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INSTITUTIONAL INVESTMENT ACROSS MARKET ANOMALIES

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Abstract

If a small firm effect exists, one would expect to see a trend towards proportionately greater investment in small firms. Among the most sensitive investors would be institutional investors who are constantly seeking to maximize their portfolio's rankings. This study examines changes in institutional investments on the basis of firm size, price/earnings ratios and Timeliness rankings. Institutional investors, in general, were found to have increased their interest in low price/earnings ratio firms and those with timely rankings, but not small firms. The study of decision making by institutional investment is becoming increasingly important as direct equity ownership declines.

INTRODUCTION

According to a recent *Wall Street Journal* article [7], the stock market will soon mark a historic moment: It will officially become dominated by pension funds, mutual funds and other large institutions, rather than mom-and-pop investors. On that day institutions will hold more than 50% of U.S. stocks. In 1991 alone, households bought $14 billion less than they sold. An estimated seventy-five to eighty percent of daily trading is by institutions. The importance of institutional investors leads to questions concerning the basis of their selection decisions. Timely questions include, what is driving the modeling used in writing investment programs? Are institutional investors taking any cues from the finance literature?

For example, empirical finance literature has persistently reported observations of a small firm effect. In an early and widely-publicized article, Banz [1] reported that small firms enjoyed a significant, positive excess returns over the 1926-1981 period. Sinquefield [9] found a 4.5 percent excess rate of return on firms in the two smallest deciles of size over the 1970-1989 period. Articles in the Special Winter 1991 edition of the *Journal of Financial and Strategic Decisions* reported that the firm size effect is most significant during bull stock markets [5] and that the size effect also exists for Canadian stocks [3].

If a small firm effect exists, one would expect to see institutional investment in small firms growing at a rate in excess of that for the stock market overall. Even in the absence of a theoretical explanation for the anomalous performance of stocks issued by small firms, professional money mangers may react to the published findings supporting investment in firms with a small capitalization. One outcome is the development of several "small-cap" funds, which are included on the *Mutual Funds Quotations* page in the *Wall Street Journal*. Such data, however, does not manifest the percentage of small firms that are now in the hand of mutual funds. The response of other institutional investors (i.e., pension funds, insurance companies, universities) to the anomaly literature is unreported. This report documents the distribution of institutional investors across levels of firm size.

Prediction of institutional investor reaction to the published anomaly reports is not as simple as one might expect. Lacking a theoretical basis for the excess, risk-adjusted returns of small firms, institutional investors may not be placing emphasis on such issues. Several institutional investors may decrease small firm investment in the belief that small firm effect notoriety has artificially increased small firm prices.

In addition to the firm size effect, a test was also conducted measuring the relationship between institutional investment and two other popularly reported anomalies. Krueger and Johnson [4] found that stocks issued by firms

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with low price/earnings ratios earned a higher return than firms with high price/earnings ratios after adjusting for risk and transactions costs. These authors also report that investors selecting stocks which Value Line, Inc., considers to be timely investments would have earned an excess rate of return after adjusting for risk and transactions costs. Descriptions of these anomalies may be found in many investments texts [8] available to institutional managers. The following sections present the research method and findings arising from an examination of institutional ownership trends for these widely-reported anomalies.

RESEARCH METHOD

Institutional investment observations were gathered at the beginning of 1975, 1980, 1985, and 1990 for firms included in the Value Line Investment Survey over this period. The number of institutional investors and shares held were obtained from February's *Standard & Poor's Stock Guide* in each of these years. Six hundred and thirty firms are in the sample.

Firm size was estimated by multiplying the end of January share price by the number of shares outstanding in January as reported in February's *Standard & Poor's Stock Guide*. Although one might expect a narrowing of the size range across deciles, the relative size of small-decile firms versus large-decile firms was stable across the four observations. The mean firm size of the small firm decile in 1990, $61 million, was a small fraction of the mean firm size of the large firm decile, $22,376 million.

Earnings/Price ratios were calculated by dividing earnings reported in *Standard & Poor's* by share price. This ratio was used instead of the popularly reported price/earnings ratio to compensate for the occurrence of negative earnings. Timeliness Rankings were obtained from the *Value Line Investment Survey*.

