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Earnings Yields, Market Values, and Stock Returns

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ABSTRACT

Earlier evidence concerning the relation between stock returns and the effects of size and earnings to price ratio (E/P) is not clear-cut. This paper re-examines these two effects with (a) a substantially longer sample period, 1951–1986, (b) data that are reasonably free of survivor biases, (c) both portfolio and seemingly unrelated regression tests, and (d) an emphasis on the important differences between January and other months. Over the entire period, the earnings yield effect is significant in both January and the other eleven months. Conversely, the size effect is significantly negative only in January. We also find evidence of consistently high returns for firms of all sizes with negative earnings.

SOME OF THE MOST enigmatic findings in finance concern the anomalies of firm size (Banz [1]) and the earnings to price ratio (Basu [3] and Nicholson [13]). Despite repeated efforts, researchers have not been able to disentangle the two effects. For example, Reinganum [14], Basu [4], Cook and Rozeff [9], and Banz and Breen [2] examine the size effect and the earnings to price ratio (E/P) effect jointly. Reinganum [14] concludes that the E/P effect vanishes when size is simultaneously considered. Basu [4] argues that the E/P effect subsumes the size effect when both variables are jointly considered. The results of Cook and Rozeff [9] are different still, with stock returns being jointly related to both size and the E/P ratio. Banz and Breen [2] find a market value effect but no independent E/P effect across all months, a result similar to that of Reinganum [14].

The inability of the existing literature to unravel the two effects may be attributed, in part, to the use of relatively short periods of analysis and to the failure to separate January from the rest of the year. Use of the Compustat files for retrieval of earnings limits most studies to the twenty-year window of historical data supplied by Compustat,[1] a relatively short period when compared to the sixty years of CRSP monthly data that are used to document the size

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[1] Reinganum [14], Basu [4], Cook and Rozeff [9], and Banz and Breen [2] examine 14, 17¾, 13¾, and 7¾ years, respectively. As a result, documentation of the interaction between the E/P and size effects has been limited to the 1963–1983 period. Basu [3], who examines only the E/P effect, uses the 1956–1971 period.

effect. The recent release by Compustat of post-1950 data, for both currently covered and deleted companies, substantially lengthens the available period.

Of the above-mentioned studies only Cook and Rozeff [9] investigate January and non-January months separately. Their research suggests that both the size and E/P effects are significant, both in January and in the rest of the year. Unfortunately, they employ the ANOVA approach, which does not provide point estimates of statistical relations. One must visually gauge effects by reading rows and columns of numbers.

This study re-examines the relation between the size and E/P effects with (a) a substantially longer sample period, 1951–1986, (b) data that have no significant survivor biases, (c) both portfolio and seemingly unrelated regression (SUR) tests, and (d) an emphasis on the important differences between January and other months. Over the entire period, the earnings yield effect is significant in both January and the other eleven months. While these results hold in the later subperiod (1969–1986), the E/P effect in the earlier subperiod (1951–1968) is significant only in January. Conversely, the size effect is significantly negative only in January in the overall period and in both subperiods.

Since our sample period (1951–1986) subsumes those considered by previous researchers, we re-examine their findings with our data. Our analysis suggests that the results of prior studies conflict because the magnitude of the two effects is period specific.

Finally, we find uniquely anomalous returns for stocks with negative earnings, an area ignored by previous researchers. These firms tend to be among the smallest firms on the exchange.[2] Of course, the question of survivor bias is relevant here, but closer detailed analysis of such turnaround firms is of obvious value to portfolio managers.

We describe our data collection and portfolio selection procedures in Section I. An overview of the relation among earnings yields, size, and abnormal returns is presented in Section II. The seemingly unrelated regression model is discussed and regression results are reported in Section III. Several variations of the basic model are considered in the penultimate section. The paper concludes with a brief summary.

I. Data Collection and Portfolio Selection

Research on the E/P effect is subject to two potential biases associated with the use of earnings data from Compustat files such as the Primary-Supplementary-Tertiary (PST) data file. Banz and Breen [2] refer to these biases as the ex post selection bias and the look-ahead bias. The ex post selection bias arises for two reasons. First, the PST file excludes nonsurviving firms. Second, when entering a firm, Compustat provides its full accounting history. The look-ahead bias occurs when the researcher uses data not yet available to the investor, i.e., using December net income in January when it is not available to investors until several months later.

[2] In this regard, the E/P effect is similar to the "U-shaped" dividend-yield effect described by Blume [5] and Keim [12].

Banz and Breen [2] find that estimation of the E/P effect is not very sensitive to the ex post selection bias but is quite sensitive to the look-ahead bias. Their analysis (e.g., see their Table III) suggests that much of the measured E/P effect is due to the failure to account for the look-ahead bias. They conclude that the look-ahead bias can be avoided with the annual Compustat data by limiting the sample to December 31 fiscal closers and by computing E/P ratios using year-end earnings and March 31 prices.

