high Beta. The results are shown in Table V for reasonable transaction costs. VLATC shows no consistent trend with Beta.

³ Beta was calculated for each stock from CRSP Monthly tapes over the entire 4-year period (1974–1977), using monthly stock returns and monthly market returns, including dividends in both cases.

Table IV
Buy-and-Hold Returns according to Risk Level
(Including Reasonable Transaction Costs)

	1974		1975		1976		1977	
	N	Return	N	Return	N	Return	N	Return
Low Beta								
Market	546	-13.32	417	29.82	783	31.14	891	3.23
VL	27	-2.17	29	27.88	28	28.86	29	13.34
VLC		11.15		-1.94		-2.28		10.11
Medium Beta								
Market	436	-28.09	464	56.65	383	47.27	291	8.10
VL	29	-23.44	30	47.21	29	50.51	29	13.19
VLC		4.65		-9.44		3.24		5.09
High Beta								
Market	496	-44.66	596	70.20	313	52.84	300	11.79
VL	30	-41.36	31	81.87	29	39.55	30	17.96
VLC		3.30		11.67		-12.89		6.17
All Betas								
Market	1482	-28.89	1477	54.51	1476	39.89	1482	8.53
VL	86	-23.01	90	52.92	86	39.77	88	17.23
VLC		5.28		-1.59		-0.12		8.70
Maximum Beta in Low Beta Group		0.785		0.705		0.935		1.005
Minimum Beta in High Beta Group		1.096		1.005		1.285		1.305

VLC is Value Line Contribution (= VL Buy-and-Hold minus Market Buy-and-Hold).

N is Number of Stocks in Portfolio.

One-way transaction costs are 2.00 percent before 1 May 1975 and 1.25 percent thereafter.

In conclusion, we have not been able to find any suggestion either that VL has used Beta to improve their techniques, or that Beta could be used by VL with benefit.

Beta Distribution

The distribution of Betas in the VL stocks for each of the years 1974–1977 is presented in Table VI. Note that there is no difference in the distribution for 1974 (a falling market) and 1975–1977 (rising markets). If there were, it would imply that VL was able to predict the direction of the market. It seems self-evident on those grounds alone that the explanation of the VL “anomaly” does not have to do with VLs choice of stocks from particular Beta groups.

IV. Conclusion

We have demonstrated that VL does indeed have the ability to choose “good” stocks, when transaction costs are not considered. This is shown both for active trading and for Buy-and-Hold portfolios.

Table V
Value Line Active Trading Contribution (VLATC) According to Risk Level

	1974		1975		1976		1977	
	N	Return	N	Return	N	Return	N	Return
Low Beta								
Active	27	6.04	30	49.34	29	23.73	31	11.11
VL B-H		-6.51		26.16		26.89		12.88
VLATC		12.54		23.18		-3.16		-1.77
Medium Beta								
Active	29	-28.93	30	61.26	29	47.21	29	10.07
VL B-H		-25.41		40.23		47.70		9.42
VLATC		-3.53		21.02		-0.50		0.65
High Beta								
Active	31	-23.24	32	66.46	29	46.35	30	14.67
VL B-H		-36.10		70.47		37.47		11.06
VLATC		12.86		-4.01		8.89		3.61
Maximum Beta in Low Beta Group		0.785		0.705		0.935		1.005
Minimum Beta in High Beta Group		1.096		1.005		1.285		1.305

N is Number of Stocks in Portfolio.

One-way transaction costs are 2.00 percent before 1 May 1975 and 1.25 percent thereafter.

Table VI
Distribution of Betas

	1974	1975	1976	1977
Total Number	421	365	380	345
Median	1.14	1.10	1.15	1.10
Average	1.18	1.11	1.14	1.16
Standard Deviation	0.30	0.24	0.25	0.26
Maximum	2.14	1.85	1.85	2.15
Minimum	0.16	0.45	0.60	0.55

For active trading, the abnormal returns gained from following VL recommendations are consumed by transaction costs, so that a real-life trader should not expect to reap "economic profits." However, a passive investor would benefit, since for VL Buy-and-Hold portfolios, abnormal returns amounting to about 8.6 percent per year is indicated, even after transaction costs are considered.

The effect of risk was studied by dividing the VL stocks into three portfolios consisting of high Beta, medium Beta, and low Beta stocks. There was no indication that the VL results were explainable by a failure to adjust for risk.

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