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The ratio of earnings per share to the price of a common stock, more commonly known at the price-earnings (P/E) ratio, has long been one of the most observed indicators of a stock's value. Once a company's future earnings are forecast, the stock's price is simply determined by applying the P/E ratio to those earnings. Presumably the P/E ratio represents investors' collective opinion regarding a firm's future prospects. In this sense, the more favorable a firm's outlook, the higher the P/E ratio, and therefore the higher the price that investors are willing to pay.

As early as 1949, Benjamin Graham in his The Intelligent Investor contended that investors often overreact to future corporate prospects -- causing the most favorably viewed companies to be overpriced and the least attractively regarded to be underpriced. This disparity manifests in the phenomenon that favorably viewed stocks are attributed P/E's that are too high, while the lackluster stocks receive multiples that are too low.

This study analyzes a special kind of P/E ratio -- one that is normalized to reflect industry considerations -- and its ability to forecast security performance. It is hypothesized that this industry-normalized P/E ratio, which we shall call the price-earnings relative (PER), is an indicator of future security returns. If Graham's early contention is valid, then the lowest P/E's and PER's are presumably over-depressed and should eventually adjust upwards to a more normal level. Such adjustments should lead to higher-than-normal returns. On the other hand, the over-inflated high P/E's and PER's should at some time collapse to lower and more realistic levels, thereby depressing returns from these stocks.

The purpose of this study is to test the significance of the PER as a predictor of investment returns. In order to accomplish this, an attempt is

made to control for the several factors that have been cited as deficiencies in previous P/E-related studies. Before proceeding further, however, we shall first trace the important developments which motivated this research.

Low P/E's and Abnormal Returns

S. Francis Nicholson in an article entitled "Price-Earnings Ratios," which appeared in the July-August 1960 issue of the Financial Analysts Journal, presented the first test of Graham's hypothesis. His study revealed that indeed investors did overreact by attributing lower-than-deserved P/E's to less glamourous stocks; however, he also discovered that the market eventually tended to rectify this overreaction by pushing the multiple back to a more realistic level. The results indicated that in the long run the lowest ratio stocks not only dramatically outperformed the higher P/E stocks, but also significantly "beat the market." Subsequent studies confirmed Nicholson's findings.[1] These studies suggested that investors should adhere to a low P/E investment strategy to achieve abnormal rates of return.

At approximately the same time that these low P/E studies were appearing, another group of researchers were constructing the framework of modern portfolio theory (MPT).[2] At the foundation of this theory is the capital asset pricing model (CAPM) which asserts that in equilibrium, the expected return on any asset equals the risk-free rate plus a risk premium based on the asset's riskiness relative to the market portfolio. The CAPM is expressed as follows:

$$E(R_i) = R_f + \beta_i(R_m - R_f)$$

where $E(R_i)$ = the expected return on asset i;

R_f = the risk-free rate of return;

R_m = the market rate of return;

βi = the risk of asset i relative to the market (the "beta" coefficient).

The beta coefficient is the crucial risk guage, measuring an asset's variability relative to that of the market. Thus, the CAPM implies that a particular asset will generate a higher than market return only if that asset has a higher than market beta (>1.0). Furthermore, MPT claims that the market is efficient -- thus abnormal security returns cannot be obtained after adjusting for risk.

Accordingly, in a world of efficient markets the findings that low P/E stocks generate higher-than-market returns is not surprising if one believes that these low ratio stocks are riskier than the market average. In that event the excess returns generated by low P/E stocks would merely be a deserved risk premium that the investor demands for tolerating greater-than-market risk. But, none of the pioneering low P/E studies incorporated risk considerations into their analyses and therefore their discovery of high returns for low P/E portfolios was not necessarily incompatible with the claims of MPT.

In a later study (1977), S. Basu demonstrated that low P/E portfolios, on average, earned higher-than-market rates of return, even after adjusting for risk.[3] His contention that returns on low multiple stocks are higher than suggested by the underlying risk poses a more serious challenge to the CAPM -- implying that the CAPM may be misspecified or even false.

However, later studies questioned the merit of Basu's findings. These studies contended that abnormal returns may be attributable to some non-P/E consideration(s). One set of studies illustrated that returns generated by small firms' stocks systematically exceeded those indicated by the CAPM.[4] They also detected a significant correlation between P/E and firm size -- the larger the firm, typically the higher the P/E. Since firm size and P/E are

closely related, any abnormal return associated with a low P/E might really be more attributable to the small firm size rather than the low ratio.

Another study by Elroy Dimson delved further into the small firm effect and showed that infrequent trading of a security creates a bias in the security's risk parameter, beta.[5] When infrequent trading exists, positive serial correlation is induced into the calculated returns and the estimated risk (beta) is biased downward. After adjusting for beta bias, abnormal returns no longer existed for infrequently traded securities. Since Basu did not control for either small firm size or infrequent trading, his findings were questioned by advocates of MPT.