Data collection and portfolio selection procedures used here are chosen to minimize these biases. Data on returns, price, and shares outstanding are taken from the University of Chicago Center for Research in Security Prices (CRSP) monthly stock return and master files for the 1951–1962 period and from the CRSP daily return and master files for the 1963–1986 period. Use of the daily tapes over the latter period permits inclusion of AMEX firms, thereby substantially increasing the number of sample firms. During this latter period, daily stock returns are linked together within the month to compute a monthly return.

Earnings per share are obtained from the Compustat PST files (currently active firms) and the complementary Research file (firms that "disappeared") for the 1967–1986 period and from the "Backdata" versions of these two files for the 1950–1966 period. We define earnings per share as the annual net income in the calendar year (exclusive of extraordinary items) divided by the number of shares outstanding. A merged file is generated which includes all firms that appear both in the CRSP and PST files. Since Compustat's PST file contains only the annual earnings reported at the most recent fiscal year end, we avoid "stale" earnings information by considering only those firms with fiscal years ending December 31. The numbers of firms meeting these criteria range from 352 in 1950 to 1309 in 1974.[3]

Portfolios are selected using two separate ranking procedures:

Procedure I. Firms are ranked on the ratio of year-end earnings to share price at the end of March in each year and placed into one of six groups. Group 0 includes all securities with negative earnings and groups one to five contain securities with positive earnings. Stocks with the lowest E/P ratios are placed into group 1, and those with the highest E/P are in group 5. Next, the stocks in each E/P group are ranked on the March 31 market value of their common stock outstanding. Each E/P group is then divided into five subgroups on the basis of size. Subgroup 1 includes the smallest stocks and subgroup 5 includes the largest stocks. This procedure results in thirty subgroups or portfolios, each of which is updated annually.[4]

[3] The percentage of CRSP firms deleted from our sample for not closing on December 31 ranged from 29.2 percent in 1951 to 40.9 percent in 1974. Banz and Breen [2, p. 792] report, "Therefore, using only December fiscal year companies and forming portfolios based upon year-end earnings and March-ending prices produces similar conclusions for the current Compustat file and the sequentially collected Compustat file."

[4] Note that the five portfolios formed from securities with negative earnings are of equal size. Similarly, the twenty-five portfolios formed from securities with positive earnings are of equal size. However, the number of securities in each of the first five portfolios differs from the number in each of the last twenty-five portfolios.

Reinganum's [14] procedure ranks all stocks by market value and divides the sample into quintiles. Quintile 1 contains the smallest stocks, and quintile 5 includes the largest stocks. All stocks are then

Equally weighted returns for each of the thirty portfolios are computed monthly during the year, starting on April 1 and ending on the following March 31. We begin tracking portfolio returns in April since firms do not generally release annual earnings numers immediately following year end. Thus, our procedure should avoid the look-ahead bias. Both Basu [4] and Cook and Rozeff [9] also begin tracking portfolio returns in April. However, Reinganum [14] starts the return period in January, immediately after the grouping period.

Procedure II. This procedure is identical to procedure I except that firms are ranked on market value first and then ranked on E/P. Since our results from the two procedures are quite similar, all reported results are from procedure I unless otherwise stated.

II. Portfolio Evidence on Size and E/P Effects

We first present average characteristics for our thirty portfolios to summarize our data and to provide a basis for comparison with other studies. Average monthly returns, sizes, E/P ratios, and beta estimates for the thirty portfolios are reported in Table I. The results are based on the period from March 31, 1951 to December 31, 1986.

For the subset of stocks with positive earnings, two relations between the ranking variables and returns emerge in Panel A. First, returns are negatively related to market value. This relation is nearly monotonic in each of the five columns of positive-earnings stocks. Second, average returns tend to be positively related to the E/P ratio. The lowest (but positive) E/P portfolios appear to be an exception as the returns in this column are greater than or equivalent to the average returns for portfolios in E/P category 2. The beta estimates for the lowest E/P portfolios tend to be the highest in the table, however, indicating that risk-adjusted "excess" returns may be linearly related to the E/P ratio. Surprisingly, stocks with negative earnings outperform many of the positive-earnings portfolios in the other five columns.[5]

Panel B of Table I contains the average E/P ratio for each of our thirty portfolios and Panel C presents the mean (median) market value for each of the portfolios. These data reveal two related phenomena. First, market values appear

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reranked by their E/P ratios and divided into quintiles. Quintile 1 contains the stocks with the lowest E/P ratio (negative E/P ratios are excluded). A portfolio is formed by collecting all stocks that are in quintile 1 both when ranked on size and when ranked on E/P. This procedure is repeated until twenty-five groups are formed.