Firms were grouped into deciles based on firm size and earnings/price ratios without regard to the other independent variables. Except for the rare case of equal firm values at the separation points, the normal decline contained 63 firms.

The dependent variables in the statistical regression tests were the log of the number of institutional investors and institutional ownership as a percent of outstanding shares. The number of institutional investors variable captures the breadth of institutional interest, while the percent of outstanding shares variable captures the depth of institutional share ownership. Independent variables consisted of deciles of size and E/P, plus the five-level Timeliness Rank classification.

The correlation of size and earnings/price ratios was a low -0.12. The correlation of Timeliness Rankings and size and Timeliness Rankings and E/P ratios was a low 0.06 and -0.08, respectively. Consequently, the findings of institutional interest in one variable was not confounded by that variable's colinearity with one of the two other anomalies.

FINDINGS

Means And Ranges

Firm Size. In each of the years, the absolute number of institutions investing in large firms exceeded the number of investing in small firms. On average, only one percent of the number of institutions investing in large firms in January 1975 were also investing in small firms, as exhibited in the "Number" column under 1975 in Table 1. In 1990, the ratio of average institutional investment had risen to 37 for small firms divided by the large decile's 735, or five percent. In 1975 and 1980 some of the 63 small firms have no institutional investment whatsoever. The minimum number of institutional investors in the small decile rises to 11 by 1990.

In all years, there is a monotonic increase in the number of institutional investors as firm size increases. There also is a monotonic increase in the number of institutional investors within a size decile across years, as one might expect given the increase in the number of institutional investors. Institutional participation existed in all firms only in 1985. In 1975 institutional investment was absent in firms large enough to be in the ninth decile of firm size.

TABLE 1

Institutional Investment Across Firm Size Deciles[a]

Row 1: Average Number Of Institutional Investors And Ownership Percentage
Row 2: Range Of Institutional Investors And Ownership Percentage

Size Decile	1975		1980		1985		1990	
	Num	Prct	Num	Prct	Num	Prct	Num	Prct
Small	4	4	6	6	18	20	37	33
	0-19	0-25	0-24	7-28	3-47	1-54	11-84	3-79
2	9	7	17	11	33	28	63	39
	0-49	0-30	2-237	0-51	11-56	5-73	14-176	2-84
3	15	7	24	16	49	31	94	42
	0-56	0-28	1-69	0-54	17-90	2-77	16-175	7-80
4	19	7	35	18	72	33	127	49
	0-59	0-21	5-75	2-62	12-153	4-68	4-220	12-94
5	33	11	53	20	97	40	170	52
	2-80	0-31	7-114	1-68	6-174	4-78	11-298	12-87
6	46	12	90	23	132	45	180	47
	7-122	1-34	25-778	0-53	36-199	6-72	0-303	0-77
7	69	12	105	23	174	48	267	54
	12-152	1-28	2-212	1-44	18-269	8-80	65-377	20-82
8	87	11	139	26	222	47	346	54
	19-241	0-35	4-294	3-45	55-424	9-94	168-484	17-81
9	123	13	181	28	304	50	448	56
	0-320	0-30	16-367	2-66	120-501	11-92	7-740	1-96
Large	334	11	393	29	540	46	735	52
	13-978	1-36	8-1241	1-53	17-1639	0-80	4-1697	1-82
All Firms	74	10	105	20	164	39	247	48
	0-978	0-36	0-1241	0-68	3-1639	0-94	0-1697	0-96

a. Due to matching sizes, observations per cell ranged from 62 to 64 across size deciles. There were 630 obserations per year, resulting in an average cell size of 63 (630 / 10).

Between January 1975 and January 1990, there was a two hundred and thirty-four percent growth in the average number of institutional investors. The number of institutional investors within each decile in 1990 was divided by 3.34 to provide an adjustment for the growth in the number of investors. The results, exhibited in Table 2, indicate that institutional investment decline is limited to the decile of largest firms. In percentage terms, the greatest increase existed in the small-firm deciles. Nonetheless, institutions persistently favored larger corporations.