Controlling for Non-P/E Bias Sources

This study is designed to determine if, for a sample of common stocks, excess risk-adjusted rates of return can be achieved by acquiring portfolios of low price-earnings ratio stocks, while controlling for the non-P/E-rated factors (small firm size and infrequent trading) that otherwise might account for any abnormal returns. To eliminate the possible bias created by small firm size, the selected sample for this study includes only companies reporting fiscal 1980 net sales exceeding $100 million. Compensation is made for the infrequent trading problem by including in the sample only stocks with an average monthly trading volume exceeding 25,000 shares.

A final control for this study was made to compensate for the impact of possible industry bias in any P/E ranking. Some industries, such as Food, are typified by low P/E ratio securities. Thus any broad grouping of stocks in rank order of P/E ratios would most likely enter proportionately more securities from characteristically low ratio industries into the lowest P/E category, while virtually ignoring stocks from high P/E industries. In this manner, most food company stocks, for example, would tend to cluster in the

lowest P/E groups, whereas most electronics stocks (high P/E's) would be classified into the highest ratio categories. Consequently, any detected return differences among P/E groups might be caused by variances in industry performance rather than the P/E level.

This study compensates for industry bias by introducing the price-earnings relative. The PER is expressed as follows:

$$PER = PE_i/PE_I$$

where PE_i = the price-earnings ratio for security i;

PE_I = the mean price-earnings ratio for the related industry group.

The PER is an index of the P/E ratio of a stock relative to that of its industry. A PER of 1.0, therefore, indicates that the stock's P/E is typical of its industry average. In this manner, an electronics stock with a P/E ratio of 10, for example, could have a lower PER than a food stock with a P/E of 6 because the electronics stock's P/E is lower relative to its industry norm.

The Data and Methodology

Forty stocks from each of the electronics (high P/E's), paper/container (average P/E's), and food (low P/E's) industries are included in the sample. Each stock was selected subject to the following constraints: (i) the firm's stock continuously traded from December 31, 1969 to June 30, 1980; (ii) a stock's average monthly trading volume exceeded 25,000 shares; (iii) the firm had minimum 1980 net sales of $100 million; and (iv) the relevant return, risk, and accounting data were available from COMPUSTAT.

The P/E ratio of each sample security was computed quarterly from the beginning of 1970 to mid-year 1980 (42 consecutive quarters). The numerator of the ratio is the closing market price per share at the end of the quarter and the denominator is the sum of the four most recently reported quarterly

earnings per common share (fully diluted before extraordinary items). The resultant P/E was then converted to a PER by dividing by the appropriate industry average P/E for that quarter.

The stocks in the overall sample were ranked by PER magnitude and grouped into deciles. The quarterly returns for each of these deciles were then calculated and risk-adjusted, assuming equal initial investment in each security.[6] This procedure was repeated at the end of each quarter of the selected time period, thus providing 42 quarters of return data for each of the ten PER portfolios. The composition of each portfolio was adjusted quarterly to reflect shifts in PER rankings. Thus, for example, if a stock's PER increased beyond the boundaries of its group, that stock would be "sold" at quarter-end and replaced with the lowest P/E issue from the next highest decile. The "sold" stock would then advance to a higher PER group and be "bought" for that portfolio.

The mean, risk-adjusted quarterly returns for each decile are observed to determine if significant return differences do exist among the various PER portfolios. The results are presented in the next section.

Results of This Study

The annualized risk-adjusted returns over the January 1, 1970 to June 30, 1980 period, using quarterly portfolio switching, are presented in Table 1. The results are arranged into ten PER portfolios with decile 1 containing the lowest PER's and decile 10 the highest.

TABLE 1

ANNUALIZED COMPOUND RATES OF RETURN
JANUARY 1, 1970 - JUNE 30, 1980
QUARTERLY PORTFOLIO ADJUSTING

PER Decile	Mean Annualized Return	Mean PER	Mean Beta
1	31.64	.48	1.07
2	18.52	.63	1.03
3	16.64	.72	1.02
4	19.12	.80	.99
5	18.40	.88	.98
6	11.36	.97	.97
7	8.44	1.06	.99
8	5.60	1.19	1.01
9	10.00	1.39	1.05
10	2.20	1.97	1.16
Total	14.40	1.01	1.03

Examining these results, one can observe a revealing pattern in the array of systematic (beta) risk among the PER deciles. In particular, three features of this pattern emerge: (1) the high beta portfolios groups at both the low and high deciles, (2) the portfolio betas decelerate while moving from decile 1 toward the middle deciles, then accelerate as the movement advances toward decile 10, and (3) the mean beta is higher at decile 10 than decile 1.

This pattern implies that the systematic risk of a stock increases as its P/E ratio becomes more dissimilar from its industry mean P/E. Furthermore, this risk appears to increase at an accelerating rate with the highest risk associated with those securities whose P/E's are farthest from the industry mean. It appears that the systematic portfolio risk is proportional to the difference between the PER and the industry mean P/E ratio.

Under these conditions the CAPM would predict higher returns for the high and low PER portfolios prior to risk adjustment. After risk-adjusting, these return differences should disappear. However, an examination of Table 1

clearly shows that these results do not occur. The most obvious contradiction to the CAPM can be observed by comparing the risk-adjusted returns of the lowest versus the highest PER portfolios. For example, decile 1 with an annualized return of 31.64 percent substantially outperformed decile 10's 2.20 percent return. In fact, the portfolio returns decline quite smoothly as the portfolio mean PER increases.

