FINANCIAL STRENGTH CHARACTERISTICS OF FIRMS: AN EXPLANATION OF THE P/E ANOMALY

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Abstract:

The P/E anomaly is the widely accepted proposition that even after adjusting for risk as measured by beta, low P/E stocks have higher returns than high P/E stocks. The literature includes substantial evidence supporting the proposition. Recent research has examined the small-firm effect, the January effect, and methodological issues in an attempt to explain the P/E anomaly.

This study examines the P/E anomaly from 1986-90 using a mean cross-sectional regression analysis. The findings indicate the P/E anomaly is present only on NYSE stocks and is largely explained by financial strength characteristics, consistent with Chan and Chen' s (1991) marginal firm hypothesis.

Article:

LITERATURE REVIEW

Recent research finds the existence of the P/E anomaly. A study by Basu (1977) indicates low P/E portfolios earned higher absolute and higher risk-adjusted returns during the April 1957-March 1971 period. Basu evaluated risk-adjusted returns using the Jensen, Sharpe, and Treynor performance measures among others. After adjustments for portfolio-related costs and tax effects, however, net "abnormal" returns were not significantly greater than zero. These results reflect security price behavior, which is consistent with the semistrong version of the "fair game" model. In a later study, Banz (1981) confirms the size effect and notes that the size effect is not linear and occurs only for very small firms. A later study by Basu (1983) allows for both E/P ratios and for size during the 1963-80 time period. Basu finds high E/P (low P/E) stocks earned on average higher risk- adjusted returns than low E/P stocks, even when controlling for firm size. Basu also notes that although common stock of small NYSE firms earn substantially higher returns than common stock of large NYSE firms, the impact of the size effect virtually disappears when controlling for risk and for E/P ratios. He concludes that E/P and size are merely proxies for more fundamental determinants of expected returns for common stocks.

In contrast to Basu, Reinganum (1981) finds that the E/P effect does not persist after controlling for size. Reinganum suggests that size subsumes the E/P effect indicating that the two anomalies appear to be related to the same set of missing factors. The P/E effect and small firm effect, as

well as interaction between them, were tested using experimental design methods. Reinganum's study finds evidence of the size and P/E effects in January alone as well as the rest of the year but found no interaction between size and P/E. Cook and Rozeff find both effects active, and neither subsumes the other.

Banz and Breen (1986) identify two potential problems when using Compustat data, which they call the ex-post-selection and look-ahead bias. The ex-post-selection bias occurs because companies that are merged, file for bankruptcy, or otherwise cease to exist are excluded from the sample. In contrast, new companies usually enter the data base absent a full history. The look-ahead bias results from the disparity of ex-post reporting of P/E ratios by Compustat for specific dates (e.g. a P/E for year-end when actual earnings are not available to the investor until several months afterwards). Thus, computing yields with actual year-end earnings (which are really unavailable at the time) given year-end prices suggests zero-error forecasting ability by the investor. Banz and Breen conclude that the E/P effect is very sensitive to look-ahead bias but not sensitive to the ex-postselection-bias problem. Notably, the P/E effect no longer persists when adjustments for these biases are made while the small-firm effect remains. They conclude that incorrect inferences might have been made in earlier studies regarding the P/E and the small-firm effect.

Jaffe, Keim, and Westerfield (1989) reexamine the E/P and small-firm effects from 1951 to 1986 while controlling for the two biases. The use of seemingly-unrelated-regression (SUR) technique reduces error-in-variables problems of using prior-period betas to forecast future betas and controls for cross-portfolio correlation of residuals when estimating the coefficients on size and E/P. Moreover, the use of SUR permits the examination of intermediate portfolio mean returns, unlike the ANOVA analysis used by Cook and Rozeff (1984). Jaffe, Keim and Westerfield find significant E/P and size effects for all months during the 1951-86 time period, which is consistent with Rozeff and Cook (1984) and inconsistent with Banz and Breen (1986), Basu (1983), and Reinganum (1981). Both the E/P and size effects are significant during January; however, only E/P is significant during the other months.

Chan and Chen (1991) examined the higher returns of small firms in relation to other characteristics of small firms, which they call "marginal firm characteristics." Marginal firms are firms that have lost market value because of poor economic performance. Many have suffered setbacks and have become small firms but remain on the exchange. Therefore, small firms on NYSE have higher returns because they have more risk. Thus they suggest that the real reason for the small-firm anomaly is that marginal firms have more risk than the beta reveals, and the additional return observed reflects the additional risk.