Basu [4] ranks stock first on E/P, creating five quintiles. For the securities within a given E/P quintile, he then ranks on size, creating five size quintiles. One of the above twenty-five portfolios can be denoted as portfolio (i, j), indicating that it has the ith ranking among E/P quintiles and the jth ranking among the size quintiles within the ith E/P quintile. At this point, his methodology is similar to our procedure I. He then creates the jth "randomized" size portfolio by combining each of the five portfolios with the same jth size ranking. This procedure yields five size quintiles. The entire procedure is reversed to create five randomized E/P quintiles.

Cook and Rozeff [9] use several grouping procedures. Banz and Breen [2] rank securities into five size quintiles. Within each quintile, securities are ranked according to E/P ratios.

[5] Of course, the performance of the negative-earnings firms is most susceptible to survivor bias. Use of the Compustat Research files hopefully mitigates this bias.

Table I

Average Monthly Returns (in Percent), E/P Ratios, and Market Value of Equity (Size) for Thirty Portfolios of NYSE and AMEX Firms Ranked First by E/P Ratio and then Size over the Period April 1951 to December 1986

A. Average Monthly Returns (Standard Errors) <Betas>[a]

	Earnings to Price Ratio[b]					
Size[c]	≤0	Lowest	2	3	4	Highest
Smallest	1.52	1.62	1.36	1.52	1.68	1.90
	(0.56)	(0.34)	(0.30)	(0.27)	(0.27)	(0.29)
	<1.32> [d]	<1.27>	<1.18>	<1.09>	<1.08>	<1.09>
2	1.08	1.14	1.15	1.13	1.42	1.62
	(0.43)	(0.31)	(0.27)	(0.24)	(0.25)	(0.27)
	<1.29>	<1.29>	<1.19>	<1.04>	<1.06>	<1.10>
3	1.13	1.12	0.99	1.09	1.44	1.52
	(0.39)	(0.28)	(0.24)	(0.22)	(0.22)	(0.25)
	<1.29>	<1.28>	<1.08>	<1.02>	<0.95>	<1.06>
4	0.72	1.02	1.01	1.10	1.43	1.47
	(0.39)	(0.26)	(0.22)	(0.21)	(0.22)	(0.25)
	<1.49>	<1.20>	<1.05>	<0.97>	<0.98>	<1.08>
Largest	1.21	0.89	0.90	0.97	1.24	1.43
	(0.43)	(0.24)	(0.21)	(0.21)	(0.21)	(0.23)
	<1.60>	<1.11>	<1.02>	<0.98>	<0.98>	<1.03>

B. Average E/P Ratio (in Percent)[b]

	Earnings to Price Ratio					
Size	≤0	Lowest	2	3	4	Highest
Smallest	−27.39	3.77	7.11	9.08	11.15	15.94
2	−25.31	4.18	7.13	9.07	11.10	15.97
3	−18.76	4.39	7.17	9.01	11.13	15.48
4	−12.10	4.44	7.14	9.01	11.07	15.61
Largest	−16.84	4.47	7.10	9.02	11.03	14.94

C. Mean (Median) Market Value of Equity[c]

	Earnings to Price Ratio					
Size	≤0	Lowest	2	3	4	Highest
Smallest	4.76	20.18	25.10	25.09	19.95	16.16
	(4.56)	(19.34)	(24.15)	(24.66)	(19.96)	(15.68)
2	10.31	74.29	83.96	77.14	56.60	46.88
	(9.79)	(68.21)	(81.11)	(73.41)	(53.74)	(45.11)
3	19.96	211.26	205.24	175.23	136.26	107.35
	(19.13)	(203.83)	(197.50)	(165.90)	(130.02)	(103.82)
4	43.52	538.71	466.73	419.50	333.16	259.33
	(40.07)	(506.54)	(445.43)	(402.65)	(320.11)	(244.53)
Largest	262.43	3095.43	2454.79	2306.09	1897.22	1463.64
	(148.19)	(1682.18)	(1278.26)	(1102.24)	(989.00)	(820.38)

[a] OLS betas are computed with the CRSP value-weighted index.

[b] E/P is measured by year-end earnings divided by the common stock price at the end of March in each year.

[c] Size is measured by the market value of common equity at the end of March in each year and is reported in millions of dollars.

[d] In several of the earlier years, the number of negative-earnings firms in our sample is insufficient to create five portfolios with multiple securities. Thus, beta estimates for the negative-earnings portfolios are reported for the 1969–1986 period only.

lower in the higher E/P columns, suggesting correlation between the two variables. This finding, which has been pointed out in earlier studies, leads one to question whether the results in Panel A can be explained by one or two independent effects. For example, the smallest firms with the lowest E/P ratios tend to have higher average returns than several higher E/P portfolios in that row, but these firms on average have lower market capitalizations than portfolios 2 or 3 in that row.[6] Second, firms with negative earnings appear to have the lowest market values. Thus, the unusual results in the first column of Panel A might be explained by a market-value effect and not by a separate negative-earnings effect.