The frequency of altering portfolio composition was decreased to determine if these same results occurred when portfolio changes were made less often. Tables 2 and 3 present the annualized PER portfolio returns, using semiannual and annual switching, respectively. Again, the same trend appeared. For both semiannually and annually adjusted portfolios the lowest PER decile provided the largest rate of return. Also, in both instances the portfolio returns generally declined as the PER increased. These results conform to those experienced by the quarterly adjusted portfolios.

TABLE 2

ANNUALIZED COMPOUND RATES OF RETURN
JANUARY 1, 1970 - JUNE 30, 1980
SEMIANNUAL PORTFOLIO ADJUSTING

PER Decile	Mean Annualized Return	Mean PER	Mean Beta
1	26.10	.48	1.07
2	15.86	.63	1.03
3	16.20	.72	1.02
4	18.42	.80	1.00
5	18.66	.88	.97
6	9.52	.97	.97
7	9.60	1.06	.99
8	5.62	1.19	1.01
9	11.06	1.39	1.05
10	3.24	1.97	1.15
Total	13.56	1.01	1.03

TABLE 3

ANNUALIZED COMPOUND RATES OF RETURN
JANUARY 1, 1970 - JUNE 30, 1980
ANNUAL PORTFOLIO ADJUSTING

PER Decile	Mean Annualized Return	Mean PER	Mean Beta
1	23.69	.48	1.07
2	17.45	.63	1.03
3	18.78	.72	1.03
4	18.91	.80	1.00
5	17.43	.88	.98
6	12.92	.97	.98
7	12.25	1.06	.99
8	8.07	1.19	1.01
9	10.75	1.40	1.04
10	5.47	1.98	1.14
Total	14.67	1.01	1.03

However, another pattern emerged. As the frequency of portfolio changing was decreased, the returns generated by the lowest decile group declined while the returns of the highest decile increased. Thus, the spread between the returns for decile 1 and decile 10 narrowed as the frequency of portfolio alteration diminished. Seemingly, more frequent updating of low PER portfolios, i.e., more rapid deletion of stocks whose PER's have advanced beyond the decile boundary, is useful for enhancing portfolio returns.

A series of tests were conducted to assess the significance of the return differentials among PER deciles, assuming quarterly, semiannual, and annual portfolio altering. The first of these tests was designed to measure the significance of the difference between the risk-adjusted returns of corresponding pairs of deciles. For example, the mean return of decile 1 was tested against that of decile 10, then decile 2 was compared to decile 9, and so on.

The results are displayed in Table 4. Corresponding to each decile pair is the calculated Z-test value and its significance level (denoted by α). The higher the calculated Z value, the smaller the probability that the difference between the returns for a given pair of deciles could be attributable to chance factors alone. For instance, the Z values for the deciles 1 and 10 pairing is very high, indicating significance at the .01 probability level. this indicates that there is a no greater than 1-in-100 (.01) chance that the return differences experienced between the two deciles is attributable to random chance alone. Alternatively, there is an extremely high probability that some non-random factor caused the deciles' return differentials.

TABLE 4

SIGNIFICANCE TEST OF THE
DIFFERENCE BETWEEN DECILE (D) PAIRS

	Frequency of Portfolio Alteration					
	Three Months		Six Months		One Year	
test	Z	α	Z	α	Z	α
D1 vs. D10	5.6	.01	6.3	.01	6.7	.01
D2 vs. D9	1.8	.05	1.4	*	2.6	.01
D3 vs. D8	2.4	.01	3.2	.01	4.5	.01
D4 vs. D7	2.4	.01	2.6	.01	2.7	.01
D5 vs. D6	1.4	*	2.5	.01	1.8	.05

*Not significant.

Observation of Table 4 illustrates that there is a very high level of statistical difference between the returns for decile 1 versus decile 10 for all three holding periods. Moreover, the returns of some other pairs of deciles also differ significantly. For example, decile 4 versus decile 7 returns differ at the .01 significance level across the board. Some significant differences even extend down to the decile 5 versus decile 6 level. These results substantiate the contention that low PER stocks have returns exceeding those experienced by high PER securities.

Next, tests were performed to gauge the differences between the various decile returns as compared to the return of the overall sample of stocks. Do low or high PER portfolios outperform or underperform the average portfolio? The results of these tests are presented in Table 5, where $\bar{X}$ denotes the average (mean) overall sample return. Decile 1 portfolios for all holding periods clearly outperformed the sample as a whole. The opposite conclusion prevailed for decile 10: the returns of these high PER portfolios were significantly below the average return. However, after the lowest and highest PER groups, only scattered significance occurred. These results mean that although Tables 1-3 show return differences among PER deciles across the board, only the returns of deciles 1 and 10 differ significantly from the average on a consistent basis. The implication is that extremely low PER stocks tend to perform better than the average while very high PER securities tend to underperform the average.