Fama and French (1992) examine the relation between average return and size, leverage, E/P, and book-to-market equity over the 1963-90 time period. A negative relation between size and average return is present even with the inclusion of other variables. Similarly, a positive relation between book-to-market equity (BE/ME) and average return persists even in the presence of other explanatory variables. Moreover, beta does not explain the cross-section of average returns for the 1963-90 time period. Even in the 1942-1965 time period, the relation between beta and average return disappears when controlling for size. Moreover, size and book-to-market equity

appear to nullify the effects of E/P and leverage in the later time period. These results suggest risk is multidimensional and that BE/ME could be a relative distress factor.

Chan and Chen's marginal firm hypothesis provides deeper insights on the size effect and direction on the P/E anomaly. Similar reasoning to theirs, when applied to the P/E anomaly, suggests the possibility that low P/E stocks could have high risk factors and that the high risk factors explain the excess returns, thereby explaining the P/E anomaly.

This study investigates the nature of the P/E effect in recent years. Because a stock distribution channel could serve as a screening method of a firm's financial strength, a separate analysis is conducted for NYSE, Amex/Regional, and NASDAQ/OTC stocks. This study also seeks to identify and test some underlying factors that might explain the P/E anomaly while controlling for ex-post-selection-bias and look-ahead bias. Following Chan and Chen's explanation of the size anomaly, this study introduces (1) dividend changes, (2) leverage, (3) expected basic profitability, and (4) firm size as explanations of why low P/E stocks appear to offer higher average risk-adjusted returns.

DATA AND METHODOLOGY

This study examines the average monthly returns, the average market risk, and explanatory factors of the P/E anomaly over a five-year period from 1986 to 1990. The data base includes 7,013 companies on Compustat listed on the NYSE, the Amex, the NASDAQ, those traded OTC, or those with a blue sheet listing; complete data was available for 2,209 stocks. Firms having a primary listing on Canadian exchanges or companies that were involved in leveraged buyouts were excluded from the sample.

The P/E ratios, equity market value, and returns were computed on a monthly basis and averaged for a five-year period. The P/E ratio is the month-end close price divided by the 12 month trailing earnings per share.[1] The 12-month trailing earnings per share excludes extraordinary items and is adjusted for stock splits and dividends. The equity market value is computed as the month end closing stock price multiplied by the number of shares outstanding (reported quarterly).

This paper posits that the P/E ratio is a proxy for a number of other variables. These variables are:

(1) Leverage: A priori, one expects that beta captures all information embedded in the leverage measure. Prior research suggests this is not true. In particular, it does not capture marginal firm characteristics (Chan and Chen, 1991). Leverage is measured by total debt (current plus long-term, annual basis) plus preferred stock divided by the market value of equity year-end. The annual measures were averaged for the five-year period.
(2) Net Dividend Changes: Stable dividends or consecutively increasing dividends are regarded as a signal of good prospects. Net dividend decreases are indicative of a "marginal firm." Although beta should capture all the relevant risk aspects of the firm, Chan and Chen suggest it does not.[2] A reduction in the dividend is an indication of cash flow problems. Net dividend changes is the number of dividend increases minus decreases over the five-year period. Quarterly regular dividends and consistent extra or special year-end common stock dividends are included.

(3) Operating Return on Assets: A high operating return on assets is a proxy for financial-strength.[3] Marginal firms are likely to have lower returns on assets as a consequence of poor profitability. This could lead to difficulty in raising capital. Operating ROA may also signal under-utilization of assets, poor sales, or excessive expenses among other problems. Operating ROA is computed as annual operating income before depreciation charges divided by total assets. An average of the annual operating ROA was computed for the five-year period.
(4) Firm Size: The small-firm anomaly suggests that risk-adjusted returns of small firms are larger than those of large firms. From previous research the interaction between the P/E anomaly and the size anomaly remains ambiguous. Chan and Chen explain the small-firm effect in terms of marginal firm characteristics such as (1), (2), and (3) above. They develop the concept of "marginal firm" and hypothesize that marginal-firm characteristics are correlated with size. In this study the size measure is removed in the final analysis. The market value of equity is determined as the product of the month-end closing stock price multiplied by the number of shares outstanding as last reported in the quarterly income statement.

A stock beta was computed over five years (1986-90) using monthly returns for each common stock. Further, an analysis of firm financial characteristics suggests that stocks be initially classified into three groups (1) NYSE, (2) Amex and regional exchanges, and (3) NASDAQ, OTC and blue sheet listed stocks. This study measures dividend changes and leverage as continuous variables and does not limit the analysis to the extreme quintiles. The use of mean values over a five-year period stabilizes the regression coefficient estimates and eliminates the problems of combining time series and cross-sectional data.