III. Size and E/P Effects: Regression Results

The average returns in Table I are descriptive in nature, since no statistical tests are employed. Most previous attempts to disentangle the E/P and size effects have used such portfolio returns as the basis for their tests. For example, Cook and Rozeff [9] use ANOVA to test for equality of the mean portfolio returns and Banz and Breen [2] test for significance of the difference in return between extreme E/P portfolios.[7] Such tests have shortcomings though. ANOVA may reject equality of mean returns even in the absence of a clear relation between returns and the ranking variables. Examining only the returns on the extreme portfolios ignores the information in the returns on the intermediate portfolios.

We employ a Seemingly Unrelated Regression (SUR) model to simultaneously adjust for portfolio risk and test for significance of the size and E/P effects. The SUR model has several advantages over other methods. It reduces the error-in-the-variables problem inherent in those approaches that use prior-period betas as forecasts of future betas and also accounts for cross-portfolio correlation in the residuals when estimating the coefficients on size and E/P. Also, data from earlier years are not lost since β estimates can be made "in sample." Finally, point estimates are generated—something not possible in the ANOVA approach.[8]

We use the following SUR model that accounts for differences in the effects

[6] Although high-E/P firms tend to be small firms, and vice versa, not all low-E/P firms are large firms. In fact, detailed examination of the lowest E/P firms reveals, year after year, a heterogeneous mix of very large (IBM, Standard Oil of California) and very small firms. Such a mixture is conspicuously absent in the other levels of E/P since larger firms occupy the intermediate E/P levels while smaller firms dominate the higher E/P categories.

[7] The original test methodology for this type of empirical inquiry was developed by Fama and MacBeth [10] and others. The approach specifies an alternative (to, say, the CAPM) hypothesis in the form of

$$R_p = \gamma_0 + \gamma_1\beta_p + \gamma_2 Z_p,$$

where R_p is the expected return on asset p, β_p is the "beta" of asset p, and Z_p is an attribute of asset p. The null hypothesis is that $\gamma_2 = 0$.

[8] See Brown, Kleidon, and Marsh [8] for a discussion of the SUR method in applications similar to the one in the text. The SUR technique gives asymptotically more efficient estimators than those using OLS. Its small sample properties are not well known. However, our total sample consists of 10,800 observations, which results in 28.3 observations per parameter.

in January versus the other months:

$$\begin{aligned}\tilde{R}_{pt} - R_{Ft} = {} & a_{0j}D_{jt} + a_{0r}(1 - D_{jt}) + \beta_{pj}(\tilde{R}_{mt} - R_{Ft})D_{jt} \\ & + \beta_{pr}(\tilde{R}_{mt} - R_{Ft})(1 - D_{jt}) + a_{1j}(E/P_{pt} \cdot D_{jt}) \\ & + a_{1r}[E/P_{pt}(1 - D_{jt})] + a_{2j}(LMVE_{pt} \cdot D_{jt}) \\ & + a_{2r}[LMVE_{pt}(1 - D_{jt})] + \tilde{e}_{pt}, \qquad (1) \\ p = 1, \cdots, 25, & \qquad t = 1, \cdots T,\end{aligned}$$

where D_{jt} is a dummy variable that takes the value of one if month t is January and zero otherwise, $\tilde{R}_{mt}$ is the monthly return for the CRSP value-weighted index, R_F is the monthly return on a thirty-day Treasury bill, E/P_{pt} is the average earnings to price ratio of the securities in portfolio p for time t, and $LMVE_{pt}$ is the natural logarithm of the average market value of outstanding common stock in the portfolio for time t.[9] For coefficients estimates over all twelve months of the year, we estimate

$$\begin{aligned}\tilde{R}_{pt} - R_{Ft} = {} & a_0 + \beta_{pr}(\tilde{R}_{mt} - R_{Ft}) \\ & + a_1(E/P)_{pt} + a_2 LMVE_{pt} + \tilde{u}_{pt}, \qquad (2) \\ p = 1, \cdots 25, & \qquad t = 1, \cdots, T.\end{aligned}$$

The SUR model is estimated with the monthly returns for twenty-five portfolios of positive-earnings firms for our entire period from April 1951 to December 1986 and for two subperiods of approximately equal length: April 1951 to March 1969 and April 1969 to December 1986. Test results reported through the remainder of the paper are estimates of equations (1) and (2) with the CRSP value-weighted market index. We also estimate equations (1) and (2) with the CRSP equally weighted market index, but the results are not dramatically different and we do not report them.

Results are presented in Table II. In the overall period from 1951 to 1986, we find a significant E/P and size effect across all months. This is consistent with Cook and Rozeff [9] but inconsistent with Banz and Breen [2], Basu [4], and Reinganum [14]. The findings also indicate a difference between January and the rest of the year: whereas the coefficient on E/P is significant in January (t-value is 2.62) and in the other months (t-value is 2.97), the size coefficient is significant only in January ($t = -9.01$).[10]

[9] Brown, Kleidon, and Marsh [8] find that returns are linear in the log of size.