TABLE 5

SIGNIFICANCE TESTS OF THE
DIFFERENCE BETWEEN DECILE (D) AND SAMPLE MEAN ($\bar{X}$)

	Frequency of Portfolio Alteration					
	Three Months		Six Months		One Year	
test	Z	α	Z	α	Z	α
D1 vs. $\bar{X}$	5.1	.01	5.1	.01	5.1	.01
D2 vs. $\bar{X}$	1.2	*	0.9	*	1.6	*
D3 vs. $\bar{X}$	0.7	*	1.1	*	2.3	.02
D4 vs. $\bar{X}$	1.4	*	2.0	.05	2.4	.01
D5 vs. $\bar{X}$	1.2	*	2.0	.05	1.5	*
D6 vs. $\bar{X}$	0.9	*	1.6	*	1.0	*
D7 vs. $\bar{X}$	1.8	.05	1.6	*	1.4	*
D8 vs. $\bar{X}$	2.6	.01	3.3	.01	3.7	.01
D9 vs. $\bar{X}$	1.3	*	1.1	*	2.2	.02
D10 vs. $\bar{X}$	3.5	.01	4.2	.01	5.2	.01

*Not significant.

The final set of tests is perhaps the most important. A commonly used statistical test, known as analysis of variance (ANOVA) is employed to test for the significance of the return differences among all the deciles. ANOVA is used to test the hypothesis that there is "no difference" in the mean returns among the deciles.

A plausible test of this "no difference" hypothesis requires a numerical measure of the degree to which the return averages for the various deciles differ. This numerical value, called an F-Statistic, would equal zero if the decile average returns were identical; correspondingly, the greater the statistically perceptible differences among these return means, the larger will be the F-Statistic. In this manner, ANOVA measures the overall significance of the PER as a discriminator of portfolio returns.

The ANOVA results are presented in Table 6. For each of the three alteration periods, the F-Statistic is very large. Consulting an F-Distribution table (an appendix in most basic statistics books) reveals these figures to be significant at the .01 probability level, i.e., there is a less than 1-in-100 chance that the observed differences in average returns among the PER deciles can be explained by chance fluctuations. This result clearly implies that the assumption of equal mean returns among the portfolios is <u>not</u> a reasonable one. Apparently the decile classification scheme does, in fact, differentiate the portfolio returns, upholding the hypothesis that the PER is an important factor in predicting investment returns.

TABLE 6

ANALYSIS OF VARIANCE
DECILES 1 THROUGH 10

Frequency of Portfolio Alteration	ANOVA Statistics F	α
3 Months	6.8	.01
6 Months	8.6	.01
1 Year	11.0	.01

Conclusion

In this study, a concept called the price-earnings relative was defined. The purpose of the study was to investigate the validity of the PER as a predictor of investment returns. In doing so, an attempt was made to compensate for two potential sources of bias: the small firm effect and the infrequent trading effect.

The results of the statistical tests performed indicate that the PER is a significant factor related to security returns. Low PER portfolios tend to outperform their high PER counterparts as well as the sample mean. Furthermore, as the PER increases, the returns consistently decline. These results imply that excess returns can be achieved by adopting a low PER strategy. This in turn suggests that the CAPM is an inadequate description of the behavior of capital markets.

FOOTNOTES

[1]See James D. McWilliams, "Prices, Earnings, and P-E Ratios," Financial Analysts Journal, May-June 1966, pp. 137-142; Paul F. Miller and Ernest R. Widman, "Price Performance Outlook for High and Low P/E Stocks," 1966 Stock and Bond Issue, Commercial and Financial Chronicle, September 29, 1966, pp. 26-28; William Breen, "Low Price-Earnings Ratios and Industry Relatives," Financial Analysts Journal, July-August 1968, pp. 125-127; and Francis Nicholson, "Price Ratios in Relation to Investment Results," Financial Analysts Journal, January-February 1968, pp. 105-109.

[2]The origin of modern portfolio theory may be traced by referring to the following: William F. Sharpe, "Capital Asset Prices: a Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, September 1964, pp. 425-552 and John Lintner, "The Valuation of Risky Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," Review of Economics and Statistics, February 1965, pp. 13-37.

[3]Treynor's return-to-volatility measure was used to adjust security returns for beta risk. This procedure converts a stock's expected return, $E(R_i)$, to a risk-adjusted expected return, $E(R_i)'$, in the following manner:

$$E(R_i)' = R_f + [E(R_i) - R_f]/\beta_i$$

For a complete description, see S. Basu, "Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis," Journal of Finance, June 1977, pp. 663-682.

[4]See Marc R. Reinganum, "Abnormal Returns in Small Firm Portfolios," Financial Analysts Journal, March-April 1981, pp. 52-56 and Rolf W. Banz, "The Relationship Between Return and Market Value of Common Stock," Journal of Financial Economics, 1981, pp. 3-18.

[5]Elory Dimson, "Risk Measurement When Shares Are Subject to Infrequent Trading," Journal of Financial Economics, 1979, pp. 197-226.

[6]The quarterly returns were calculated using the following formula:

$$R_q = (P_q - P_{q-1} + D_q)/P_{q-1}$$

where R_q = the quarterly return (percentage) in quarter q;
P_q = the market price per share at the end of quarter q;
D_q = the cash dividend paid per common share during quarter q.