RESULTS

Table 1 reports descriptive statistics for the secondary market channel groups. An examination of the table suggests that NYSE stocks have enjoyed a higher mean return during 1986-90 than the other two groups; their mean NE ratio is also lower. Moreover, the average beta is not appreciably different among the three groups. The mean return for NYSE stocks is 58 percent higher than Amex and regional exchange stocks and 32 percent higher than the NASDAQ/OTC stocks. The risk- adjusted return for the NYSE stocks is higher, suggesting overpricing for the other two groups.

Table 1 also indicates that NASDAQ/OTC firms are more highly levered than either NYSE firms or Amex and regionals, consistent with the NYSE having a membership of larger and mature firms. The net dividend change variable reflects stable-to-growing dividend policies generally considered representative of NYSE firms (presenting a clear positive signal of stability and financial strength). Operating ROA is a measure of basic earning power and signals continued profitability and financial strength. The mean operating ROA on the NYSE dominates the other two groups. In summary, the characteristics in Table 1 are consistent with financially strong firms transferring to successively more prestigious and visible secondary market stock distribution channels.

TABLE 1

DESCRIPTIVE STATISTICS BY EXCHANGE FOR 1986-1990

Description	NYSE	Amex and Regional	NASDAQ and OTC
Mean Monthly Return (%)	1.0037	0.6362	0.8406
Beta	1.0352	0.9632	1.0084
Price/Earnings Ratio	24.3537	32.2654	29.2499
Leverage	1.3037	1.5714	1.7181
Net Dividend Change	2.6046	1.6020	0.9623
Operating ROA (%)	16.6211	13.1891	14.9727
Number of Observations	870	304	1035

Table 2 focuses on the P/E anomaly in a univariate analysis. Stocks are ranked by mean monthly P/E over the five years and grouped into P/E quintiles (Ql is lowest P/E quintile). The finding of a higher mean stock returns (with a lower mean betas) in the lower P/E quintiles versus the higher ones for the NYSE supports the P/E anomaly. The evidence is more ambiguous in the other two distribution channels. The low P/E stocks on the NYSE show more positive dividend increases as well as higher basic profitability. This dividend pattern appears to exist to a lesser extent on the other exchanges. Average market value of the NYSE group is substantially larger than either of the other groups, with the largest firms occupying the middle three P/E quintiles. Although the descriptive statistics presented in Table 2 are interesting, the mean stock return findings do not directly control for market risk. A more elevated level of analysis is required to confirm and explain the P/E anomaly.

Table 3 Panel A shows a simple regression analysis of the mean monthly return from 1986-90 as the dependent variable and the stock beta for the same period as the independent variable.[4] The beta coefficient indicates the risk-return trade-off is greater for the Amex/Regional Exchanges and the NASDAQ/OTC-listed stocks than for NYSE stocks. Panel B reports the results of a regression using both beta and the mean monthly P/E for the five-year period as independent variables again using mean return as the dependent variable. In the presence of beta the price/earnings ratio coefficient remains significant only for the NYSE, indicating there is no P/E anomaly on the exchanges other than the NYSE. This parallels Chan and Chen's "marginal firm hypothesis" as an explanation for the size effect, which they conclude is a phenomenon of NYSE stocks.

TABLE 2

SELECTED STATISTICS BY PRICE/EARNINGS QUINTILE FOR 1986-1990

Panel A: NYSE

Description	Q1	Q2	Q3	Q4	Q5
Monthly Ret. (%)	1.1500	1.1453	0.9431	0.9759	0.8040
Beta	0.8369	1.0512	1.0753	1.1029	1.1121
P/E Ratio	9.9032	13.3984	16.6142	22.0491	59.8436
Leverage	1.4209	1.5505	1.0956	1.0226	1.4305
Net Div. Chg.	3.0284	3.0639	2.9885	2.5287	1.4138
Oper. ROA (%)	19.6375	17.1116	16.6891	16.6011	13.0374
MV(Equity)	1620.1500	2674.5900	2004.9000	2233.9100	1463.9800

Panel B: Amex and Regional Exchanges

	Q1	Q2	Q3	Q4	Q5
Monthly Ret. (%)	0.8672	0.7016	0.7688	0.3705	0.4700
Beta	0.8672	0.9229	1.0508	1.0098	0.9650
P/E Ratio	9.7234	13.6316	17.8528	26.2561	94.8895
Leverage	1.7631	1.1905	2.1078	1.4185	1.3738
Net Div. Chg.	2.1311	2.5246	1.9508	0.7541	0.6333
Oper. ROA (%)	13.7607	15.2557	16.7787	10.5197	9.5717
MV(Equity)	108.2014	118.6565	266.8657	132.2215	161.0729