[10] We also estimate the E/P effect in the absence of size using models (1) and (2) without the log of market value terms. The estimated coefficients on E/P in the 1951–1986 period are quite similar to those estimated in the presence of size. The coefficients (t-values) are 0.0275 (4.05) over all months, 0.1097 (4.29) in January, and 0.0253 (3.41) in February–December. The January coefficients are significant in both the April 1951 to March 1969 and April 1969 to December 1986 subperiods (t-values are 3.95 and 2.55, respectively), while the non-January estimate is insignificant in the earlier subperiod ($t = 1.13$) and significant in the latter subperiod ($t = 3.24$).

The tests in Table II use twenty-five portfolios based on five size and five E/P categories, a research design employed in numerous prior papers. To the extent that a 5 × 5 breakdown is too

Table II

Estimates of Coefficients (t-Values) on E/P Ratio and Log of Size Using a SUR Model[a]

The Model:[b]

$$\tilde{R}_{pt} - R_{Ft} = a_0 + \beta_p(\tilde{R}_{mt} - R_{Ft}) + a_1 EP_{pt} + a_2 LMVE_{pt} + \tilde{e}_{pt},$$
$$p = 1, \ldots, 25, \qquad t = 1, \ldots, T$$

	Intercept	EP	LMVE
	A. 4/1951–12/1986		
All Months	0.0073 (2.07)	0.0238 (3.51)	−0.0006 (−2.59)
January	0.1060 (8.25)	0.0633 (2.62)	−0.0076 (−9.01)
February–December	0.0002 (0.04)	0.0209 (2.97)	−0.0001 (−0.40)
	B. 4/1951–3/1969		
All Months	0.0090 (2.22)	0.0137 (1.27)	−0.0007 (−2.62)
January	0.0610 (4.46)	0.0837 (2.23)	−0.0049 (−5.23)
February–December	0.0051 (1.23)	0.0083 (0.73)	−0.0004 (−1.48)
	C. 4/1969–12/1986		
All Months	0.0124 (2.30)	0.0233 (2.74)	−0.0010 (−2.60)
January	0.1447 (7.01)	0.0631 (2.03)	−0.0106 (−7.39)
February–December	0.0027 (0.45)	0.0214 (2.40)	−0.0003 (−0.65)

[a] The data are monthly returns for twenty-five portfolios of NYSE and AMEX firms over the period April 1951 to December 1986 and two subperiods. The sample includes 12/31 fiscal closers only; portfolios are reformed on March 31 of each year. $\tilde{R}_{mt}$ is the monthly return for the CRSP value-weighted index.

[b] The separate estimates in January and February–December are from a variant of this model where the intercept and the independent variables are multiplied by month-related dummy variables. See equation (1) in the text.

coarse and, thereby, hides information in the cross-section, we also employ procedure I to create forty-nine portfolios based on seven size and seven E/P categories and re-estimate equations (1) and (2). The results are very similar to those reported in Table II. For example, the coefficient (t-value) on E/P, estimated over all months for the 1951–1986 period, is 0.0203 (3.30); the estimate for the size coefficient is −0.0006 (−2.80).

To test whether our results are sensitive to alternative grouping procedures, we estimate the above model grouping first on market value and then on E/P (procedure II). The results are quite similar to those using procedure I. The estimates are presented below:

	Intercept	E/P	LMVE
All Months	0.0083 (2.18)	0.0321 (4.98)	−0.0007 (−2.85)
January	0.0945 (0.31)	0.1049 (4.56)	−0.0074 (−8.20)
February–December	0.0012 (−8.20)	0.0264 (3.93)	−0.0002 (−0.08)

Finally, we also estimate equations (1) and (2) with twenty-five value-weighted portfolios that are constructed exactly as in procedure I of Section I, but with value weights. Again, the results are quite similar to those reported in the text:

	Intercept	E/P	LMVE
All Months	0.0076 (2.55)	0.0202 (3.31)	−0.0006 (−3.04)
January	0.0646 (6.16)	0.0827 (3.77)	−0.0049 (−7.07)
February–December	0.0037 (1.22)	0.0150 (2.33)	−0.0003 (−1.51)

The coefficient estimates in Table II allow us to assess economic significance as well. Excluding negative-earnings firms, the average E/P ratio in the lowest E/P quintile is 0.0425 while the average E/P ratio in the highest E/P quintile is 0.1559, indicating a spread of $0.1559 - 0.0425 = 0.1134$. The results in Table II suggest that, by moving from E/P quintile 1 to E/P quintile 5, while holding market value constant, one can increase his or her return by $0.0238 \times 0.1134 = 0.0027$ per month, or about 3.2 percent annually.

Excluding negative-earnings firms, the average market value (in millions) in market value quintile 1 is $\$21.30 = e^{3.058}$ while the average market value (in millions) in market value quintile 5 is $\$2243.43 = e^{7.716}$. The increase in return by moving from quintile 5 to quintile 1 while holding E/P constant is $-0.0006[3.058 - 7.716] = 0.0028$ per month, or about 3.4 percent annually.