Appendix

Risk Adjusted Returns by Deciles

1. Three Month Holding Period
2. Six Month Holding Period
3. One Year Holding Period

PERIOD	BUY DATE	SELL DATE	GROUP ONE	GROUP TWO	GROUP THREE	GROUP FOUR	GROUP FIVE	GROUP SIX	GROUP SEVEN	GROUP EIGHT	GROUP NINE	GROUP TEN
1	69/12	70/ 3	1.50	-.63	-.08	-6.26	-.63	-2.21	-2.02	2.94	-2.57	-1.08
2	70/ 3	70/ 6	-18.98	-26.78	-23.86	-17.58	-28.86	-24.98	-25.12	-22.95	-21.71	-25.05
3	70/ 6	70/ 9	32.60	27.53	14.61	24.37	13.40	17.95	14.02	13.83	17.43	14.67
4	70/ 9	70/12	17.05	2.97	2.42	14.56	8.50	6.79	9.93	13.03	5.35	.49
5	70/12	71/ 3	28.63	19.14	13.92	22.59	27.71	19.48	19.15	15.63	20.39	12.02
6	71/ 3	71/ 6	-1.50	-2.98	-.93	-.47	2.24	2.37	-1.63	2.72	.84	-4.95
7	71/ 6	71/ 9	2.94	-3.95	-2.96	-8.58	-1.21	-.78	-1.46	-3.13	-1.37	-3.16
8	71/ 9	71/12	.62	1.26	7.14	4.07	.43	7.50	8.09	-2.11	.45	.52
9	71/12	72/ 3	10.54	15.60	5.17	13.09	12.44	6.05	8.51	4.58	13.41	9.01
10	72/ 3	72/ 6	-3.11	-1.98	.91	1.85	5.48	-6.39	-3.90	-1.61	3.15	12.46
11	72/ 6	72/ 9	.26	-.20	-1.27	1.76	-2.98	-4.63	1.75	-6.20	-1.90	1.93
12	72/ 9	72/12	10.89	4.04	5.89	6.41	6.55	13.12	8.27	9.79	14.64	4.31
13	72/12	73/ 3	-13.36	-16.92	-14.08	-7.54	-15.48	-17.68	-16.14	-8.48	-10.91	-8.23
14	73/ 3	73/ 6	-14.42	-22.57	-11.76	-6.57	-8.92	-13.41	-15.39	-6.74	-7.90	-13.84
15	73/ 6	73/ 9	24.21	27.56	22.61	19.71	19.93	13.80	21.07	28.61	27.20	20.90
16	73/ 9	73/12	-21.75	-19.76	-19.57	-16.85	-19.42	-24.51	-14.69	-9.23	-9.51	-18.08
17	73/12	74/ 3	20.67	16.52	15.48	13.50	18.79	10.38	6.07	.24	.95	-5.37
18	74/ 3	74/ 6	-9.15	-13.94	-7.41	-13.13	-15.75	-12.75	-13.11	-10.61	-6.30	-6.33
19	74/ 6	74/ 9	-14.21	-13.55	-14.07	-19.85	-21.09	-24.34	-23.78	-31.04	-31.85	-35.27
20	74/ 9	74/12	7.84	6.55	6.36	3.59	7.60	16.34	11.48	6.35	13.83	-.68
21	74/12	75/ 3	51.41	50.22	38.27	41.18	57.03	45.54	33.54	29.37	29.04	38.71
22	75/ 3	75/ 6	24.72	18.80	33.22	19.51	21.59	16.36	17.48	11.64	12.05	17.86
23	75/ 6	75/ 9	-8.47	-4.97	-6.65	-6.31	1.35	-9.06	-13.03	-10.42	-8.45	-16.13
24	75/ 9	75/12	9.94	14.94	10.16	15.78	11.85	15.65	11.31	11.77	11.99	4.88

PERIOD	BUY DATE	SELL DATE	GROUP ONE	GROUP TWO	GROUP THREE	GROUP FOUR	GROUP FIVE	GROUP SIX	GROUP SEVEN	GROUP EIGHT	GROUP NINE	GROUP TEN
25	75/12	76/ 3	56.14	35.74	35.82	33.11	28.20	12.11	16.42	12.32	11.22	18.85
26	76/ 3	76/ 6	2.09	7.40	7.64	4.51	-1.04	2.53	7.31	-1.40	5.64	-.15
27	76/ 6	76/ 9	-.23	5.63	-2.33	.56	-3.76	-.63	4.18	-2.31	-4.58	-6.25
28	76/ 9	76/12	15.95	7.34	9.01	9.23	12.54	8.48	8.17	5.91	7.05	-.07
29	76/12	77/ 3	8.20	8.05	-3.33	-1.01	2.75	-2.37	-3.26	-3.90	-9.42	-11.90
30	77/ 3	77/ 6	14.17	9.47	3.24	6.29	7.42	6.69	2.88	2.76	.21	-.40
31	77/ 6	77/ 9	-.91	-2.54	-3.33	-.54	.19	-.99	-6.99	-5.44	-3.65	-9.63
32	77/ 9	77/12	7.74	.45	8.24	5.09	2.14	4.31	2.87	-2.94	-3.77	3.01
33	77/12	78/ 3	6.45	-4.89	4.72	2.99	-2.08	-3.30	-5.19	-8.30	-4.46	-6.08
34	78/ 3	78/ 6	12.79	15.33	19.47	13.50	9.78	14.10	14.70	16.84	14.00	13.37
35	78/ 6	78/ 9	13.63	10.15	7.34	7.10	14.31	8.45	4.53	8.30	5.20	10.59
36	78/ 9	78/12	-7.54	-9.84	-13.61	-13.20	-7.87	-7.29	-10.95	-12.06	-10.24	-14.79
37	78/12	79/ 3	34.15	8.90	25.88	9.20	10.32	14.82	9.18	13.38	16.46	11.39
38	79/ 3	79/ 6	7.28	4.91	1.66	.47	5.11	4.30	2.38	-4.32	5.42	1.60
39	79/ 6	79/ 9	11.18	10.67	5.65	15.20	9.31	8.21	6.58	4.95	6.22	3.44
40	79/ 9	79/12	-.52	3.87	-6.18	1.72	-1.84	-4.38	-7.23	-.01	-.74	3.82
41	79/12	80/ 3	-4.80	-7.72	-16.26	-9.92	-14.50	-12.16	-12.82	-10.82	-12.47	-8.28
42	80/ 3	80/ 6	17.69	14.64	17.71	18.52	21.64	15.76	15.65	8.05	14.60	15.10
AVERAGE PERIOD RETURN			7.91	4.63	4.16	4.78	4.60	2.84	2.11	1.40	2.50	.55
AVERAGE ANNUAL RETURN			31.65	18.52	16.65	19.14	18.40	11.36	8.46	5.62	9.99	2.21