Panel C: NASDAQ, OTC and Blue Sheet Stocks

	Q1	Q2	Q3	Q4	Q5
Monthly Ret. (%)	1.0024	0.8560	0.8725	0.8599	0.7473
Beta	0.8971	1.0111	1.1029	1.0024	1.0285
P/E Ratio	10.4583	14.9367	19.3813	27.9336	73.5396
Leverage	2.8113	1.1612	1.7906	1.3866	1.4408
Net Div. Chg.	1.3961	1.6087	1.0870	0.3237	0.3961
Oper. ROA (%)	17.2068	17.2415	16.5053	12.7647	11.1454
MV(Equity)	83.8996	151.2562	235.2153	132.0529	209.2395

TABLE 3

REGRESSION RESULTS VERIFYING THE P/E ANOMALY FOR 1986-1990

(t-statistic in parentheses)

Panel A: Beta Only

Variable	NYSE	Amex and Regional	NASDAQ and OTC
Intercept	0.0062	0.0014	0.0003
	(5.098)[a]	(0.667)	(0.194)
Beta	0.0037	0.0051	0.0083
	(3.312)	(2.578)[b]	(7.075)[a]
F-Value	10.973[a]	6.648[b]	50.059[a]
Adjusted R2	1.13 %	1.83 %	4.53 %
Observations	870	304	1035

Panel B: Beta and P/E

Variable	NYSE	Amex and Regional	NASDAQ and OTC
Intercept	0.0068	0.0011	0.0002
	(5.559)[a]	(0.529)	(0.179)
Beta	0.0038	0.0051	0.0083
	(3.485)[a]	(2.550)[b]	(7.052)[a]
Price/Earnings	-0.3208[1]	0.9855[2]	0.5810[3]
	(-3.301)[a]	(0.665)	(0.046)
F-Value	10.997[a]	3.539[b]	25.006[a]
Adjusted R2	2.25 %	1.65 %	4.44%
Observations	870	304	1035

a. Significant at the 1% level. b. Significant at the 5% level.

Notes:
1. Multiply coefficient by 10^{-4}.
2. Multiply coefficient by 10^{-5}.
3. Multiply coefficient by 10^{-6}.

Table 4 extends the analysis to multiple regression introducing three additional independent variables: leverage, net dividend changes and operating return on assets.[5] The explained variation for each group is enhanced through the addition of these variables. For all three secondary market stock distribution groups all three independent variables are significant. As anticipated, firms with higher leverage had lower mean returns, even controlling for systematic risk as measured by beta. Net dividend changes were positively related to the mean monthly return. Each additional dividend change increased the mean return by .12 percent on the NYSE, .10 percent on Amex and regional exchanges, and .09 percent on NASDAQ/OTC. The net dividend change relationship was particularly strong on the NYSE. Firms with higher operating return on assets also had higher risk-adjusted returns, where operating ROA is a proxy for financial strength.

The entrance of leverage, net dividend changes, and operating ROA as measures of marginal firm characteristics, and hence risk, reduces the statistical significance of the P/E variable. In Table 4 the P/E variable is marginally not significant at the five percent level. The t-value drops from -3.301 to -1.946, removing a substantial portion of variation explained by the P/E variable.

TABLE 4

REGRESSION RESULTS OF FACTORS EXPLAINING THE MEAN MONTHLY STOCK RETURNS FOR 1986-1990

(t-statistic in parentheses)

Variable	NYSE	Amex and Regional	NASDAQ and OTC
Intercept	0.0015 (1.208)	-0.0041 (-1.789)	-0.0048 (-3.112)[a]
Beta	0.0050 (5.056)[a]	0.0058 (3.238)[a]	0.0074 (6.491)[a]
Price/Earnings	-0.1694[1] (-1.946)	0.2100[1] (1.574)	0.1365[1] (1.126)
Leverage	-0.0009 (-10.241)[a]	-0.0017 (-6.269)[a]	-0.0005 (-5.740)[a]
Net Dividend Change	0.0012 (8.729)[a]	0.0010 (3.430)[a]	0.0009 (2.897)[a]
Operating ROA	0.0103 (4.505)[a]	0.0392 (4.259)[a]	0.0377 (6.626)[a]
F-Value	51.966[a]	20.011[a]	33.454[a]
Adjusted R^2	22.68%	23.88%	13.56%
Observations	870	304	1035

a. Significant at the 1% level. b. Significant at the 5% level.