The above calculations suggest that market value has marginally more economic significance than does the E/P ratio. Of course, this type of significance is a function not only of the coefficients, a_{1j} and a_{2j}, but of the variation of E/P and LMVE in the population.

The subperiod results in Panels B and C yield similar conclusions to those for the overall period reported in Panel A. In both subperiods, the size coefficient is significant in January but insignificant during the remainder of the year, and significant when measured over all months. The E/P coefficient is significant in January and during the rest of the year in the latter subperiod but significant only in January in the early subperiod. In fact, the E/P effect is insignificant, when averaged over all months, in the early subperiod.[11]

The subperiod results in Table II strongly suggest that the significance of the E/P effect is sensitive to the period in which it is measured. Therefore, we also examine the regression coefficients estimates over subperiods chosen by Basu [4], Banz and Breen [2], Cook and Rozeff [9], and Reinganum [14]. The results, reported in Table III for coefficients estimated over all months, indicate that the conclusions drawn in prior studies are based on period-specific findings. For the similar time periods employed by Basu [4], 1963–1979, and Reinganum [14], 1963–1977, the E/P effect is at best marginally significant while the size coefficient has a t-value greater than two only for Basu's [4] time period.[12] In the 1968–1981 subperiod used by Cook and Rozeff [9], however, both the E/P and size coefficients are significant. Finally, the coefficient estimates for the period

[11] To determine whether the 1969–1986 results are due to the incorporation of AMEX stocks into the sample (the 1951–1968 sample contains no AMEX stocks), we reproduce all statistical procedures needed to generate Table II, but using only NYSE stocks. The results, reported below, are qualitatively and quantitatively the same as those reported in Panel C of Table II:

	Intercept	E/P	LMVE
All Months	0.0120 (2.22)	0.0297 (3.25)	−0.0010 (−2.51)
January	0.1299 (6.43)	0.1322 (3.99)	−0.0099 (−7.00)
February–December	0.0015 (0.27)	0.0235 (2.49)	−0.0002 (−0.44)

[12] Basu [4] concludes that, after accounting for E/P, the size effect is not significant during his sample period. The results reported in Table III are consistent, however, with the significant size effect reported by Cook and Rozeff [9] during this sample period.

examined by Banz and Breen [2], 1974–1981, suggest that their conclusion that the E/P effect is subsumed under the size effect is period specific.

IV. The Influence of Price

Blume and Husic [6] find a relation between the price of a common share and subsequent returns. Later studies (e.g., Stoll and Whaley [15] and Blume and Stambaugh [7]) find substantial correlation between market value and share price. Further, share price is used to compute E/P ratios and other variables found to be correlated with stock returns, such as dividend yield (Keim [12]). Thus, the results reported above might be ultimately related to the single common denominator of price.

To demonstrate that there may be some substance to this conjecture, we report in Table IV the average share price for our thirty E/P-size portfolios. There appears to be a distinct relation between price and E/P (size); the higher (smaller) is E/P (size), the lower is price. These findings suggest that the E/P and size effects as measured in equations (1) and (2) may be more fundamentally a price effect.

To test this conjecture, we first estimate the sensitivity of the E/P effect to the price effect over all months and in both January and non-January months using equations (1) and (2) with the logarithm of market value (LMVE) replaced by the logarithm of price per share (LP).[13] The SUR estimates are computed for the entire period, 1951–1986, and two subperiods, April 1951 to March 1969 and April 1969 to December 1986. We use twenty-five portfolios that are created exactly as described in Section I, except that, after we sort initially on E/P, we sort secondarily on market price per share of the firms' common stock.

The results, presented in Table V, are somewhat different from those presented in Table II for E/P-market capitalization. In the overall period, the coefficient on E/P is significantly positive only in non-January months ($t = 4.57$). The relative importance of the E/P effect (January vs. non-January) differs across subperiods; the E/P coefficient is significant only in January (February–December) in the early (latter) subperiod. These results are in contrast to the E/P coefficient estimates in Table II, where, when estimated in the presence of size, the coefficients on E/P are significant in January in both subperiods and overall. The attenuation of the January E/P coefficient in Table V appears to be due to the strength of the explanatory power of log price. The coefficient on log price is significantly negative in January in both subperiods and overall. Surprisingly, this coefficient outside of January is positive, yet marginally significant.

[13] In addition to estimating equations (1) and (2) with log price, we also estimate them with price per share instead. The results for the 1951–1986 period are:

	Intercept	E/P	Price
All Months	−0.0023 (−2.12)	0.0373 (5.11)	0.0000 (1.14)
January	0.0095 (2.32)	0.0690 (2.62)	−0.0002 (−4.86)
February–December	−0.0029 (−2.44)	0.0360 (4.71)	0.0000 (1.86)

We also test (1) and (2) after ranking first on log price P and then on E/P. The results (unreported) are quite similar to those in Table V.