PERIOD	BUY DATE	SELL DATE	GROUP ONE	GROUP TWO	GROUP THREE	GROUP FOUR	GROUP FIVE	GROUP SIX	GROUP SEVEN	GROUP EIGHT	GROUP NINE	GROUP TEN
1	69/12	70/ 6	-16.72	-24.52	-20.42	-29.52	-21.57	-28.43	-27.65	-18.64	-20.43	-27.63
2	70/ 3	70/ 9	.90	-17.47	-8.58	-9.21	-9.97	-12.33	-10.93	-12.91	-12.34	-12.99
3	70/ 6	70/12	41.87	38.36	22.34	33.43	24.24	29.99	24.88	29.23	24.11	17.41
4	70/ 9	71/ 3	39.01	22.04	22.90	32.49	28.43	37.32	32.05	20.54	26.87	13.21
5	70/12	71/ 6	25.07	13.34	16.75	29.50	25.38	17.29	23.61	10.35	24.87	12.44
6	71/ 3	71/ 9	2.80	-14.68	-7.41	-.30	-.21	-2.69	-2.32	2.04	-4.49	-2.70
7	71/ 6	71/12	1.38	-3.30	-1.28	-1.70	7.30	4.77	2.77	-3.95	-4.96	1.30
8	71/ 9	72/ 3	16.30	8.36	18.37	8.41	16.84	14.26	16.27	2.48	16.58	8.39
9	71/12	72/ 6	6.28	12.92	7.76	16.17	20.49	2.62	5.00	2.83	17.39	17.91
10	72/ 3	72/ 9	-4.29	-2.13	-2.40	4.18	6.52	-12.06	-3.35	-6.76	3.66	13.15
11	72/ 6	72/12	6.06	2.90	.36	11.22	3.07	8.74	9.46	6.49	11.16	10.60
12	72/ 9	73/ 3	-6.47	-9.59	-4.51	-9.88	-10.38	1.50	-9.97	-2.09	-.91	-3.28
13	72/12	73/ 6	-26.41	-31.60	-20.69	-15.11	-24.41	-28.91	-26.00	-22.30	-17.78	-15.71
14	73/ 3	73/ 9	7.68	-4.45	3.97	8.50	8.98	5.83	1.80	22.76	12.02	8.64
15	73/ 6	73/12	-4.05	-.87	-1.46	-4.21	4.96	-9.62	1.78	16.49	15.84	.53
16	73/ 9	74/ 3	-9.49	-6.20	-7.50	-7.95	-5.87	-18.84	-8.32	-5.22	-11.02	-22.06
17	73/12	74/ 6	1.37	-1.07	4.25	1.09	7.77	.76	-8.87	-11.73	-6.34	-9.96
18	74/ 3	74/ 9	-26.21	-24.52	-17.97	-32.28	-32.50	-32.88	-36.09	-35.49	-35.93	-38.09
19	74/ 6	74/12	-13.65	-6.74	-19.61	-3.52	-10.74	-14.96	-19.87	-25.95	-19.10	-34.55
20	74/ 9	75/ 3	63.34	47.06	46.14	49.38	66.26	51.76	49.44	43.03	51.06	34.34
21	74/12	75/ 6	90.26	89.35	66.05	75.23	86.44	62.93	61.83	48.22	48.88	63.03
22	75/ 3	75/ 9	11.88	13.44	25.41	4.54	14,41	14.94	.77	2.94	4.41	-1.03
23	75/ 6	75/12	2.45	-.11	5.12	7.44	15.61	1.64	-2.64	5.67	.26	-13.71
24	75/ 9	76/ 3	59.12	59.90	54.32	53.40	43.46	29.56	32.03	22.77	27.00	18.27