Notes:
1. Multiply coefficient by 10^{-4}.

CONCLUSION

As suggested by Basu (1983), the P/E anomaly appears to proxy more fundamental underlying firm characteristics. Similarly, this study's results are consistent with Chan and Chen's hypothesis that certain characteristics of "marginal firms" explain market return anomalies. This study finds that higher returns for low P/E stocks are substantially explained by leverage, net dividend change signals, and general financial strength. Similar to Fama and French (1992), P/E (or inverse thereof) becomes statistically insignificant with the inclusion of other variables in the regression equation. However, the relation between beta and the average return remains positive and statistically significant during the 1986-90 time period. Even in the absence of size and book-to-market equity, variables including beta, leverage, net dividend change, and operating ROA cause the P/E variable to fall substantially below statistically significant levels.

The continuing existence of the P/E effect suggests that beta as risk measure appears to be non-comprehensive; the P/E effect continued to exist on the NYSE during the 1986-90 time period when returns are adjusted for beta only. However, the introduction of other financial strength factors appears to explain a substantial proportion of the variation in returns that would otherwise be attributed to the P/E effect. Likewise, it is true that the P/E ratio may reflect growth. Growth companies generally have higher P/E ratios. However, growth companies are also characterized as having higher betas, lower leverage, higher retention ratios, and higher operating earnings. Therefore, both growth and the P/E ratio may well be proxies of these same variables.

The persistency of these P/E anomaly proxies has not been examined over a longer period of time in this study. Moreover, the scope of this research is limited to these three measures of financial strength. Finally, this study has been limited to the P/E anomaly and does not address other anomalies. Nonetheless, the findings indicate that the P/E ratio appears to proxy multiple financial strength indicators; security prices reflect information embedded in these financial risk

measures. Therefore, low P/E stocks appear to have more risk than is otherwise apparent from a traditional market risk/retum framework.

ENDNOTES

(1) The methodology in this study reduces the "look-ahead" bias by computing P/E ratios by month, which is computed using the each month's closing price and the previous 12 months of earnings from the previous four quarters of data. Some previous research has relied on an audited fiscal or calendar end-of-year earnings from an annual statement use that may not be available until months later. In addition, by averaging the monthly P/Es for a five-year period and not re-ranking P/Es each month, the average P/E reflects longer-term pricing. The average P/E reflects adjustments or corrections made to the monthly P/E ratios in subsequent months.

(2) A company's decision to increase or decrease its dividend is a decision unique to the company. Therefore, a dividend change in isolation could be regarded as unsystematic risk if the underlying cause is due to a firm-specific event. However, the number of net increases or decreases for many firms is strongly influenced by economy-wide factors (e.g. fewer companies in a recessionary economic environment would increase dividends and many more than average would decrease them than if business conditions were stronger). The implication for Chan and Chen's (1991) study is that beta does not appear to adequately explain all systematic risk that influences the mean expected return for a stock.

(3) Operating ROA affects financial strength because it is a measure of basic earning power. It encompasses the effects of profits on revenues, asset utilization, and liquidity as distinct from capital structure and tax effects.

(4) All regression equation results are tested for heteroskedasticity using the White (1980) test statistic. The reported results are corrected using a heteroskedasticity-consistent estimator of the variance-covariance matrix of the OLS estimator as suggested by White.

(5) Although the natural logarithm of the market value of equity might be suggested as an additional independent variable, a correlation analysis of the regression variables, shown in Appendix A, indicates a very high correlation of 46.12 percent with the net dividend change variable. In addition to multicollinearity problems and resulting difficulty in interpretation of the coefficient values, the F-Value of the resulting regression (when including ln(market value of equity)) reduced the regressions' overall F-statistics.

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APPENDIX
CORRELATION MATRIX
N = 2209 OBSERVATIONS

Variable	Monthly Return	P/E	Leverage
Beta	0.1798	0.0518	-0.0364
Monthly Return		-0.0195	-0.2607
Price/Earnings			0.0006

Variable	Net Div. Changes	Operating ROA	ln(MV Equity)
Beta	-0.0891	0.0339	0.1223
Monthly Ret.	0.1928	0.2045	0.1647
Price/Earnings	-0.1172	-0.0997	0.0171
Leverage	-0.0961	-0.0986	-0.1167
Net Dividend Change		0.1066	0.4612
Operating ROA			0.1602