TABLE 2
Institutional Investment Differences
Adjusted For Industry Growth[a]

	Anomalies					
	Firm Size		E/P Ratio		Timeliness Rank	
Decile	1975 Raw Value	1990 Adjusted Value	1975 Raw Value	1990 Adjusted Value	1975 Raw Value	1990 Adjusted Value
1	4	11	30	75	27	126
2	9	19	33	75	80	88
3	15	28	51	75	77	74
4	19	38	63	66	79	73
5	33	51	56	78	57	40
6	46	54	73	86		
7	69	80	61	102		
8	87	104	101	83		
9	123	134	160	66		
10	334	220	112	32		

a. Common industry size comparisons are created by dividing each decile or Rank's 1990 value by the ratio of the average institution number in 1990 to the average in 1975, 3.34 (247 / 74).

These findings suggest that institutions have been slow to accept or unable to react to literature supporting investment in small firms. Yet, none of the firms in the sample had an outstanding equity value in 1990 less than $15 million. The observed increase in small firm investment may be at least partially explained by the development of "small-cap" funds. Non-participation by over half the market supports the assertion that the small firm return may be a liquidity premium.

E/P ratio. Unlike the absence of a noticeable general effort to invest in small firms, institutional investors appear to be moving their portfolios towards firms with higher earnings/price (E/P) ratios. While the number of institutions investing in high E/P stocks has increased eight-fold, the number of institutions in low E/P stocks has declined, as shown in the first and last data column of Table 3, respectively.

Although held by fewer institutions, on average, institutional ownership of firms with low E/P ratios has risen from 10 to 37 percent. This rate of percentage investment growth is much less than that experienced in the high E/P decile, wherein institutional ownership increased from 6 to 51 percent.

In 1975, one is able to observe firms without institutional investment across the five highest E/P deciles. By 1990, each of the high E/P firms had at least four institutional investors and the percent of shares held by institutions in the two highest E/P deciles exceeding that found in lower deciles.

After adjusting for industry growth, institutional investment in the two highest E/P deciles doubled, as exhibited in the E/P ratios of Table 2. Ownership frequency on an adjusted basis has declined substantially in the three low E/P (high P/E) deciles. Institutions appear to have responded by increasing investment in high E/P (i.e, low P/E) securities. However, the range of average institutional participation across deciles is not as great as that observed for firm size.

TABLE 3
Institutional Investment Across Earnings/Price Ratio Deciles[a]

Row 1: Average Number Of Institutional Investors And Ownership Percentage
Row 2: Range Of Institutional Investors And Ownership Percentage

E/P Decile	1975 Num	1975 Prct	1980 Num	1980 Prct	1985 Num	1985 Prct	1990 Num	1990 Prct
High	30	6	87	18	162	29	250	51
	0-391	0-27	1-687	0-68	4-977	1-76	4-947	1-94
9	33	9	87	19	157	34	250	52
	0-568	0-28	1-604	0-48	9-944	5-77	13-941	11-88
8	51	10	94	20	192	35	249	47
	0-313	0-29	1-492	0-62	9-909	0-69	33-1697	7-96
7	63	9	74	17	172	44	221	44
	0-805	0-30	1-421	0-53	9-622	7-78	11-851	6-84
6	56	9	93	18	175	42	260	46
	0-293	0-22	1-867	1-44	7-737	6-80	37-1236	12-78
5	73	11	140	21	162	41	287	49
	4-344	0-34	1-778	1-45	9-705	4-92	22-1416	2-82
4	61	9	109	21	224	42	343	54
	0-358	7-35	3-769	0-44	5-1639	2-72	4-982	21-87
3	101	11	128	23	170	42	276	49
	1-729	0-36	1-653	0-66	6-843	5-94	7-1087	1-82
2	160	11	126	23	135	38	221	50
	2-978	2-30	4-1241	1-47	6-635	1-80	0-808	0-87
Low	112	10	106	20	91	35	108	37
	0-742	0-28	0-554	0-58	3-454	4-71	12-733	3-80
All Firms	74	10	105	20	164	39	247	48
	0-978	0-36	0-1241	0-68	3-1639	0-94	0-1697	0-96

a. Due to matching sizes, observations per cell ranged from 60 to 68 across size deciles. There were 630 obserations per year.

Timeliness Rankings. According to Fisher Black [2], most investment management organizations would improve performance if they replaced security analysts with the Value Line Service. Although institutional managers are unlikely to replace themselves, they may pay greater attention to those variables Value Line considers to be of importance. The result would be a disproportionate growth of institutional investors among Rank 1 firms.