Table III

Estimates of Coefficients on E/P Ratios and Logarithm of Market Value of Equity Using a SUR Model for Various Subperiods as Selected by Previous Researchers[a]

The Model:

$$\tilde{R}_{pt} - R_{Ft} = a_0 + \beta_p(\tilde{R}_{mt} - R_{Ft}) + a_1 EP_{pt} + a_2 LMVE_{pt} + \tilde{e}_{pt},$$
$$p = 1, \ldots, 25, \qquad t = 1, \ldots, T$$

Subperiod (Author)	Intercept	EP	LMVE
1963–1977 (Reinganum [14])	0.0101	0.0201	−0.0007
	(1.83)	(1.91)	(−1.89)
1963–1979 (Basu [4])	0.0133	0.0157	−0.0009
	(2.53)	(1.72)	(−2.51)
1968–1981 (Cook and Rozeff [9])	0.0147	0.0205	−0.0010
	(2.69)	(2.17)	(−2.85)
1974–1981 (Banz and Breen [2])	0.0293	0.0105	−0.0021
	(4.08)	(1.07)	(−4.30)

[a] The sample includes 12/31 fiscal closers only; portfolios are reformed on March 31 of each year. $\tilde{R}_{mt}$ is the monthly return on the CRSP value-weighted index.

To test whether price is subsumed by size,[14] and as a final check on the relation between price, size, and the E/P ratio, we estimate the price coefficient, the size coefficient, and the earnings to price coefficient in January and non-January months using the following SUR model for the twenty-five E/P-size portfolios used in Table II:

$$\begin{aligned}\tilde{R}_{pt} - R_{Ft} = {} & a_{0j} D_{jt} + a_{0r}(1 - D_{jt}) + \beta_{pj}(\tilde{R}_{mt} - R_{Ft}) D_{jt} \\ & + \beta_{pr}(\tilde{R}_{mt} - R_{Ft})(1 - D_{jt}) + a_{1j}(E/P_{pt} \cdot D_{jt}) \\ & + a_{1r}[E/P_{pt}(1 - D_{jt})] + a_{2j}(LMVE_{pt} \cdot D_{jt}) \\ & + a_{2r}[LMVE_{pt}(1 - D_{jt})] + a_{3j}(LP_{pt} \cdot D_{jt}) \\ & + a_{3r}[LP_{pt}(1 - D_{jt})] + \tilde{e}_{pt}, \\ p = 1, \cdots, 25 & \qquad t = 1, \cdots, T.\end{aligned} \tag{3}$$

[14] To test this conjecture directly, we estimate the market-value effect and the price effect using equations (1) and (2) with log of price per share in place of E/P. Portfolios are formed by ranking first on size and then on price. The results for the 1951–1985 period are:

	Intercept	LMVE	LP
All Months	0.0144 (3.62)	−0.0007 (−2.92)	−0.0010 (−1.76)
January	0.1396 (10.38)	−0.0045 (−5.28)	−0.0194 (−9.53)
February–December	0.0040 (1.02)	−0.0004 (−1.67)	0.0006 (1.04)

Although the January size coefficient is reduced by more than forty percent from the estimate in Table II, the size results are otherwise the same as in Table II. The price coefficient is significant only in January.

Table IV

Average (Median) Price for Thirty Portfolios of NYSE Firms Ranked First by E/P Ratios and Then by Size over the Period April 1951 to December 1986

	Earnings to Price Ratio[b]					
Size[a]	≤0	Lowest	2	3	4	Highest
Smallest	6.82	16.32	20.43	20.62	18.54	16.67
	(5.14)	(16.39)	(19.98)	(20.18)	(20.01)	(15.36)
2	8.53	31.71	31.11	30.24	26.68	20.42
	(5.48)	(29.10)	(29.72)	(27.09)	(26.20)	(22.13)
3	11.08	45.64	39.02	37.82	33.09	27.81
	(8.35)	(39.03)	(34.72)	(36.89)	(32.32)	(20.42)
4	13.38	69.06	46.70	42.12	35.44	32.90
	(12.89)	(70.63)	(46.09)	(35.95)	(33.99)	(28.68)
Largest	22.78	94.62	60.91	51.69	49.29	41.57
	(16.41)	(76.00)	(54.53)	(45.08)	(45.89)	(38.17)

[a] Size is measured by the market value of common equity at the end of March in each year.
[b] E/P is measured by year-end earnings divided by the common stock price at the end of March in each year.