PERIOD	BUY DATE	SELL DATE	GROUP ONE	GROUP TWO	GROUP THREE	GROUP FOUR	GROUP FIVE	GROUP SIX	GROUP SEVEN	GROUP EIGHT	GROUP NINE	GROUP TEN
25	75/12	76/ 6	58.42	29.44	51.58	35.52	31.11	16.01	18.67	15.84	21.16	17.92
26	76/ 3	76/ 9	3.07	9.78	5.44	8.14	-3.50	4.13	4.48	-2.45	3.04	-5.33
27	76/ 6	76/12	17.88	13.28	5.75	7.58	9.01	6.29	13.05	4.63	.06	-3.97
28	76/ 9	77/ 3	14.48	14.88	13.75	8.86	14.93	1.08	5.58	5.41	-3.65	-9.97
29	76/12	77/ 6	22.32	19.79	-2.39	8.17	10.08	.01	.53	.25	-7.92	-12.80
30	77/ 3	77/ 9	13.37	3.93	.58	2.54	2.59	4.99	2.29	-5.77	.54	-8.39
31	77/ 6	77/12	4.47	-1.08	4.91	6.13	.54	-3.74	.05	-6.67	-4.66	-9.21
32	77/ 9	78/ 3	7.02	2.20	6.46	3.31	3.51	-3.70	2.54	-5.71	-9.01	1.15
33	77/12	78/ 6	19.66	7.65	18.99	22.11	8.64	8.26	11.75	5.89	7.74	7.69
34	78/ 3	78/ 9	22.15	29.16	33.81	21.39	17.20	23.39	23.45	26.00	23.54	22.23
35	78/ 6	78/12	1.71	.53	-2.87	-2.82	-1.27	-3.35	-.44	-6.38	-4.72	-8.14
36	78/ 9	79/ 3	7.98	.80	1.11	.54	.78	3.44	-5.48	-5.33	26.45	.56
37	78/12	79/ 6	35.48	15.44	21.00	12.56	14.37	14.58	17.67	12.23	16.56	18.99
38	79/ 3	79/ 9	17.63	8.94	12.33	12.16	17.75	12.54	7.97	1.26	15.21	5.71
39	79/ 6	79/12	12.45	10.74	2.64	11.35	5.96	4.45	7.57	-.65	8.41	7.15
40	79/ 9	80/ 3	1.23	-5.79	-20.34	-15.19	-17.01	-19.32	-14.03	-14.36	-14.36	-.99
41	79/12	80/ 6	7.21	5.22	-2.37	13.18	3.17	2.85	-4.72	.08	-2.55	6.40
AVERAGE PERIOD RETURN			13.05	7.93	8.10	9.21	9.33	4.76	4.80	2.81	5.53	1.62
AVERAGE ANNUAL RETURN			26.10	15.87	16.21	18.42	18.65	9.52	9.59	5.61	11.06	3.24

PERIOD	BUY DATE	SELL DATE	GROUP ONE	GROUP TWO	GROUP THREE	GROUP FOUR	GROUP FIVE	GROUP SIX	GROUP SEVEN	GROUP EIGHT	GROUP NINE	GROUP TEN
1	69/12	70/12	14.69	-5.54	-2.06	-3.59	-7.61	-6.96	-6.75	3.57	.36	-15.38
2	70/ 3	71/ 3	35.14	4.60	29.93	11.74	10.49	8.82	14.28	17.00	6.58	3.45
3	70/ 6	71/ 6	75.70	71.39	41.82	67.18	39.80	65.61	44.04	44.35	58.35	29.55
4	70/ 9	71/ 9	33.25	9.89	11.98	32.01	23.89	31.82	34.36	20.28	29.91	9.49
5	70/12	71/12	27.14	3.57	10.03	25.32	23.88	17.99	28.22	16.75	29.38	10.44
6	71/ 3	72/ 3	13.63	.48	2.79	7.96	19.69	9.50	7.02	20.06	12.95	2.68
7	71/ 6	72/ 6	14.09	-5.75	10.04	20.94	11.47	25.09	18.46	7.16	-4.04	25.49
8	71/ 9	72/ 9	6.68	12.24	15.29	6.23	7.99	21.65	16.57	2.67	29.63	13.67
9	71/12	72/12	6.07	22.29	14.42	19.08	36.66	5.73	11.83	22.90	24.19	27.52
10	72/ 3	73/ 3	-16.77	-3.89	-14.93	-5.50	2.49	-21.36	.44	-12.86	7.88	9.11
11	72/ 6	73/ 6	-26.14	-22.78	-15.50	-18.93	-22.21	-20.83	-8.64	-21.56	-8.69	-8.05
12	72/ 9	73/ 9	-9.47	-4.45	8.52	-5.75	-8.06	11.89	-4.24	-.04	17.87	7.23
13	72/12	73/12	-25.31	-33.86	-28.25	-3.28	-24.46	-34.40	-25.68	-7.99	-11.52	-9.77
14	73/ 3	74/ 3	-2.80	-16.54	-.18	1.01	5.63	-14.02	-8.18	15.58	-.40	-12.88
15	73/ 6	74/ 6	-5.37	-3.25	6.19	.96	8.10	-21.86	-10.62	14.44	3.80	-9.82
16	73/ 9	74/ 9	-41.05	-27.07	-27.28	-32.59	-28.60	-47.11	-40.51	-36.86	-45.16	-48.14
17	73/12	74/12	-22.16	-9.31	-9.55	-18.91	12.18	-13.73	-25.35	-27.39	-24.62	-40.18
18	74/ 3	75/ 3	3.84	18.91	2.86	-1.38	13.92	-1.71	2.30	-.91	-6.92	-14.08
19	74/ 6	75/ 6	71.45	67.25	25.96	63.30	27.42	44.61	31.97	11.87	22.63	4.48
20	74/ 9	75/ 9	95.17	53.91	87.19	63.35	85.26	64.45	55.57	47.96	58.23	33.48
21	74/12	75/12	79.22	91.82	66.33	82.32	91.35	68.08	70.24	50.80	48.11	47.87
22	75/ 3	76/ 3	66.99	71.30	91.52	61.93	52.88	56.08	42.38	22.75	28.50	18.97
23	75/ 6	76/ 6	41.61	37.12	42.15	59.29	40.77	36.06	16.72	15.48	16.15	4.20
24	75/ 9	76/ 9	54.82	62.96	66.39	60.29	45.22	39.12	33.70	29.50	23.01	18.36