Rank 1 data exhibited in row 1 of Table 4 indicates that there has been a fifteen-fold increase, from 27 to 422, in the number of institutions investing in securities considered to be prime investment prospects by Value Line. The growth in the number of institutional investors investing in Rank 5 securities has not kept pace with the increase in institutional investors, as shown on the fifth row of Table 2. The minimum number of investors in Rank 1 firms has swelled from 0 in 1975, to 4 in 1980, to 17 in 1985, to 51 in 1990. A higher average percentage of timely Rank 1 stocks were being held in 1990 than any other category. Average percentage ownership was similar across Timeliness Rankings in 1990, with maximum percentage ownerships ranging from 80 to 96 percent. Institutional investors owned at least twenty-one percent of Rank 1 stocks, the highest minimum of all five ranks.

TABLE 4
Institutional Investment Across Timeliness Rankings

Row 1: Average Number Of Institutional Investors And Ownership Percentage
Row 2: Range Of Institutional Investors And Ownership Percentage

	1975			1980			1985			1990		
RANK	**n**	**#**	**%**	**n**	**#**	**%**	**n**	**#**	**%**	**n**	**#**	**%**
1	35	27	8	41	113	22	29	220	43	24	422	56
		0-111	0-26		4-622	2-47		17-1639	7-70		51-1416	21-87
2	116	80	10	106	125	22	124	202	41	114	295	54
		0-232	0-30		0-554	0-53		5-1077	4-80		4-1087	4-88
3	302	77	10	332	106	21	338	161	39	289	248	46
		1-978	0-35		1-867	0-66		4-909	0-92		0-982	0-96
4	141	79	9	128	92	16	109	135	37	126	243	47
		0-742	0-36		1-1241	0-68		7-686	3-94		11-1697	2-82
5	35	57	7	21	38	15	23	91	27	47	132	49
		0-463	0-20		1-150	0-43		3-469	4-71		19-447	8-80

Legend: n = Number of sample firms in each rank
= Number of institutional investors in each rank
%= Percentage of shares held by institutions${C10}

The dramatic institutional investment increase in Rank 1 securities is obvious even after adjustment for industry growth. Timeliness Rank 1 columns of Table 2 show an adjusted increase of almost 100 investing institutions. Either there is a greater correlation between Value Line's selection criteria and that found at other institutions, or institutions are using Timeliness Rankings as one of their selection criteria.

Statistical Significance

Mean data presented above suggest that firms with high E/Ps and Timeliness Ranks of 1, as well as small size to a lesser extent, have become relatively more popular among institutional investors. The range values described above, however, suggest that within each decile or Rank a variety of institutional ownership levels exist. Multiple regression was employed to test for the significance of the relationships between the anomalies and institutional investment and changes in this relationship.

Empirical relationships were first sought between the individual anomalies and institutional ownership within each year. These results are given in Panel A of Tables 5 and 6, respectively, for the number of institutional investors and percentage investment. Next, independent anomaly variables were used in a regression based upon a sample consisting of data from all four years. A year variable was used to control for the general increase in institutional investment over the period. The equation and results are given in Panel B of Tables 5 and 6, respectively. Finally, a four variable model, consisting of the three anomalies and year as independent variables, was applied to the combined sample. The three anomaly model and results are given in Panel C of these tables.

Number of Institutions

Individual Anomalies Within Years. Consideration of each anomaly's regression results can be conducted in three stages. Step one consists of a consideration of the sign and absolute value of independent variable coefficients. Consistent with the mean and range results discussed above, the firm size coefficients located in Panel A of Table 5 are positive and decline only slightly over the four individual observation points. The implication is that institutional investors consistently preferred large to small firms.

The second analytic step is that of reviewing coefficient p-values. These values, given in parentheses, indicate that the firm size variable has a significant relationship with the number of institutional investors variable. Analysis of the coefficient of determination, R^2, indicates that between fifty-six and seventy-three percent of variation in the number of institutional investors may be explained using firm size. The decreased regression coefficient and R^2 values in 1990 implies a small movement away from large firms in 1990.

Following the same three-step process, the E/P coefficient signs switched from negative (i.e., low E/P) to positive (i.e., high E/P), as might be expected given the growth of literature supporting investment in high E/P firms. The relationship between E/P and the number of institutional investors is significant, as manifested by the significant p-values. However, the explanatory power of the E/P variable, its R^2, is much less than that of firm size.