Table V

Estimates of Coefficients (t-Ratios) on E/P Ratios (EP) and Log of Price per Share (LP) Using a SUR Model[a]

The Model:[b]

$$\tilde{R}_{pt} - R_{Ft} = a_0 + \beta_p(\tilde{R}_{mt} - R_{Ft}) + a_1 EP_{pt} + a_2 LP_{pt} + \tilde{e}_{pt},$$
$$p = 1, \ldots, 25, \qquad t = 1, \ldots, T$$

	Intercept	EP	LP
	A. 4/1951–12/1986		
All Months	0.0000 (0.02)	0.0342 (4.77)	−0.0003 (−0.54)
January	0.0921 (9.43)	0.0384 (1.48)	−0.0231 (−10.45)
February–December	−0.0064 (−2.25)	0.0344 (4.57)	0.0012 (1.92)
	B. 4/1951–3/1969		
All Months	−0.0016 (−0.48)	0.0235 (2.08)	0.0001 (0.15)
January	0.0591 (5.31)	0.1448 (3.80)	−0.0160 (−6.44)
February–December	−0.0051 (−1.51)	0.0144 (1.24)	0.0011 (1.43)
	C. 4/1969–12/1986		
All Months	0.0048 (1.16)	0.0316 (3.65)	−0.0014 (−1.40)
January	0.1287 (8.68)	0.0152 (0.47)	−0.0338 (−9.47)
February–December	−0.0046 (−1.09)	0.0322 (3.52)	0.0011 (1.04)

[a] Monthly data are for twenty-five E/P-price portfolios of NYSE and AMEX firms over the period April 1951 to December 1986. The sample includes 12/31 fiscal closers only; portfolios are reformed on March 31 of each year. $\tilde{R}_{mt}$ is the monthly return for the CRSP value-weighted index.
[b] The separate estimates in January and February–December are from a variant of this model where the intercept and the independent variables are multiplied by month-related dummy variables (as in equation (1) in the text).

Table VI

Estimates of Coefficients (t-Values) on E/P Ratio, Log of Size, and Log of Price Using a SUR Model[a]

The Model:[b]

$$\tilde{R}_{pt} - R_{Ft} = a_0 + \beta_p(\tilde{R}_{mt} - R_{Ft}) + a_1 EP_{pt} + a_2 LMVE_{pt} + a_3 LP_{pt} + \tilde{e}_{pt},$$
$$p = 1, \ldots, 25, \qquad t = 1, \ldots, T$$

	Intercept	EP	LMVE	LP
All Months	0.0113	0.0189	−0.0004	−0.0017
	(2.81)	(2.67)	(−1.51)	(−2.17)
January	0.1435	0.0712	−0.0043	−0.0208
	(10.49)	(0.28)	(−4.65)	(−7.49)
February–December	0.0002	0.0220	−0.0001	0.0001
	(0.06)	(2.97)	(−0.49)	(0.09)

[a] Monthly data are for twenty-five E/P-size portfolios of NYSE and AMEX firms over the period April 1951 to December 1986. The twenty-five portfolios used here are the same portfolios used for the tests in Tables II and III. The sample includes 12/31 fiscal closers only; portfolios are reformed on March 31 of each year. $\tilde{R}_{mt}$ is the monthly return for the CRSP value-weighted index.

[b] The separate estimates in January and February–December are from a variant of this model where the intercept and the independent variables are multiplied by month-related dummy variables. See equation (3) in the text.

The results are presented in Table VI. The subperiod results are not dramatically different. The size coefficient is significant in January (t = −4.65) and insignificant in the non-January months (t = −0.49). The non-January size coefficients are actually larger (in absolute value) than they are in Table II, suggesting some interaction with the price variable. The price coefficient is also significant in January (t = −7.49) and is insignificant in non-January months. The earnings to price coefficient is positive and insignificant in January (t = 0.28) and significant in non-January months (t = 2.97), resulting in a significantly positive E/P effect when estimated over all months. The results of this table suggest that the negative relation between returns and size and/or price is primarily concentrated in January while the E/P effect is more pervasive throughout the remainder of the year. Our results do not suggest that price is a good surrogate for size since price seems to have a separate influence on expected return.

V. Concluding Remarks

Earlier evidence concerning the relation between stock returns and the effects of size and E/P is not clear-cut. Reinganum [14] argues that size dominates E/P, while Basu [4] concludes that E/P dominates size. Cook and Rozeff [9] attach approximately equal significance to both factors. Banz and Breen [2] can find no separate E/P ratio effect. Furthermore, the methodologies in all the above works can be criticized. This paper attempts to improve on previous estimation techniques and, in the process, to resolve the existing differences of opinion.

Our research finds significant E/P and size effects when estimated across all months during the 1951–1986 period. This is consistent with Cook and Rozeff [9] but inconsistent with Banz and Breen [2], Basu [4], and Reinganum [14]. The findings also indicate a difference between January and the rest of the year; the coefficients on *both* E/P and size are significant in January, but only the E/P coefficient is significant outside of January. Furthermore, the results on E/P are not affected by our technique of ranking first on E/P and then on market value. Controlling for cross-sectional differences in market price attenuates the coefficients on both E/P and size. However, the only change in the above inferences is that the E/P coefficient is no longer significant in January. Finally, we find evidence of consistently high returns in firms of all sizes with negative earnings.

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