PERIOD	BUY DATE	SELL DATE	GROUP ONE	GROUP TWO	GROUP THREE	GROUP FOUR	GROUP FIVE	GROUP SIX	GROUP SEVEN	GROUP EIGHT	GROUP NINE	GROUP TEN
25	75/12	76/12	74.35	38.91	71.04	43.39	41.00	28.22	28.03	22.37	20.02	18.18
26	76/ 3	77/ 3	13.44	27.15	23.74	15.97	-.50	19.42	9.43	1.80	-7.01	-11.85
27	76/ 6	77/ 6	31.52	34.19	13.15	11.93	17.70	10.28	18.66	-0.00	-5.63	-13.77
28	76/ 9	77/ 9	23.58	13.18	8.94	14.98	14.24	5.49	11.69	5.59	-.84	-8.49
29	76/12	77/12	29.80	16.10	1.02	10.41	-.34	-2.03	5.15	-1.39	-10.85	-18.06
30	77/ 3	78/ 3	23.38	5.86	2.08	7.23	4.85	6.11	3.13	-7.11	-7.42	-13.00
31	77/ 6	78/ 6	18.90	13.80	28.40	17.93	2.88	10.11	13.11	.65	1.65	1.80
32	77/ 9	78/ 9	35.85	24.72	29.23	30.10	42.99	14.62	26.55	11.83	10.05	26.75
33	77/12	78/12	14.07	3.62	17.95	25.50	-.57	8.65	7.03	.88	4.41	7.24
34	78/ 3	79/ 3	29.21	42.89	37.18	20.54	17.06	30.02	16.82	21.98	22.10	30.00
35	78/ 6	79/ 6	25.28	23.11	8.19	10.34	15.16	12.06	9.00	8.17	9.40	33.84
36	78/ 9	79/ 9	28.47	5.60	12.24	14.53	16.45	14.00	3.47	2.59	26.44	12.35
37	78/12	79/12	56.02	24.69	30.75	22.50	21.90	22.42	27.82	11.61	21.10	30.09
38	79/ 3	80/ 3	4.86	2.01	5.75	-10.33	3.17	-6.55	-9.22	-15.69	9.65	-.84
39	79/ 6	80/ 6	24.73	9.56	8.08	9.16	15.70	6.53	9.04	-4.11	9.99	11.52
AVERAGE PERIOD RETURN			23.69	17.45	19.78	18.91	17.43	12.92	12.25	8.07	10.75	5.47
AVERAGE ANNUAL RETURN			23.69	17.45	18.78	18.91	17.43	12.92	12.25	8.07	10.75	5.47

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000002          HCH    015406711
000003          TSEPTEMBER 71BOECKH CONSTRUCTION COST INDEX,(RESIDENCES), 57-59=100.
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000005             906   907   909   914   920   926   929   931   934   936   938   94055CH
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000010            1038  1043  1041  1042  1045  1047  1045  1043  1043  1040  1039  103960CH
000011            1037  1037  1037  1038  1045  1048  1051  1051  1052  1049  1049  104961CH
000012            1051  1051  1051  1056  1062  1064  1069  1072  1073  1072  1069  105962CH
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000015            1130  1134  1136  1137  1141  1150  1160  1161  1164  1170  1170  117665CH
000016            1174  1176  1180  1187  1194  1201  1209  1210  1212  1218  1222  122466CH
000017            1229  1230  1231  1233  1248  1279  1294  1300  1306  1309  1312  131267CH
000018            1311  1316  1324  1333  1352  1374  1385  1392  1401  1403  1403  141168CH
000019            1432  1449  1464  1463  1467  1490  1489  1504  1498  1493  1501  151069CH
000020            1516  1521  1523  1526  1533  1536  1575  1578  1593  1596  1606  160770CH
000021            1610  1613  1626  1652  1652  1660                                    71CH
000022          Z
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