Negative coefficients on the Timeliness Ranking, in Panel A of Table 5, arise when institutional investors favor firms which Value Line, Inc., considered to be timely, Rank 1 versus Rank 5, investments. Persistently significant p-values suggests that Timeliness Rankings can be used to predict the relative level of investing institutions. However, only a small portion of institutional ownership may be explained.

TABLE 5

Regression Analysis: Number Of Institutional Investors
p-Values Given In Parentheses[a]

Panel A: Individual Anomalies Within Years

$$Log(\#Institutional\ Investors_i + 1) = a + b\ (Anomaly\ Class / Rank_i) + e_i$$

	Firm Size			E/P Ratio			Timeliness Rank		
Year	**a**	**b**	**R^2**	**a**	**b**	**R^2**	**a**	**b**	**R^2**
1975	1.298	.421 (.001)	.62	4.068	-.168 (.001)	.11	2.995	.138 (.027)	.01
1980	1.953	.398 (.001)	.68	4.109	-.041 (.023)	.01	4.382	-.149 (.011)	.06
1985	2.909	.396 (.001)	.73	4.410	.043 (.002)	.07	4.998	-.137 (.004)	.07
1990	3.897	.336 (.001)	.56	4.726	.061 (.001)	.07	4.407	-.050 (.074)	.07

Panel B: Individual Anomalies Across Years

$$Log(\#Institutional\ Investors_i + 1) = a + b_1\ (Anomaly\ Class / Rank_i) + b_2\ (Year) + e_i$$

Firm Size				E/P Ratio				Timeliness Rank			
a	b_1 (.001)	b_2 (.001)	R^2	a	b_1 (.032)	b_2 (.001)	R^2	a	b_1 (.160)	b_2 (.001)	R^2

TABLE 5
Regression Analysis: Number Of Institutional Investors
p-Values Given In Parentheses[a]

Panel C: Three Anomaly Model
$$\text{Log}(\#\text{Investors}_i + 1) = a + b_1 (\text{Size Class}_i) + b_2 (\text{E/P Class}_i) + b_3 (\text{Rank}_i) + b_4 (\text{Year}) + e_i$$

a	b_1	b_2	b_3	b_4	R^2
0.351	.376 (.001)	.001 (.284)	-.077 (.001)	.796 (.001)	.79

a. Intercept p-values were significant at the 0.001 level in all cases.

Individual Anomalies Across Years. Panel B reports that the firm size and E/P coefficients were significant for an aggregated sample. Sixty-eight percent of the difference in the number of institutional investors is explained by firm size and year. The positive size coefficient reinforces the finding of a lack of institutional investment in small firms.

The tendency of institutions to prefer stocks with high E/P ratios was also found in the aggregated sample. Nineteen percent of institution frequency is explained by combinations of E/P and year; sixteen percent by Rank and year. Though the sign on the Rank coefficient is negative, indicating an interest in "timely stocks," the larger p-value implies a reduced level of Rank significance.

Combined Anomaly Model. Panel C of Table 5 reports the results for a model consisting of all of the anomalies. In the combined model, E/P was unable to provide a marginal explanation for variances in the number of institutional investors. Its positive coefficient was insignificant, as would be expected given the change in significant coefficient signs during the period. Timeliness Ranking has some effect even though firm size is in the model. The increase in explanatory power may reflect the benefits of a gain in coefficient precision resulting from having all variables in the model. While the number of institutions rose, a significant trend toward investment in small stocks was not found.

Institutional Percentage Ownership

The coefficients of determination found for the percentage of shares owned by institutions, Table 6, are generally smaller than those found when ownership frequency served as the dependent variable. Such a results would be expected, since the maximum ownership percentage would be 1.00, or 100 percent. Most noticeable is the decline in the explanatory power of the firm size variable. The average explanatory power of firm size, R^2, is approximately .19 [(.13 + .28 +.25 +.10) / 4], or one third of that found when institution frequency served as the dependent variable [(.62 + .68 + .73 + .56) / 4 = .65]. Nevertheless, the size coefficient is positive and significant in all models. The implication of this finding is that institutions own a greater percentage of the shares of large firms, but the difference across firm sizes is less dramatic than raw numbers alone would indicate.

There also is a relationship between E/P ratios and percentage ownership. Higher E/P ratios tend to attract institutions. The R^2 column of the E/P set in Table 6, however, documents the limited explanatory power of the E/P ratio. Most striking is the significance of the positive E/P ratio in the three anomaly model, Panel C of Table 6. Comparing this p-value to that found in Panel C of Table 5, suggests that those institutions willing to rely upon E/P related information were willing to invest a greater portion of their wealth in high E/P firms.

Timeliness Rankings were most highly related to percentage ownership in 1980 and 1985. In 1990, there was an erosion of the relationship between Timeliness Rank and percentage ownership. Further research designed to explain this divergence may increase understanding of market anomalies and institutional investment.

TABLE 6

Regression Analysis: Percentage Ownership
p-Values Given In Parentheses[a].

Panel A: Individual Anomalies Within Years

$$Log(Percentage\ Ownership_i + 1) = a + b\ (Anomaly\ Class / Rank_i) + e_i$$

	Firm Size			E/P Ratio			Timeliness Rank		
Year	**a**	**b**	**R^2**	**a**	**b**	**R^2**	**a**	**b**	**R^2**
1975	.047	.008 (.001)	.13	.102	.004 (.001)	.03	.381	-.002 (.897)	.00
1980	.075	.020 (.001)	.28	.192	.004 (.014)	.03	.229	-.019 (.001)	.04
1985	.197	.024 (.001)	.25	.343	.006 (.001)	.04	.362	-.015 (.014)	.03
1990	.321	.020 (.001)	.10	.347	.007 (.008)	.05	.099	-.004 (.196)	.03

Panel B: Individual Anomalies Across Years

$$Log(Percentage\ Ownership_i + 1) = a + b_1\ (Anomaly\ Class / Rank_i) + b_2\ (Year) + e_i$$

Firm Size				E/P Ratio				Timeliness Rank			
a	**b_1**	**b_2**	**R^2**	**a**	**b_1**	**b_2**	**R^2**	**a**	**b_1**	**b_2**	**R^2**
-.123	.018 (.001)	.113 (.001)	.48	-.005	.003 (.001)	.104 (.001)	.39	.009	-.007 (.001)	.102 (.001)	.43

Panel C: Three Anomaly Model

$$Log(Percentage\ Ownership_i + 1) = a + b_1\ (Size_i) + b_2\ (E / P_i) + b_3\ (Rank_i) + b_4\ (Year) + e_i$$

a	**b_1**	**b_2**	**b_3**	**b_4**	**R^2**
-.107	.018 (.001)	.002 (.021)	-.003 (.134)	.114 (.001)	.59

a. Intercept p-values were significant at the 0.001 level in all cases.

SUMMARY

Keeping control of the stock market is eventually going to be a losing battle for individuals. As individuals turn over control of their stock selection, it is increasingly necessary to monitor institutional investor behavior. Furthering Kuhle and Pope's [6] recent performance analysis, the present study focuses on institutional decision-making as it relates to three popular anomalies--firm size, price/earnings ratios, and Value Line's Timeliness Rankings.

Examination of institutional investment in number and percentage ownership terms was able to detect only a slight increase in small firm selection, beyond that arising from growth in the industry. Despite the existence of over 4500 institutions, according to *Standard & Poor's Stock Guide* in 1990, institutional investment in the sixty-three firms in the "small" size decile averaged only 37. If institutional managers believed in the small firm effect, they probably would invest at least a small portion of their portfolio in an manner consistent with the objective of earning the small firm "premium."

Institutions appear to be taking positions in line with expectations consistent with those supported by earnings research. Institutions appear to have converted from investing in low E/P firms with the expectations that price would go higher, to investing in high E/P firms believing them to be undervalued. Coefficients on the E/P ratio have become positive and have generally increased over time. Although there frequently has been a significant relationship between E/P and institutional ownership, E/P's explanatory power is limited.

Value Line's Timeliness Rankings and institutional investment have tended to coincide over time. Greater institutional participation was observed in those equities that Value Line considered to be better investments for the coming twelve months. Further research could examine institutional ownership in relationship to the factors Value Line uses in setting Timeliness Rankings.

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